

Head And Neck

Neuroradiology/Head and Neck (Temporal Bones)

Sunday, Nov. 29 10:45AM - 12:15PM Location: N226

HN **NR** **MR**AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50**Participants**Richard H. Wiggins III, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
Amanda S. Corey, MD, Atlanta, GA (*Moderator*) Consultant, RadMD**Sub-Events****SSA16-01 Is Magnetic Resonance Tractography of Intraparotid Facial Nerve Useful in Patients with Malignant Tumors?**

Sunday, Nov. 29 10:45AM - 10:55AM Location: N226

ParticipantsRene-Charles Rouchy, Grenoble, France (*Presenter*) Nothing to Disclose
Arnaud Attye, MEd, Grenoble, France (*Abstract Co-Author*) Research Grant, Guerbet SA
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Adrian I. Kastler, MD, MSc, Grenoble, France (*Abstract Co-Author*) Nothing to Disclose
Christian Righini, Grenoble, France (*Abstract Co-Author*) Nothing to Disclose
Alexandre Krainik, MD, PhD, Grenoble CEDEX, France (*Abstract Co-Author*) Nothing to Disclose**PURPOSE**

Parotidectomy with facial nerve (VIIn) sacrifice is often necessary in patients with malignant tumor. In all parotid masses, diagnosis of perineural spread is important as a prognosis biomarker since patients may have asymptomatic nerve invasion. Recently, the feasibility of intraparotid VIIn tractography was assessed to identify nerve contact with parotid tumors. The aim of this study was to determine if VIIn fractional anisotropy (FA) was linked to histologic grade in patients undergoing surgery for parotid tumors.

METHOD AND MATERIALS

Study ethics approval was obtained from our institutional review board (IRB 5891). Patients aged 18 or over, were including in this prospective study if they had:(a) A history of parotid tumors, requiring surgical management between December 2013 and April 2015(b) Undergone MR scans with diffusion acquisition and post-processing tractography(c) Surgical intraoperative checking of the intraparotid facial nervePatients underwent MR scans with VIIn tractography calculated with the constrained spherical deconvolution model. We performed scans on a 3T MRI Philips ACHIEVA® 3.0T TX with a 32 channel head coil. The post-processing steps were performed using MRtrix package software. The parameters of the diffusion sequence were: b-value of 1000 s/mm², 32 directions, voxel size: 2 mm isotropic, scan time: 9'31".

RESULTS

Twenty patients (mean age: 53 years, 5 women) were enrolling in this study. The first group (n=10) referred with a benign tumor without facial nerve compression or invasion as checked by surgical team. The second group (n=10) referred with a malignant tumor and included three patients with clinical facial nerve palsy.The VIIn mean FA value was estimated as being 0.53±0.06 in patients with benign tumors and 0.37±0.08 in malignant tumor group. Mean FA value was significantly lower in the second group (t-test, p≤0.05) and was also reduced in patients free from clinical facial palsy with surgically evidence of VIIn perineural spread (n=3).

CONCLUSION

In these preliminary results, MRI using diffusion tractography was a promising procedure to assess parotid tumor histologic grade and potential perineural spread.

CLINICAL RELEVANCE/APPLICATION

A reliable imaging biomarker of histologic grade and perineural spread in cases with parotid tumors may help to better inform and manage patients.

SSA16-03 Additive Value of "Otosclerosis Weighted" Images for the Diagnosis of Fenestral Otosclerosis

Sunday, Nov. 29 11:05AM - 11:15AM Location: N226

ParticipantsKoji Yamashita, MD, PhD, Fukuoka, Japan (*Presenter*) Nothing to Disclose
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Masatoshi Kondo, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Inoguchi, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose**PURPOSE**

CT is one of the main diagnostic tool for the detection of otosclerotic foci which are often identified as low density lesions in the

ante fenestral region. Bone densities can be measured in Hounsfield units by the accurate regions of interest (ROIs) setting. However, small ROI settings by less-experienced radiologists may result in false negative findings. Our purpose was to evaluate the diagnostic ability of our proposed method (otosclerosis weighted image) compared with conventional CT images alone.

METHOD AND MATERIALS

Temporal bone CT of consecutive patients with otosclerosis were retrospectively analyzed. The diagnosis of otosclerosis was confirmed during surgery in all cases. All CT images were obtained using a sixty-four-detector-row CT scanner with 0.5-mm collimation, 80 mm FOV, and a 512 × 512 matrix. "Otosclerosis weighted" images were obtained by extracting temporal bone region with threshold technique and reversing the density gradients (black to white). Two independent radiologists took part in two reading sessions. In the first session, the observers read only conventional CT images. In the second session they read "otosclerosis weighted" images along with the conventional CT images. Accuracy was assessed for the two readers (Chi-square test).

RESULTS

Thirty temporal bones of 25 patients with otosclerosis (M:F = 3:22, mean age: 53.9±9.0 years old) were included. For both observers, reading with "otosclerosis weighted" image was associated with higher sensitivity (66.7-76.7%) than with the conventional CT images alone (50-56.7%; $p < 0.005$, each).

CONCLUSION

Application of our proposed method based on threshold value may help reduce misdiagnosis of fenestral otosclerosis.

CLINICAL RELEVANCE/APPLICATION

CT is one of the main diagnostic tool for the detection of otosclerotic foci which are often identified as low density lesions. Application of our method based on threshold value helps reduce misdiagnosis of fenestral otosclerosis.

SSA16-04 Preserved Cochlear T2 Signal is an Important Predictor for Hearing Preservation in Patients Treated for Vestibular Schwannoma

Sunday, Nov. 29 11:15AM - 11:25AM Location: N226

Participants

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PURPOSE

Hearing preservation is a therapeutic goal for many patients with vestibular schwannoma (VS). We examined the relationship between pre-treatment MRI and post-treatment hearing status in an effort to define factors that may influence management.

METHOD AND MATERIALS

From September 2010 through January 2014, consecutive cases of VS treated with stereotactic radiosurgery (SRS) or microsurgery were reviewed. Preoperative MRIs were analyzed by two readers with respect to three dimensional tumor size, shape (round vs. oval), cochlear T2 signal, relationship of tumor to internal auditory canal (IAC), and presence of necrosis. Patients were excluded if they had prior treatment or no pre-treatment MRI within one year. "Serviceable" hearing was defined as speech discrimination score (SDS) $\geq 70\%$ or AAO-HNS class A/B. Post-treatment hearing "preservation" was defined as maintenance or development of serviceable hearing after SRS or microsurgery using non-translabrynthine approach. Bivariate statistics were calculated.

RESULTS

191 cases were reviewed; 68 patients met criteria for inclusion. A majority underwent SRS (69%), had tumors in the distal IAC (52%), oval shape (56%), without confluent necrosis (68%), and median volume of 0.95 mL. Of these patients, 55 and 30 had pre- and post-treatment audiometry, respectively; 56% and 67% had "serviceable" pretreatment hearing on SDS and AAO-HNS, respectively. People without serviceable pre-treatment hearing on SDS had significantly larger ($p=0.05$) and round ($p=0.02$) tumors. Reduced cochlear T2 signal trended towards worse hearing on AAO-HNS ($p=0.12$). Preserved cochlear T2 signal was the only variable significantly associated with post-treatment hearing preservation as measured by SDS or AAO-HNS in all tumors ($p < .001$ and $p=.01$, respectively) or SDS for those in the distal IAC ($p=0.02$). Interobserver agreement measuring cochlear T2 signal was 92%.

CONCLUSION

Preoperative MRI identified patients more likely to have better hearing outcomes, thus aiding clinicians in pretreatment counseling. Decreased cochlear T2 signal may indicate close association with the cochlear neurovascular bundle, influencing endolymph protein concentration and negatively influencing hearing outcome.

CLINICAL RELEVANCE/APPLICATION

Pre-treatment cochlear T2 signal is associated with hearing outcomes after treatment for vestibular schwannoma. Use of thin section MRI has the potential to better inform treatment decisions.

SSA16-05 Slip Interface Imaging: A Novel MR Elastography-Based Method to Predict Tumor-Brain Adhesion in Vestibular Schwannoma

Sunday, Nov. 29 11:25AM - 11:35AM Location: N226

Participants

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Kevin J. Glaser, Rochester, MN (*Abstract Co-Author*) Intellectual property, Magnetic Resonance Innovations, Inc; Stockholder, Resoundant, Inc
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John Huston III, MD, Rochester, MN (*Abstract Co-Author*) Stockholder, Resoundant, Inc

PURPOSE

To assess the clinical feasibility of MR slip interface imaging (SII) for predicting the degree of tumor-brain adhesion in vestibular schwannomas.

METHOD AND MATERIALS

With IRB approval and informed consent, nine patients with pathologically suspected and subsequently confirmed vestibular schwannomas were recruited. The SII acquisition is similar to MR elastography (MRE) in which low-amplitude mechanical vibration is applied to the head with a pillow-like device placed in the head coil and the resulting shear waves are imaged using a phase-contrast pulse sequence with motion encoding gradients synchronized with the applied vibration. Imaging was performed on a 3T MR system with an 8-channel head coil in a scan time of less than 7 minutes. The acquired shear motion data were processed with two different algorithms (shear line analysis and calculation of octahedral shear strain (OSS)) to identify the degree of tumor-brain adhesion. Blinded to the SII results, neurosurgeons qualitatively assessed tumor adhesion at the time of tumor resection as one of three patterns: no adhesion, partial adhesion, and complete adhesion. Correlations between SII and surgical findings were determined, and the ability to use OSS to quantify the tumor adhesion was tested using a Mann-Whitney U test with a statistical significance set at $p < 0.05$.

RESULTS

In SII, the presence of a non-adhesive tumor-brain interface appears as a dark line in the shear line images and exhibits higher OSS values than an adhesive interface. The absence of shear lines corresponded to complete tumor adhesion. Surgical results for the nine patients included 2 cases with complete adhesion, 3 with partial adhesion, and 4 with no adhesion. SII results were concordant with the intraoperative assessment of tumor adhesion in 8 cases (88.9%). One case was identified as having no adhesion with SII, but adhesions were found at surgery. The OSS values for the non-adhesive interfaces were significantly larger ($p=0.012$) than the adhesive interfaces.

CONCLUSION

Our results demonstrate that SII is a clinically feasible method to preoperatively predict the degree of tumor-brain adhesion in patients with vestibular schwannomas.

CLINICAL RELEVANCE/APPLICATION

The SII technique shows promise for allowing radiologists and neurosurgeons to preoperatively quantify the degree of intracranial tumor adhesion and predict potential complications of tumor resection.

SSA16-06 Endolymphatic Hydrops as an Imaging Biomarker: A Chronic Disease with Various Clinical Presentations

Sunday, Nov. 29 11:35AM - 11:45AM Location: N226

Participants

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PURPOSE

MRI seeking for endolymphatic hydrops (EH) was recently found as closely reflecting histopathologic findings in patients with Meniere's disease (MD). However, the lack of healthy subject data was problematic to precisely define the pathological condition. The aim of this study was to assess EH prevalence in a large cohort of patients with four clinical presentations: MD, sensorineural hearing loss (SHL), recurrent peripheral vestibulopathy (RPV) and recurrent benign paroxysmal positional vertigo (rBPPV) in comparison with healthy subjects. We also evaluated EH localization (i.e cochlear or vestibular) in each group.

METHOD AND MATERIALS

300 patients and 25 healthy subjects were recruited between January 2013 and May 2015. Patients were consecutively included in this study if they had: (a) A history of clinically define MD (n=100), RPV (n=100), SHL (n=50) or rBPPV (n=50) (b) Have undergone an MRI scan 4 hours after intravenous gadoteric acid injection using FLAIR imaging (TR: 8000 ms, TE: 316 ms, TI: 2400 ms) with subtraction process. Control subjects inclusion was approved by our institutional review board (IRB 6705/15-CHUG-02). Two radiologists performed blind, semi-quantitative evaluations of MRI scan. Cochlear EH have been noted as present if nodular or irregular dilatation of endolymphatic canal and VH recorded as present when more than 50% of the vestibule have been occupied by endolymphatic space. Patients were graded based on the number and localization of hydrops and results were analyzed using the Student's t-test.

RESULTS

In the control group, 3 healthy subjects were found with EH in either cochlea or vestibule with these criteria. EH prevalence was

approximately estimated as being 85%, 50%, 40% and 40% in MD, SHL, RPV and rBPPV groups respectively. The results showed a significantly higher average number of hydrops localizations in the MD group when compared to other groups (t-test, $p < 0.01$). Cochlear EH was found in 36% and 38% of RPV and rBPPV patients. Vestibular EH was displayed in 20% of SHL patients.

CONCLUSION

MRI criteria for EH allowed to distinguish pathology from healthy condition. However, EH appeared as a chronic disease rather than directly responsible of patient symptoms.

CLINICAL RELEVANCE/APPLICATION

We aimed to better explain pathophysiology of inner ear disorders, allowing better patient information and adapted therapeutic strategies in patients with endolymphatic hydrops.

SSA16-07 Superiority of Heavily T2-weighted 3D-FLAIR Over Regular 3D-FLAIR for the Detection of Cochlear Lymph Fluid Signal Abnormality in Patients with Sudden Sensorineural Hearing Loss

Sunday, Nov. 29 11:45AM - 11:55AM Location: N226

Participants

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Mitsuru Ikeda, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the signal increase of cochlear lymph fluid on 3D-FLAIR in patients with sudden sensorineural hearing loss (SNHL) between the regular contrast 3D-FLAIR (FL) and heavily T2-weighted 3D-FLAIR (HF).

METHOD AND MATERIALS

25 patients with unilateral sudden SNHL and 8 healthy volunteers were included. Patients were divided into mild group of 9 patients, average hearing level of 60 dB or less; and severe group of 16 patients, hearing level of more than 60dB. All patients and healthy volunteers underwent a MR cisternography (MRC) for anatomical reference of the fluid space, FL and HF at 3T. Region of interest (ROI) was manually drawn on mid-modiolar section of MRC around cochlea. ROI for noise was drawn in the air area. ROIs were copied onto FL and HF. Contrast-to-noise ratio (CNR) between affected and non-affected ear was measured in patients' group and CNR between right and left ear was measured in control group. Differences in CNR on FL and HF among 3 groups were tested by one-way analysis of variance (ANOVA).

RESULTS

There was a statistically significant difference in the mean of CNR on HF among the three groups ($p < 0.001$). Further, from the pairwise comparisons among them, there was a statistically significant difference with each other in the mean of CNR on HF ($p < 0.05$). There was no statistically significant difference in the mean of CNR on FL among the three groups ($p = 0.074$).

CONCLUSION

HF is more sensitive to signal alteration of cochlea with sudden SNHL than FL.

CLINICAL RELEVANCE/APPLICATION

Heavily T2-weighted 3D-FLAIR (HF) is more sensitive to high signal of cochlea in the ears with sudden sensorineural hearing loss (SNHL) than regular contrast 3D-FLAIR (FL).

SSA16-08 Three-Dimensional Fluid-Attenuated Inversion Recovery Signal Changes as a Prognosis Predictor in Idiopathic Sudden Sensorineural Hearing Loss

Sunday, Nov. 29 11:55AM - 12:05PM Location: N226

Participants

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PURPOSE

To investigate the relationship of 3D FLAIR findings and outcome in patients with idiopathic sudden sensorineural hearing loss (ISSNHL).

METHOD AND MATERIALS

We retrospectively reviewed consecutive 66 patients presenting with unilateral ISSNHL from June 2013 to September 2014. Before treatment, all patients underwent MRI exams, including 3D-FIESTA, and 3D-FLAIR without gadolinium enhancement. One blind observer registered 3D-FIESTA and 3D-FLAIR on a dedicated workstation and drew ROIs to measure the signal intensity of cochlea in both affected and unaffected ears on 3D-FLAIR.

RESULTS

The ratio of the cochlear signals between the affected and unaffected ears showed significant correlation with the severity of pre-treatment hearing loss and the clinical outcome (Siegel criteria) after treatment. The increased FLAIR signal intensity is a specific prognostic predictor of poorer outcome (Siegel grade III/IV) after treatment. (sens./spec: 32%/86% (cutoff value: 1.2) and 5%/91% (cutoff value, 1.4)).

CONCLUSION

This study demonstrated a correlation between cochlear FLAIR signal and pre-treatment hearing level, and post-treatment outcome. Increased FLAIR signal is a specific prognostic predictor of poorer outcome after treatment.

CLINICAL RELEVANCE/APPLICATION

The causes of sudden deafness now are still idiopathic. In general, labyrinthitis caused by viral infection, blood circulation disorders, or ruptures of the inner ear membrane are believed to cause sudden deafness. The unpredictability of idiopathic sudden sensorineural hearing loss (ISSNHL) presents a challenge to preventive care. Prognosis can be predicted that the patients poor post-treatment outcome from the high intensity signal inner ear of 3D FLAIR sequence on MRI.

SSA16-09 Flat Panel CT in Diagnosis of Superior Canal Dehiscence. A Really New Diagnostic Approach?

Sunday, Nov. 29 12:05PM - 12:15PM Location: N226

Participants

Christina Loberg, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
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Justus Ilgner, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Superior canal dehiscence (SCDS) is a rare defect, caused by a thinning or complete absence of temporal bone overlying superior semicircular canal of vestibular system. Treatment of choice is covering the defect with ceramic implant. Flat panel CT is an innovative technique that permits visualization of the complex anatomy of temporal bone with high spatial resolution. The utility of flat panel CT has been demonstrated in multiple disease states including neurovascular disease, peripheral vascular disorders and oncology. We therefore evaluated flat panel CT in diagnosis of SCDS.

METHOD AND MATERIALS

30 patients (m = 18/ f = 12) age 36 - 63 (m= 48,2) with symptoms of SCDS underwent flat panel CT examination between January 2013 and January 2015. 13 patient underwent MSCT imaging before, these images were assessed as normal. Flat panel CT was performed by Siemens Axion Artis, rotation 220°. Postprocessing was done at Siemens leonardo workstation with reconstructions in bone window in 3D projection and adapted to superior semicircular canal. Applied Radiation dose inbetween flat panel CT and MSCT was compared.

RESULTS

In 5/ 17(29%) patients who underwent flat panel CT imaging SCDS was confirmed. In 6/ 13 (46%) patients who underwent MSCT and flat panel CT defect of temporal bone overlying superior semicircular canal was found and SCDS was intraoperatively confirmed. Applied radiation dose was nearly equal (flat panel CT 276, 5mGy/ cm / MSCT 277,4mGy/ cm).

CONCLUSION

Flat panel CT should be performed in cases with symptoms SCDS when MSCT is assessed normal. It is a reliable diagnostic tool and a new diagnostic approach in diagnosis of SCDS.

CLINICAL RELEVANCE/APPLICATION

Flat panel imaging is a reliable tool in imaging temporal bone and inner ear structures and can improve preoperative virtual planning.

SSA17

Neuroradiology/Head and Neck (Vascular Disease of the Head and Neck)

Sunday, Nov. 29 10:45AM - 12:15PM Location: N227



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Mahmud Mossa-Basha, MD, Seattle, WA (*Moderator*) Research support, General Electric Company

Sub-Events

SSA17-01 The CTA Rim Sign: Calcification Pattern Predicts Carotid Intraplaque Hemorrhage

Sunday, Nov. 29 10:45AM - 10:55AM Location: N227

Participants

Laura B. Eisenmenger, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

Joseph S. McNally, MD, PhD, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Carotid intraplaque hemorrhage (IPH) is associated with a high risk of future stroke. The gold standard for IPH detection is MRI with heavily T1-weighted sequences. This study was undertaken to determine essential CTA imaging predictors of carotid IPH.

METHOD AND MATERIALS

In this IRB-approved retrospective cross sectional study, 172 patients (244 carotid arteries) were studied having undergone carotid disease workup with both MRA and CTA from 2009-present. IPH was detected with the Magnetization Prepared Rapid Acquisition Gradient-recalled Echo (MPRAGE) sequence. CTA predictors included the presence or absence of calcification, type of calcification (rim, adventitial or bulky), percent diameter stenosis, mm stenosis, maximum plaque thickness, ulceration, and intraluminal thrombus. Clinical covariates included age, male sex, diabetes, hypertension, hyperlipidemia and body mass index. Cardiovascular medication confounders included antihypertension, antiplatelet, anticoagulation and statin medication classes. A mixed effects multivariable Poisson regression model was used accounting for 2 vessels per patient. A backwards-elimination method was used to determine the final model, in which prevalence ratios were reported and all remaining predictors had a $p < .10$. ROC analysis was used to determine discriminatory power measured by area under the curve (AUC).

RESULTS

The final model for carotid IPH prediction included the rim sign (prevalence ratio, $PR=8.6$, $p < .001$, 95%CI: 4.0,18.5) and maximum plaque thickness ($PR=1.2$, $p = .001$, 95%CI: 1.1,1.4). In the final model, no other imaging criteria were significant predictors of IPH. The discriminatory value of the final model was extremely high (AUC=93.9%), significantly higher than the rim sign alone (86.1%, $p < .001$), thickness alone (85.2%, $p < .001$), NASCET stenosis (78.4%, $p < .001$), mm stenosis (77.7%, $p < .001$) or ulceration (71.0%, $p < .001$).

CONCLUSION

The carotid CTA rim sign is highly predictive of carotid IPH.

CLINICAL RELEVANCE/APPLICATION

Because most patients undergoing acute stroke workup receive lumen imaging with CTA, MRI is often not performed and IPH is ignored. The CTA rim sign and maximum plaque thickness allow high discrimination of carotid IPH. Future prospective studies may be envisioned to determine if the rim sign indicates a higher future stroke risk.

SSA17-02 Clinical Risk Prediction Models for the Identification of Patients with High-Risk Carotid Plaque

Sunday, Nov. 29 10:55AM - 11:05AM Location: N227

Participants

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Alan R. Moody, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

Kush Kapur, PhD, MENG, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

High-risk carotid plaque containing intraplaque hemorrhage predicts stroke, however, it is not yet routinely screened for in practice. We aimed to develop cross-validated clinical models to identify patients at risk of high-risk carotid plaque.

METHOD AND MATERIALS

Between 2003 and 2014, 1862 suspected neurovascular disease patients had MRI. High-risk carotid plaque was defined by presence of intraplaque hemorrhage on 3D T1w GRE black-blood MRI, a sequence routinely included in our institutional neurovascular MRI protocol. Using derivation and validation cohorts with 931 patients each, two risk-prediction logistic regression models considering 11 risk factors, with and without inclusion of stenosis grade, were developed. Receiver-operator characteristic curves were used to compare discriminatory ability of these two models.

RESULTS

The overall prevalence of high-risk carotid plaque was 19.3% (359/1862). Patients with high-risk carotid plaque could be identified

using age, sex, hypercholesterolemia, and peripheral vascular disease (AUC 0.781, 95% CI 0.747 to 0.815). Optimal threshold sensitivity and specificity was 81.8% and 62.4%, respectively. The addition of carotid stenosis grade improved discrimination of patients (AUC 0.826, 95% CI 0.795 to 0.856), and improved optimal threshold specificity to 72.8% without a significant change in sensitivity.

CONCLUSION

Patients prone to high-risk carotid plaque, containing intraplaque hemorrhage, may be identified using a simple clinical risk prediction model of cardiovascular risk-factors and carotid stenosis grade.

CLINICAL RELEVANCE/APPLICATION

The model provides an opportunity for targeted carotid MRI screening in patients not already undergoing neurovascular MRI, but external validation studies are required.

SSA17-03 Identification of the Vulnerable Carotid Plaque Using Dynamic Contrast Enhanced Ultrasound

Sunday, Nov. 29 11:05AM - 11:15AM Location: N227

Participants

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PURPOSE

Carotid atherosclerosis is implicated in 15-20% of all strokes. Dynamic contrast enhanced ultrasound (DCEUS) is a simple adjunct to color Doppler ultrasound for the assessment of carotid atherosclerosis. It has been identified that DCEUS can demonstrate perfusion within carotid plaques of greater than 50% stenosis with some differentiation observed between symptomatic and asymptomatic patients. In this study the perfusion of carotid plaques is evaluated both qualitatively and quantitatively to evaluate carotid perfusion of symptomatic and asymptomatic patients.

METHOD AND MATERIALS

After ethical approval, the carotid arteries of 24 patients were imaged using the L9-3 probe of the Philips iU22 ultrasound platform. Patients were injected with a bolus of 2ml of Sonovue with subsequent dynamic phase imaging acquisition. Offline blinded analysis was performed using DICOM data transferred to QLAB commercial analysis software. Qualitative perfusion assessment used binary grading: 0 represented less than 50% of carotid plaque area contained moving microbubbles and 1 represented more than 50% of carotid plaque area contained moving microbubbles. Static reflectors were not considered as valid microbubble signal. For quantitative DCEUS analysis, a region-of-interest (ROI) was drawn around the plaque. Plaques were delineated from the lumen signal to remove potentially large amplitude differences between the plaque and lumen signal intensity. A time intensity curve (TIC) was derived from the dynamic phase ROI signal with mean plaque intensity signal calculated from the TIC.

RESULTS

The qualitative analysis results showed that 75% (9/12) of asymptomatic patients had >50% carotid plaque perfusion in comparison to only 33% (4/12) of symptomatic patients. After quantitative image analysis, the mean DCEUS intensity signal from the TIC of the carotid plaques was again significantly higher for asymptomatic patients than symptomatic patients ($P < 0.05$).

CONCLUSION

Contrary to previous studies, this study suggests that patients with greater carotid plaque perfusion are more likely to have an asymptomatic carotid symptom status where as those with reduced perfusion are more likely to be symptomatic from their carotid disease.

CLINICAL RELEVANCE/APPLICATION

In patients with greater than 50% carotid stenosis, reduced plaque perfusion on DCEUS may represent vulnerable, symptomatic carotid atherosclerosis.

SSA17-05 Advanced Atherosclerotic Disease with Intraplaque Hemorrhage is Present in Non-Stenotic Carotid Arteries of Diabetic Patients

Sunday, Nov. 29 11:25AM - 11:35AM Location: N227

Participants

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David Jenkins, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Diabetic patients have an increased risk of ischemic cerebrovascular events with worse outcomes than the non-diabetic population. Carotid artery stenosis currently stratifies patient risk but, even without significant stenosis, intraplaque hemorrhage (IPH) may predict cerebrovascular events. We report the prevalence of IPH in an asymptomatic diabetic population without carotid artery stenosis, using 3-dimensional (3D) magnetic resonance imaging (MRI) and investigate its association with carotid artery wall

volume.

METHOD AND MATERIALS

Patients were recruited from a prospective dietary trial between 2010 and 2013, with a carotid intima-media thickness (IMT) > 1.2mm and non-stenotic carotid arteries on ultrasound. All were asymptomatic type 2 diabetic patients who underwent baseline 3D T1-weighted black blood imaging for visualization of intraplaque hemorrhage (3D-MRIPH) and 3D- time of flight imaging. Carotid artery vessel wall (VW) volumes and IPH volumes were determined bilaterally for a standard 32 mm segment centered at each carotid bifurcation, using a validated approach with the software, VesselMASS (Medis, Netherlands). Descriptive statistics as well as repeated measures linear regression analyses were performed.

RESULTS

159 patients were included with mean age 63.1 + 7.9 years, 62.3% male, 17.9% with a smoking history and 69.2% on hypertensive medication. The prevalence of IPH was 23.3% (n=37) with five patients exhibiting IPH in both carotid arteries. VW volume of the IPH positive carotid arteries was found to be significantly different from IPH negative arteries ($\beta=0.15\text{mm}^3$ SE=0.03, $p<0.01$) and independent from other factors that affected VW volume - age ($\beta=0.01\text{yrs}$ SE=0.002, $p<0.01$), sex ($\beta=0.21$ SE=0.04, $p<0.01$), BMI ($\beta=0.22$ SE=0.10, $p=0.03$) - when adjusted (none significant) for disease duration, smoking, blood pressure, and medications (statins, anti-hypertensive, anti-platelet).

CONCLUSION

IPH can be found in the absence of carotid artery stenosis in asymptomatic diabetic patients and is associated with an increased carotid artery wall volume as measured by 3D-MRI. It represents a biomarker of advanced atherosclerotic disease and may identify individuals at higher risk of cardiovascular disease.

CLINICAL RELEVANCE/APPLICATION

3D MRI can identify high risk cardiovascular biomarkers, such as intraplaque hemorrhage, in diabetic patients before onset of stenosis.

SSA17-06 Feasibility of High-resolution MR Imaging for the Diagnosis of Posterior Inferior Cerebellar Artery Dissection

Sunday, Nov. 29 11:35AM - 11:45AM Location: N227

Participants

Miran Han, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Wook Choi, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sun Yong Kim, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Soo Lee, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yoolim Baek, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the feasibility of HR-MR imaging diagnosing posterior inferior cerebellar artery (PICA) dissection and to find most useful imaging findings suggesting dissection

METHOD AND MATERIALS

We retrospectively reviewed 104 patients suspected of having arterial dissection involving posterior cerebral circulation and underwent HR-MR imaging between March 2012 and March 2015. 66 patients were diagnosed with arterial dissection involving posterior cerebral circulation and 16 patients among them (24.2%) were diagnosed with isolated PICA dissection by the consensus among neuroradiologists, neurointerventionist and neurologist after reviewing all clinical and paraclinical investigations available at hospital discharge (initial CT, MR, DSA images and etiologic work-ups) and follow up. Two neuroradiologists independently reviewed the HR-MR images of patients finally diagnosed as PICA dissection and looked for evidence of dissection (mural hematoma, dissection flap, outer diameter enlargement on T2WI) on each sequence of HR-MRI (PDWI, T2WI, T1WI and CE-T1WI). Inter- and intraobserver agreement for detecting evidence of dissection was estimated using the Cohen's kappa coefficient.

RESULTS

Dissection flaps were seen in all cases on T2WI (100%) and secondly detected on CE-T1WI (81.3%). Outer-diameter enlargement of the steno-occlusive lesions on angiography was detected in most of cases (81.3%). A mural hematoma was best detected on CE-T1WI (50.0%). The two reviewers showed substantial to almost perfect agreement for detecting dissection signs on every sequence (Cohen's kappa coefficient: 0.63 ~0.94)

CONCLUSION

HR-MR imaging could be a useful and non-invasive diagnostic tool for PICA dissection and dissection flap with outer wall enlargement on T2WI is most confident sign for suggesting dissection.

CLINICAL RELEVANCE/APPLICATION

HR-MR imaging can demonstrate direct findings of dissection and be non-invasive useful diagnostic tool for the diagnosis of posterior inferior cerebellar artery dissection

SSA17-07 Correlation of Carotid Plaque Features with Acute Cerebral Infarction in Type 2 Diabetic Patients - A Magnetic Resonance Imaging Study

Sunday, Nov. 29 11:45AM - 11:55AM Location: N227

Participants

Beibei Sun, Shanghai, China (*Presenter*) Nothing to Disclose
Huilin Zhao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Xiaosheng Liu, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Ye Cao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to investigate the association between carotid atherosclerotic plaque characteristics and the severity of acute cerebral infarct (ACI) in symptomatic patients with T2DM.

METHOD AND MATERIALS

We studied 204 arteries in 102 stroke patients by carotid and brain MRI. ACI volume was determined from symptomatic internal carotid artery territory on diffusion-weighted imaging (DWI). The symptomatic carotid plaque burden and compositional characteristics between stroke patients with T2DM and without T2DM were compared by using independent sample t-test and nonparametric Wilcoxon signed rank test after analyzed with MR vessel imaging. Pearson correlation test was applied to determine the correlations between volume of ACIs and carotid features in T2DM patients, then univariate and multivariate linear regressions were applied to assess the independent associations of carotid characteristics with severity of ACIs.

RESULTS

Out of 104 enrolled stroke patients, 44(42%) had T2DM. They were distinguished as atherosclerotic plaque based on carotid artery with presence of any plaque component on MRI, such as calcification, LRNC, or IPH. The occurrence rate of carotid artery plaque was higher in diabetics vs non-diabetics (76.1% vs 52.6%, $p=0.001$). Compared with patients without T2DM, the T2DM subjects showed significantly higher prevalence of LRNC (70.5% vs 48.3%, $P=0.038$) as well as a larger volume of LRNC (76.82 ± 114.31 mm³ vs 35.91 ± 73.79 mm³, $P=0.042$). Among these stroke patients, ACIs size of T2DM subjects in internal carotid artery (ICA) territory (7.75 ± 11.49 mm³ vs 3.77 ± 6.33 mm³, $P=0.042$) are greater than that of non-T2DM subjects. In addition, The LRNC volume had superior correlation ($r=0.77$, $p<0.001$) with the infarction volume of ipsilateral ICA territory, outperforming the other parameters in T2DM patients. Univariate and multivariate linear regression analysis showed close correlation of LRNC volume and MWT with the severity of ACI ($B=0.15$, $P<0.01$ and $B=4.99$, $P<0.05$, respectively).

CONCLUSION

LRNC prevalence and volume of carotid plaques are significantly different between stroke patients with T2DM and without T2DM. In addition, LRNC volume and MWT are independently associated with cerebral infarction as measured by DWI.

CLINICAL RELEVANCE/APPLICATION

Our findings indicate that characterizing atherosclerotic plaque by MR vessel wall imaging might be useful for stratification of plaque risk and infarction severity in T2DM patients.

SSA17-08 Early Atherosclerotic Disease Detected by MRI and CT in the Carotid and Coronary Arteries in Low-moderate Risk Individuals

Sunday, Nov. 29 11:55AM - 12:05PM Location: N227

Participants

Mariana Selwaness, MD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Veit Sandfort, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Robyn McClelland, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Karen Rodriguez, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Evrin B. Turkbey, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Anna E. Zavodni, MD, MPH, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Puskar Pattanayak, MBBS, FRCR, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Marissa Mallek, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Mark A. Ahlman, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Christopher Sibley, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
David A. Bluemke, MD, PhD, Bethesda, MD (*Presenter*) Research support, Siemens AG

PURPOSE

We examined the relationship between positive remodeling in the carotid and coronary arteries and investigated determinants of remodeling in a population with low-moderate risk of cardiovascular disease.

METHOD AND MATERIALS

Study subjects >55 years old with history of hypercholesterolemia underwent high resolution black blood carotid MRI using dedicated surface coils at 3T. In addition, CT angiography was performed using 320 slice scanning. Arterial wall area (outer vessel area-lumen) and the remodelling index (RI) (wall area/outer vessel area) were measured by observers blinded to clinical status. Data were analyzed using Spearman's correlation coefficient and multivariate linear regression analysis adjusted for sex, age, height and weight.

RESULTS

In 201 individuals (mean age 65.3 ± 6.5 , 64% men) with a low-moderate risk (Framingham Risk Score $7.8\pm 7.6\%$), we found a strong association between wall area and outer vessel area in both the carotid ($r=0.80$; $p<0.001$, adjusted beta 1.67 [95%CI 1.43-1.92]) as well as the coronary arteries ($r=0.82$; $p<0.001$, adjusted beta 1.48 [95%CI 1.24-1.72]). This association was stronger when we compared the third tertile of lumen area to the first tertile, indicating more outward remodeling. The RI of the right and left carotid artery in a study subject was strongly correlated ($r=0.75$, $p<0.001$), whereas intra-individual RI between carotid and coronary disease was weak ($r=0.20$, $p<0.001$). In multivariate analysis, hypercholesterolemia, height and CAC score were associated with the RI of the coronary arteries.

CONCLUSION

This study is the first to combine MRI and CT imaging to investigate positive remodeling in the carotid and coronary arteries of low-moderate risk individuals from the general population. Early atherosclerosis was associated with positive remodeling with larger diameter in the coronary and carotid arteries. Positive remodeling was not the same for different vascular beds.

CLINICAL RELEVANCE/APPLICATION

Detection of positive remodeling and understanding its role in early atherosclerotic disease could improve prevention strategies and management of stroke and coronary heart disease.

SSA17-09 Characterization of Restenosis after Carotid Endarterectomy Using Contrast-Enhanced Black Blood MRI

Sunday, Nov. 29 12:05PM - 12:15PM Location: N227

Participants

Huan Yang, Baltimore, MD (*Presenter*) Nothing to Disclose
Ye Qiao, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Li Liu, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Gunes Orman, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Zeeshan Anwar, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jarunee Intrapiromkul, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Hugh Trout III, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bruce A. Wasserman, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To characterize restenosis after carotid endarterectomy (CEA) using high-resolution contrast-enhanced black blood MRI (CEMRI) and compare with primary atherosclerotic lesions.

METHOD AND MATERIALS

17 consecutive patients (10 male; mean age 73.4±11.9 years) with carotid restenosis (13 unilateral; 4 bilateral) after CEA underwent CEMRI at 3T. The median interval between surgery and CEMRI was 16.5 months (IQR, 9.3-95.5 months). Patients were matched with 20 asymptomatic patients with primary carotid atherosclerosis (19 unilateral; 1 bilateral) by age and luminal stenosis. All MRI images were de-identified and interpreted by two readers who were blinded to the history of CEA. The presence of plaque and plaque components was recorded for each lesion based on previous criteria on CEMRI. The lesions were classified as plaques or intimal hyperplasia based on the presence/absence of plaque features on CEMRI. The MRI morphological measurements included wall thickness (WT), area, normalized wall index and eccentricity (maximum WT - minimum WT)/maximum WT, and the signal measurements included heterogeneity (defined by coefficient of variation of signal intensity) and contrast-enhancement (%CE, the percent change in signal intensity from the pre- to post-contrast images).

RESULTS

A total of 42 carotid lesions from 37 patients were analyzed, and classified as primary plaques (n=21), recurrent plaques (n=13) and intimal hyperplasia lesions (n=8). Compared with plaques (both primary and recurrent), lesions with intimal hyperplasia exhibited smaller eccentricity (0.48 vs. 0.74, p<0.001), lower signal heterogeneity (20.0% vs. 27.2%, p=0.004) and higher % CE (88.4% vs 43.9%, p=0.002). Recurrent plaques had similar MRI characteristics when compared with primary plaques. However, recurrent lesions demonstrated higher CE (57.5% vs 35.4%, p=0.046) and more frequently involved in the medial wall of the internal carotid artery, an uncommon location for a plaque formation (recurrent vs. primary; 38.5% vs 4.8%, p<0.001).

CONCLUSION

Carotid restenosis from intimal hyperplasia demonstrated distinct imaging characteristics on CEMRI compared with atherosclerotic lesions.

CLINICAL RELEVANCE/APPLICATION

The phenotype of the restenotic lesions after CEA imposes different stroke risks. CEMRI imaging allows for the differentiation of these lesions and may provide insight into the treatment of restenosis.

RC106

Anatomy and Pathology of the Pharynx and Larynx

Sunday, Nov. 29 2:00PM - 3:30PM Location: E450A



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC106A Imaging the Nasopharynx

Participants

Nancy J. Fischbein, MD, Stanford, CA, (fischbein@stanford.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the normal anatomy of the nasopharynx. 2) Illustrate the appearance and patterns of spread of nasopharyngeal carcinoma. 3) Describe additional pathologies of the nasopharynx, along with imaging pearls and pitfalls.

ABSTRACT

The nasopharynx is the uppermost portion of the upper aerodigestive tract, and it is located posterior to the nasal cavity, inferior to the sphenoid sinus, and anterior to the clivus and craniovertebral junction, above the level of the soft palate. Given its intimate relationship with the central skull base, detailed knowledge of the anatomy of the central skull base, including its canals and foramina, is critical to understanding the spread of disease in this region. Though CT is helpful in imaging diseases of this region, a good knowledge of MR anatomy, and an understanding of optimal MR imaging protocols, is essential to proper imaging and imaging interpretation of diseases of the nasopharynx. We will spend some of our time discussing nasopharyngeal carcinoma, including its demographics, staging, and imaging appearance, but we will also review benign pathologies of the nasopharynx, and other malignant entities. We will also review some imaging pearls for each entity, and also imaging pitfalls, as there are many ways in which the unwary radiologist can overlook or misinterpret significant pathology in the nasopharynx.

RC106B Imaging the Oropharynx

Participants

Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the normal anatomy of the oropharynx. 2) Illustrate the normal spread patterns of tumors involving various subsites of the oropharynx. 3) Describe the appearance of various infectious and inflammatory processes involving the oropharynx.

ABSTRACT

Imaging plays a crucial role in evaluating the evaluating the oropharynx. This talk will review the normal anatomy and malignancies involving the oropharynx. The presentation will also review various inflammatory and infectious processes that involve different parts of the oropharynx.

RC106C Imaging the Larynx and Hypopharynx

Participants

Peter M. Som, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The registrants will learn the intimate relationship between the larynx and hypopharynx. 2) The anatomy of the larynx and hypopharynx will be reviewed. 3) The major pathology of these structures will be reviewed.

ABSTRACT

The larynx is situated within the hypopharynx and thus their intimate relationship. The anatomy of the larynx and the hypopharynx will be reviewed, especially as it pertains to neoplasms. The scope of inflammatory and neoplastic diseases that affect these structures will be reviewed with particular attention to what should be included in the radiologist's report to create a pertinent and meaningful report.

RC111

Head and Neck Cancer PET Interpretation with Case Examples (An Interactive Session)

Sunday, Nov. 29 2:00PM - 3:30PM Location: S505AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

LEARNING OBJECTIVES

Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC111A Practical Approach for Interpreting Head and Neck PET/CT

Participants

Rathan M. Subramaniam, MD, PhD, Baltimore, MD, (rsubram4@jhmi.edu) (*Presenter*) Travel support, Koninklijke Philips NV

LEARNING OBJECTIVES

1) To understand the value of PET/CT in the care process of managing head and neck cancer. 2) To learn common pathways of tumor spread in head and neck. 3) To review illustrative cases and pitfalls of interpretation.

ABSTRACT

RC111B PET/CT for Head and Neck Cancer: Clinical Applications and Case Studies

Participants

Eric M. Rohren, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review head and neck anatomy and physiologic sites of FDG uptake. 2) Review the impact of FDG-PET/CT on the management of patients with head and neck malignancies.

ABSTRACT

FDG-PET/CT provides valuable information in the assessment of the patient with cancers of the head and neck. The metabolic information determined by FDG is complimentary and additive to the anatomic information from CT, and can be used to direct surgery, plan radiation therapy, and evaluate response to systemic or localized treatment. In this presentation, the role of FDG-PET/CT in the management of head and neck cancer will be presented, using case examples to illustrate the utility of PET as well as common pitfalls.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: <https://www.rsna.org/Honored-Educator-Award/>

Eric M. Rohren, MD, PhD - 2015 Honored Educator

RC111C The Head and Neck Surgeon's Perspective: What I Need to Know

Participants

Nishant Agrawal, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the indications of PET/CT in head and neck cancer. 2) Review the impact of PET/CT on staging in head and neck cancer. 3) Review the role of PET/CT in the evaluation of the unknown primary. 4) Review the role of post-treatment PET/CT.

RC120

Fundamentals of Imaging for the Radiation Oncologist

Sunday, Nov. 29 2:00PM - 3:30PM Location: S102C

CH **HN** **NR** **RO**

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Simon S. Lo, MD, Cleveland, OH (*Moderator*) Research support, Elekta AB;

Sub-Events

RC120A Fundamentals in Radiation Oncology Imaging of Head and Neck Cancer

Participants

Hilda E. Stambuk, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define key anatomy and understand pathways of tumor spread for head and neck cancers. 2) Identify radiographic features of the patterns of tumor involvement. 3) Understand the implications of radiographic imaging in treatment planning.

ABSTRACT

Radiographic imaging is integral to diagnosis, extent of disease assessment, treatment planning and post-treatment surveillance in patients with head and neck cancer. Since the overwhelming majority of cancers of the head and neck are squamous cell carcinoma, these tumors will be the primary focus of the lecture. In addition, choosing the appropriate imaging modality is of vital importance in effective evaluation and therefore the pros and cons of imaging modalities in particular subsites will be presented. The patterns of tumor spread depend on the site of origin of the tumor and will be discussed in detail for some of the common sites such as nasopharynx and oropharynx that are treated primarily with radiation. The implications of pathways of tumor involvement including perineural spread on treatment planning will be emphasized. This lecture will provide radiation oncologists a basic understanding of the role of imaging and will highlight pearls and pitfalls that can influence management.

RC120B Fundamentals in Radiation Oncology Imaging of Thoracic Malignancies

Participants

Matthew M. Harkenrider, MD, Maywood, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the normal imaging changes after precision radiotherapy for lung cancer. 2) To discuss methods of distinguishing recurrence vs. fibrosis after stereotactic radiotherapy. 3) To highlight difficult imaging cases in assessing response after radiotherapy.

ABSTRACT

RC120C Fundamentals in Radiation Oncology Imaging of Skull Base Tumors

Participants

Jason Rockhill, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identifying imaging techniques to help delineate target volumes for skull based tumors. 2) Discuss the challenges of determining target volumes for skull based tumors in the resected and non-resected patient. 3) Review key features to follow by imaging of skull based tumors after radiation therapy.

RC120D Imaging and RT QA in Cancer Clinical Trials: The Advanced Technology Consortium (ATC), the Quality Assurance Review Center (QARC), and the Imaging and Radiation Oncology Core (IROC)

Participants

Thomas J. Fitzgerald, MD, Worcester, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe diagnostic imaging and radiation therapy utilization in clinical trials. 2) Describe the role of quality assurance in imaging and radiation therapy in clinical trials. 3) Describe future QA strategies in the National Clinical Trials Network (NCTN).

SPDL20

RSNA Diagnosis Live™: 'Bo you don't know Didley' - Test Your Diagnostic Skills at the Crack of Dawn

Monday, Nov. 30 7:15AM - 8:15AM Location: E451B



AMA PRA Category 1 Credit™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Adam E. Flanders, MD, Penn Valley, PA (*Presenter*) Nothing to Disclose

Christopher G. Roth, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

Sandeep P. Deshmukh, MD, Philadelphia, PA, (sandeep.deshmukh@jefferson.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

MSRO24

BOOST: Head and Neck-Oncology Anatomy (An Interactive Session)

Monday, Nov. 30 8:30AM - 10:00AM Location: S103CD

HN **NR** **RO**

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

MSRO24A Imaging of Larynx and Hypopharynx: Applied Anatomy

Participants

Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the normal anatomy of the larynx. 2) Discuss the spread patterns of the different primary sites of the larynx. 3) Explain the information that imaging provides that directly affects staging and management.

ABSTRACT

This session will demonstrate the value of laryngeal imaging. This talk will review the normal anatomy of the larynx. The talk will also discuss the spread patterns of the different primary sites of the larynx and illustrate the information that imaging provides that directly affects staging and management of laryngeal cancer.

MSRO24B Current Concepts and Controversies in Contouring for Treating Laryngeal Carcinoma

Participants

Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review anatomy of larynx as it relates to patterns of spread of squamous cell carcinoma. 2) Discuss how patterns of spread affects how to contour larynx for radiation therapy.

MSRO24C QandA

Participants

MSRO24D Imaging of the Oral Cavity and Oropharynx: Applied Anatomy

Participants

Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the normal anatomy of the oral cavity and oropharynx. 2) Illustrate the normal spread patterns of the various subsites of the oral cavity and oropharynx. 3) Explain the information that imaging provides that directly affects staging and management.

ABSTRACT

Imaging plays a crucial role in evaluating the evaluating the primary site. The information provided on pre-treatment imaging directly affects the stage of the tumor and provides information regarding management and treatment that cannot be ascertained through physical exam or staging. This talk will review the normal anatomy and malignancies involving the oral cavity and oropharynx. The presentation will also provide information on technique and provide a "checklist" of information that should be included in the radiologist's report that will help determine treatment and management.

MSRO24E Current Concepts and Controversies in Contouring and Treatment of Oral Cavity/Oropharynx Carcinoma

Participants

Clifton D. Fuller, MD, PhD, Houston, TX, (cdfuller@mdanderson.org) (*Presenter*) In-kind support, General Electric Company; Research Grant, Elekta AB; ; ;

LEARNING OBJECTIVES

1) Review imaging anatomy of or pharynx as it relates to patterns of spread of squamous cell carcinoma. 2) Discuss oropharyngeal contouring patterns for radiation therapy. 3) Discuss treatment indications for surgery, radiotherapy, and chemoradiotherapy and the requisite contouring guidelines across oropharynx cancer staging.

MSRO24F QandA

Participants

Head and Neck Top Five: Important Anatomy, Missed Diagnoses and Imaging Pearls

Monday, Nov. 30 8:30AM - 10:00AM Location: E450A



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC206A Important Head and Neck Anatomy

Participants

Hugh D. Curtin, MD, Boston, MA, (Hugh_Curtin@meei.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be able to identify the key 'fat pads' at the exit points of those cranial nerves most often affected by perineural spread. 2) The participant will be able to describe the fascial organization of the parapharyngeal region. 3) The participant will be able to locate the laryngeal ventricle using axial and coronal imaging.

ABSTRACT

Important Anatomy Head and neck imaging relies heavily on an understanding of the intricate and often difficult anatomy. The session will focus on identification of anatomy that is crucial in defining the margins and patterns of spread of pathology. Other landmarks that are key to description of the location of lesions are also covered. For instance, there is a small amount of fat located just external to each neural foramen through which perineural spread of carcinoma may pass. The most important of these primary 'fat pads' are located in the pterygopalatine fossa (external to foramen rotundum), just inferior to foramen ovale (trigeminal fat pad), and the stylomastoid foramen (facial nerve) fat pad. These fat pads should be examined for potential obliteration as tumor approaches the foramen. The laryngeal ventricle is key to the organization of the larynx and reports should localize lesions related to this important structure. The ventricle may not be directly visible depending on the phase of respiration of an imaging scan. However the lateral wall of the larynx transitions from fat to muscle at the level of the ventricle. The ventricle is located at the upper margin of the thyroarytenoid muscle that makes up the bulk of the true vocal cord. The parapharyngeal spaces are crossed by several substantial fascial layers. The fascia organize the region into compartments that help the radiologist predict the identity of tumors in that location. Specifically, the anatomy makes it possible to separate tumors that are almost certainly of salivary origin from those that are not. Other specific anatomic points useful in interpretation or characterization will also be discussed.

RC206B Missed Diagnoses in the Head and Neck

Participants

Phillip R. Chapman, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify some of the most common mistakes radiologists make when evaluating MRI or CT scans of the neck and skull base. 2) Identify different patterns of perineural tumor spread (PNTS) and understand the subtle CT and MRI changes that indicate early PNTS. 3) Recognize atypical patterns of metastatic nodal disease and how it can be missed on routine CT scans. 4) Identify changes in the nasopharynx and skull base that indicate invasive infectious or neoplastic process. 5) Identify easily missed superficial lesions of the dermis that might represent primary cutaneous tumor or dermal metastases. 6) Understand the basic anatomy of the oral cavity including specific anatomic subunits, the appearance of oral cavity neoplasms and pitfalls in imaging oral cavity cancers.

ABSTRACT

This presentation will highlight some of the most common mistakes and misdiagnoses that radiologists make when interpreting head and neck studies, including MRI and CT examinations. Many 'misses' are difficult, and rely on identifying subtle changes in small structures in the complex landscape of the neck and skull base. Other misses are difficult because they are relatively rare and may not be on the radar of most radiologists. Some misdiagnoses are the result of satisfaction of search, and are observed in complex cases, especially complex head and neck cancer. Post treatment changes in the neck impose additional limitations on imaging of the head and neck. This lecture will identify some common mistakes that are made in both private and academic practices. Cases will be presented using a case-based approach. The keys to identifying the pertinent findings and making each diagnosis will be highlighted.

RC206C Head and Neck Imaging Pearls

Participants

Christine M. Glastonbury, MBBS, San Francisco, CA, (Christine.glastonbury@ucsf.edu) (*Presenter*) Author with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) To learn the key points that create a succinct imaging differential diagnosis while appreciating the 'big picture' in HandN imaging. 2) To recognize the imaging findings of critical disease and what to do or recommend next with your patient.

ABSTRACT

This session will review some important pearls in head and neck imaging. These tips and tricks will review some important aspects of

imaging in the head and neck to help with protocoling studies, as well as techniques for imaging and interpretation. Important imaging differentials will also be reviewed and discussed.

MSCM22

Case-based Review of Magnetic Resonance (An Interactive Session)

Monday, Nov. 30 10:30AM - 12:00PM Location: S100AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

John R. Leyendecker, MD, Dallas, TX (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the role of MRI in diagnosing abnormalities of the breast. 2) Be familiar with the MRI appearance of select cardiothoracic abnormalities. 3) Effectively use MRI to diagnose disorders of the head and neck. 4) Distinguish between a variety of brain lesions based on MRI appearance.

ABSTRACT

This session will help attendees recognize and manage select, commonly encountered breast, cardiothoracic, head and neck, and brain abnormalities based on their MRI appearances using a case-based, interactive format.

Sub-Events

MSCM22A Breast MRI

Participants

Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Presenter*) Medical Advisory Board, General Electric Company; Research Grant, GlaxoSmithKline plc; Research Grant, General Electric Company

LEARNING OBJECTIVES

View learning objectives under main course title.

MSCM22B Cardiothoracic MRI

Participants

Suhny Abbara, MD, Dallas, TX (*Presenter*) Author, Reed Elsevier; Editor, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: <https://www.rsna.org/Honored-Educator-Award/>

Suhny Abbara, MD - 2014 Honored Educator

MSCM22C Head and Neck MRI

Participants

Daniel W. Williams III, MD, Winston Salem, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

MSCM22D Brain MRI

Participants

Mauricio Castillo, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the differential diagnosis and imaging features of intraventricular masses in children and adults. 2) Review the cerebral complications of treatment vascular malformations. 3) Review the differential diagnosis and imaging features of masses arising in the cerebello-pontine angle region. 4) Review the differential diagnosis of cerebral microbleeds.

MSRO25

BOOST: Head and Neck-Integrated Science and Practice (ISP) Session

Monday, Nov. 30 10:30AM - 12:00PM Location: S103CD

HN OI RO

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

John C. Grecula, MD, Columbus, OH (*Moderator*) Research Grant, Teva Pharmaceutical Industries Ltd; Research Grant, Soligenix, Inc;
Sung Kim, MD, New Brunswick, NJ (*Moderator*) Nothing to Disclose

Sub-Events

MSRO25-01 Invited Speaker:

Monday, Nov. 30 10:30AM - 10:40AM Location: S103CD

Participants

Bahman Emami, MD, Maywood, IL (*Presenter*) Nothing to Disclose

MSRO25-02 Impact of Patient and Tumor Characteristics on Time from Diagnosis to Treatment in Patients Undergoing Radiation Therapy for Head and Neck Cancer

Monday, Nov. 30 10:40AM - 10:50AM Location: S103CD

Participants

Muhammad M. Qureshi, MBBS, MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Bhartesh A. Shah, BA, Edison, NJ (*Abstract Co-Author*) Nothing to Disclose
Minh T. Truong, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Apar Gupta, Boston, MA (*Presenter*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): Treatment delay is a significant impediment to effective cancer management and could potentially impact disease progression and survival, especially in Head and Neck Cancer (HNC) patients who are often diagnosed with locally advanced stage disease. The purpose of this study was to determine the impact of patient and tumor characteristics on time-to-treatment (TTT) from diagnosis in HNC patients treated with curative intent radiation therapy (RT). Materials/Methods: From August 2004 to May 2011, 131 non-metastatic and non-recurrent biopsy proven HNC patients completed definitive RT at an urban academic safety net hospital. Patient and tumor factors examined included: race/ethnicity (Black, White, Hispanic, Other), English proficiency (English proficient, EP, Limited English proficient, LEP), marital status (Married, Non-married), insurance coverage (Private/Medicare, Medicaid/Free care), age at diagnosis (years) (median, =50) and AJCC stage (stage I-III versus stage IV). TTT was calculated from date of biopsy to date of first treatment received (surgery, induction chemotherapy/IC, radiotherapy alone/RT or concurrent radiotherapy/CCRT). Analysis of Variance was performed using SAS version 9.1 to determine the drivers of TTT. Data were analyzed using a 0.05 level of significance. Results: The median TTT was 41 days (range 6-249 days). Surgery, IC, RT or CCRT was the first treatment received in 45 (34.4%), 22 (16.8%), 13 (9.9%) and 51 (38.9%) patients, respectively. TTT did not differ by first treatment received (time to surgery 48 days, time to IC 47 days, time to RT 40 days and time to CCRT 51 days), $P=0.802$. No statistically significant differences in TTT were noted for gender ($P=0.637$), race/ethnicity ($P=0.996$), marital status ($P=0.737$), insurance coverage ($P=0.836$), age at diagnosis ($P=0.571$), and AJCC stage ($P=0.889$). TTT among EP and LEP patients was 46 and 57 days, respectively ($P=0.197$). Conclusion: Limited English proficient patients had longer TTT compared to EP, although this result failed to reach statistical significance. Other patient and tumor factors were not found to be predictive of TTT.

MSRO25-03 Prediction of Weight Loss in Irradiated Head and Neck Cancer Patients Based on the Clinical and Dosimetric Big Data

Monday, Nov. 30 10:50AM - 11:00AM Location: S103CD

Participants

Minoru Nakatsugawa, PhD, Baltimore, MD (*Presenter*) Employee, Toshiba Corporation; Research support, Toshiba Corporation;
Zhi Cheng, MD, MPH, Baltimore, MD (*Abstract Co-Author*) Research Grant, Toshiba Corporation
Scott Robertson, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Kosuke Sakae, Otawara, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation
Shinya Sugiyama, Otawara, Tochigi, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation
Ana P. Kiess, MD, PhD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Mysha Allen, RN,BSN, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Sarah Afonso, RN,BSN, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Amanda Choflet, MS,RN, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
John Wong, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Elekta AB; Research Grant, Xstrahl Ltd; Research Grant, Toshiba Corporation; Co-founder, JPLC Associates LLC; Royalty, Elekta AB; Consultant, Xstrahl Ltd
Todd R. McNutt, PhD, Baltimore, MD (*Abstract Co-Author*) Research collaboration, Koninklijke Philips NV; Research collaboration, Toshiba Corporation; Research collaboration, Elekta AB
Harry Quon, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The quality of life (QOL) of irradiated head and neck cancer (HNC) patients is significantly limited by toxicities leading to weight loss. The ability to predict and reduce toxicities by applying a learning health system (LHS) model is thus an important goal. The

aim of this study is to determine the predictors for weight loss based on the outcomes of similar patients previously treated with radiation therapy (RT) to develop a real-time clinical decision-support system.

METHOD AND MATERIALS

From a database of systematically captured prospective data elements, NCI-CTCAEv4.0 toxicity assessments and all aspects of RT planning, 326 HNC patients with longitudinal records from 2007 to 2014 were identified. The records consisted of 2,985 variables, including planned dose-volume histogram at 1% volume increments (2,020 variables), distance between planning target volume (PTV) and organs at risk, diagnostic ICD-9 code, QOL and toxicities during treatment. Weight loss of 5kg or more at 3 months post-RT was predicted by the Classification and Regression Trees algorithm. Two different prediction models at the time of RT planning and at the end of treatment were developed.

RESULTS

Weight loss predictors during treatment were 1) patient reported outcome of oral intake, 2) ICD-9 code, N stage, 3) nausea, esophagitis/pharyngitis, skin toxicity, pain intensity, 4) dose to larynx, parotid, cricopharyngeal muscle and 5) minimum distance between low dose PTV and larynx. The weight loss prediction at RT planning was also developed excluding assessment variables during treatment. The sensitivity of the model at treatment / RT planning was 0.988 / 0.860 and the positive predictive value (PPV) was 0.467 / 0.451 respectively.

CONCLUSION

The informatics framework combined with data mining tools can facilitate large-scale analysis predicting for weight loss and is encouraging for the development of a LHS model to reduce the risk of toxicities. The two prediction models at RT planning / treatment show the potential for a real-time decision-support based on the incremental data collection in each patient's RT course. Given the importance of diagnostic modality, we believe that incorporation of imaging features is an important next step to improve PPV.

CLINICAL RELEVANCE/APPLICATION

The weight loss prediction model at RT planning / treatment can support decisions regarding treatment planning and toxicity management during treatment.

MSRO25-04 Short Treatment Time and Excellent Treatment Outcome in Accelerated Hyperfractionated Radiation Therapy for T1 Glottic Cancer

Monday, Nov. 30 11:00AM - 11:10AM Location: S103CD

Participants

Yukihisa Tamaki, Izumo, Japan (*Presenter*) Nothing to Disclose
Yoko Hieda, MD, PhD, Izumo, Japan (*Abstract Co-Author*) Nothing to Disclose
Rika Yoshida, MD, Izumo, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Yoshizako, MD, Izumo, Japan (*Abstract Co-Author*) Nothing to Disclose
Hajime Kitagaki, MD, Izumo, Japan (*Abstract Co-Author*) Nothing to Disclose
Taisuke Inomata, MD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): Accelerated hyperfractionated radiotherapy was performed as treatment for patients with T1 glottic cancer, and its utility was evaluated based on treatment outcomes and adverse effects. **Materials/Methods:** Subjects were 58 men (median age, 70 years) who underwent radiotherapy at a University Hospital between January 2000 and November 2013. Tumor classification was Tis (6.9%) in 4 patients, T1a (65.5%) in 38, and T1b (27.6%) in 16. Histological examination revealed squamous cell carcinoma in the majority of cases (55 patients, 94.8%). Travel time from home to hospital was 2 h for 25 patients (43.1%). Laser vaporization was performed prior to radiotherapy in 38 patients (65.5%), and 19 patients (32.8%) received concurrent chemotherapy with an agent such as S-1. Patients were irradiated twice daily (morning and evening) using an irradiation container. Most patients received a dose of 1.5 Gy/fraction up to a total of 60 Gy. **Results:** The median overall treatment time was 30 days (range, 26–45 days), with a median observation period of 59.6 months. After completion of radiotherapy, a complete response was observed in all patients. The overall 5-year and 7-year survival rates were 97.2% and 86.1%, respectively, and the 5-year and 7-year disease-free survival rates were 93.2% and 82.2%, respectively. The 5-year and 7-year local control rates were both 97.8%. Seven patients died either of other cancer (3/7) or disease (4/7), with no death due to glottic cancer or treatment-related causes. Although grade 3 pharyngeal mucositis was observed in 2 (3.4%) patients, there were no other grade 3 or higher acute adverse events. As late toxicity, grade 2 laryngeal edema and grade 1 laryngeal hemorrhage were observed in 1 patient each, but no serious events such as laryngeal necrosis or laryngeal stenosis were observed. **Conclusion:** The outcome of accelerated hyperfractionated radiotherapy for T1 glottic cancer was excellent, and the adverse events were acceptable. The present treatment method will substantially reduce the treatment duration among patients who need to stay at nearby hotels while undergoing treatment at hospitals in rural areas.

MSRO25-05 Are Contouring Time and Multimodality Imaging Prognostic Factors for Radiation Therapy of Head and Neck Cancer?

Monday, Nov. 30 11:10AM - 11:20AM Location: S103CD

Participants

Michael W. Schmuecking, MD, Hamburg, Germany (*Presenter*) Nothing to Disclose
O Elicin, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Bernd Klaeser, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Alan Dal Pra, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Dario Terribilini, PhD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Beat Bojaxhiu, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Natalie D. Klass, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Roland Bigler, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Yannick Eller, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Marco Malthaner, PhD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
S Fankhauser, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose

Jan Tille, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Nando Mertineit, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
A Geretschlaeger, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In the DEGRO-Quiro Trials correlation of clinical outcome with contouring time in the planning process of radiation therapy and the amount of multimodality imaging has not been analyzed. To evaluate if contouring time and multimodality imaging are prognostic factors for radiation therapy of advanced head and neck cancer 207 patients were analyzed retrospectively between 2001 and 2012.

METHOD AND MATERIALS

Before 2007 radiation treatment planning CT was done without contrast enhancement, MR imaging and 18F-FDG PET/CT as additional imaging modalities were used only occasionally. From 2007 contrast enhanced planning CT in addition to multimodality imaging consisting of MR imaging (including DWI and ADC) and 18F-FDG PET/CT was used routinely for every head and neck cancer patient. Additionally, in unclear or equivocal imaging findings of lymph nodes a re-report was performed with a higher sensitivity at the expense of specificity to minimize geographical miss in the contouring procedure for radiation treatment and to maximize the binary decision for each lymph node (malignant vs benign). The re-reports were done in conjunction with radiooncologists, nuclear physicians and radiologists. The mean contouring time was 60 min before 2007 and 150 min after 2007 (including the time of a re-report). Clinical outcome (local, regional and locoregional control) of advanced oropharyngeal, laryngeal and hypopharyngeal cancers with lymph node metastases was assessed in two groups (group I: 2001-2007 vs group II: 2008-2012).

RESULTS

Group I: n=113, group II: n=94. Regional recurrence was significantly reduced in group II (log-rank-test $p = 0.03$. regional control after 1, 2 and 3 years was 88%, 79% and 76%, respectively as compared to 95%, 92% and 88%, retrospectively. Locoregional control for 207 patients shows no difference in survival ($p = 0.08$), inclusion of 340 patients leads to a p -value $p < 0.05$.

CONCLUSION

Imaging findings of multimodality imaging and a critical re-report of these imaging findings in conjunction with a longer contouring time may have an impact on clinical outcome of advanced head and neck cancers. However, this overtime is not reimbursed.

CLINICAL RELEVANCE/APPLICATION

A close collaboration of radiooncologists, nuclear physicians and radiologists in the radiation treatment planning process may have a benefit for patients with advanced head and neck cancer.

MSRO25-06 Lessons from a Standardized Program Using PET-CT to Avoid Neck Dissection after Primary Radiation Therapy for N2 Squamous Cell Carcinoma of the Oropharynx: Beware the Late Recurrence and Salvage Is Unlikely

Monday, Nov. 30 11:20AM - 11:30AM Location: S103CD

Participants

Kathryn E. Hitchcock, MD, PhD, Gainesville, FL (*Presenter*) Nothing to Disclose
Robert J. Amdur, MD, Gainesville, FL (*Abstract Co-Author*) Nothing to Disclose
William M. Mendenhall, MD, Gainesville, FL (*Abstract Co-Author*) Nothing to Disclose
John Werning, Gainesville, FL (*Abstract Co-Author*) Nothing to Disclose
Walter E. Drane, MD, Gainesville, FL (*Abstract Co-Author*) Nothing to Disclose
Anthony A. Mancuso, MD, Gainesville, FL (*Abstract Co-Author*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): To report the results of a standardized program using positron emission tomography (PET)-computed tomography (CT) approximately 12 weeks after primary radiotherapy to determine the need for a planned neck dissection in patients with radiographic N2 squamous cell carcinoma (SCC) of the oropharynx. Materials/Methods: Fifty consecutive patients with T1-4 and hemineck radiographic stage N2A-B SCC of the oropharynx for whom the only indication for planned neck dissection was a positive PET-CT performed ~12 weeks after completing primary treatment with radiotherapy. Endpoints to determine the value of 12-week PET-CT in identifying residual neck disease were pathologic status of planned neck dissection specimens and neck recurrence at any time during the follow-up period. Results: All patients at risk for neck recurrence at last follow-up had =1 year of follow-up after PET-CT (median, 2.0 years). Results of PET-CT to identify residual neck disease were as follows: Sensitivity and positive predictive value: 0% (zero true positive) Specificity: 89% (4 False Negatives), and negative predictive value: 91% Potential neck recurrence from using this 12-week PET-CT program: 2% (Three of 4 neck recurrences would not have been prevented by historic approaches.) Time between negative PET-CT and detection of neck recurrence was 0.8, 0.9, 2.4, and 2.7 years. Rate of successful (>1 year) salvage of neck recurrence: 25% (1/4). Conclusion: PET-CT approximately 12 weeks after radiotherapy for oropharyngeal cancer is an excellent way to identify patients who do not need neck dissection, but low-risk is not no-risk. Approximately half of neck recurrences present over 2 years after negative PET-CT and the chance of successful salvage is low. Accurate results for this kind of program will require long-term follow-up and support a policy of frequent neck imaging for years in patients with N2 oropharyngeal cancer who do not undergo neck dissection after primary treatment with radiotherapy.

MSRO25-07 Megavoltage Radiation Therapy of Skin Malignancies of the Nose Using Custom Nasal Paraffin Bolus

Monday, Nov. 30 11:30AM - 11:40AM Location: S103CD

Participants

Randy Wei, MD, Orange, CA (*Presenter*) Nothing to Disclose
Anna-Marie Hosking, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Juying Zhang, PhD, Long Beach, CA (*Abstract Co-Author*) Nothing to Disclose
Samar Azawi, MD, Long Beach, CA (*Abstract Co-Author*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): To treat surface malignancies, bolus materials are used to enhance the dose delivered at the surface and

to reduce hot and cold spots due to sharp surface irregularities and oblique incident angles. Radiation treatment of skin malignancies on the nose is challenging due to the irregular surface anatomy of the nose to which homogenous dose must be delivered. Materials/Methods: Superflab is a commonly used bolus material that is non-conformal for irregular surface contours of the nose making it difficult to reproducibly apply and maintain. Additionally, air gaps from non-conformal bolus will result in dose inhomogeneity. We present our experiences and outcomes using custom-made paraffin bolus to conform to the shape of the nose for the treatment of basal cell cancer (BCC) or squamous cell cancer (SCC). A mold of the patient's nose was created and a negative impression was made in a paraffin rectangle block. Minimum thickness was 1.5 cm laterally and 1 cm anterior-posteriorly. Thin coating of petroleum jelly was applied within bolus to reduce air gaps. Nine patients were treated to 60 Gy at 2 Gy per with parallel opposing 6x MV photon beams using three-dimensional conformal treatment planning. Six patients had BCC and three patients had SCC. Six patients had two or more distinct sites of disease. Results show that 100% prescription isodose line conforms to the planned target volume and dose to critical structures are well below tolerance limits. Daily kilovoltage orthogonal and weekly cone beam CT show close patient and wax bolus contact and reproducibility. Six thermoluminescent dosimetry (TLD) chips (LIF) were used to measure doses deposited and matched the planned dosimetry for each patient. TLD measurements showed a 2.6% average difference between planned dose and delivered dose. Results: Of the 9 patients treated with this method, maximum hot spot was 102.7% (101.1%-104%) for all 9 plans. Mean follow-up time was 25 months (10 – 58 months). Of the 9 treated, two patients developed new lesions on the nose and one patient had recurrent disease at the columella. Acute side effects were erythema and congested nose. None of the patients developed RTOG Grade 3 skin toxicity immediately following radiation treatment. Followup visits reported no telangiectasia and good cosmetic outcomes. Conclusion: This study demonstrates a practical approach to radiotherapy of the nose which minimizes air gaps and daily setup variability, while achieving dose homogeneity with minimal hotspots.

MSRO25-08 Superior Carotid Artery Sparing by Proton Radiation Therapy Compared to IMRT/VMAT for Reirradiation of Locally Recurrent Cancers of the Base of Tongue

Monday, Nov. 30 11:40AM - 11:50AM Location: S103CD

Participants

Upendra Parvathaneni, MBBS, FRANZCR, Seattle, WA (*Presenter*) Nothing to Disclose
Yolanda D. Tseng, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Quang Dang, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
George E. Laramore, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Kent McCune, CMD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Jay J. Liao, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): Salvage treatment options for isolated in-field local recurrences in the base of tongue (BOT) after previous radiotherapy (RT) are limited. Total glossectomy is extremely morbid and re irradiation (reRT) is often preferred in an attempt to preserve function. However, the close anatomical proximity of the carotid arteries to the BOT makes it difficult to avoid this structure with photon based conformal planning such as IMRT or VMAT. Adding radiation dose to a previously irradiated carotid artery may increase the risk of a carotid blow out, which is a fatal complication. Although a clear dose threshold for this complication has not been established, a treatment plan that delivers the least dose to the carotid would be preferred. We hypothesized that compared with photon based planning (IMRT/VMAT), proton radiotherapy (PRT) may decrease the dose to the carotids as there is no exit dose distal to the target, thereby limiting cumulative dose to surrounding organs at risk (OARs). We compared the dose to carotid arteries and other OARs with IMRT/VMAT versus PRT for two patients who had reRT for locally recurrent cancers of the tongue base. Materials/Methods: Comparative plans with photons using an IMRT or VMAT technique and PRT with uniform scanning or pencil beam scanning technique were generated for two patients on Eclipse and RayStation planning systems. Both patients had BOT recurrences that were located centrally within the high dose region of previous RT fields. They also received elective nodal RT for their initial BOT cancers and hence their carotid arteries were irradiated. The patients developed local recurrences after one and 3 years following initial RT. The BOT recurrences were treated to a dose of 66-72 Gy. Elective nodal RT was not given with reRT. Target cover and OAR doses, including dose to the carotid artery were evaluated by standard dose volume histograms. Results: In both patients, the proton plans spared the surrounding OARs including carotid arteries better than IMRT or VMAT photon plans. For patient 1, mean dose to both carotids was lower with protons (right, 3.0 vs 28.0 Gy; left, 4.8 vs 15.7 Gy). Dose to the spinal cord (max, 0 vs 14.9 Gy) was also lower with protons versus photons. Similarly, in patient 2, the proton plan had a lower mean dose to both carotids (right, 5.9 vs 15.9 Gy; left, 0.7 vs 8.1 Gy) and parotids (right, 1.6 vs 19.0 Gy; left, 0 vs 10.7 Gy). Both techniques provided adequate target coverage. Conclusion: Compared with conformal photon techniques such as IMRT/VMAT, proton radiotherapy reduces dose to previously irradiated carotid arteries and other surrounding OARs during treatment of recurrent cancers of the base of tongue. In the re irradiation setting, this advantage may translate to a reduced risk of a fatal carotid blow out. This case study suggests that proton therapy should be considered for reirradiation of locally recurrent tongue base cancers.

MSRO25-09 Hyperbaric Oxygen Therapy for Radiation Induced Toxicity: A Retrospective Review from a Single Institution

Monday, Nov. 30 11:50AM - 12:00PM Location: S103CD

Participants

Leah Katz, MD, MPH, New York, NY (*Presenter*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): Adverse radiation (RT) side effects pose an important barrier to progress in the field of radiation oncology. While hyperbaric oxygen therapy (HBOT) is recognized as an effective treatment for RT side effects, in particular for osteoradionecrosis (ORN); many radiation oncologists fail to refer patients. We evaluated NYU's HBOT experience over the past three years to assess its safety and efficacy in treating various RT toxicities. It is our hope that clinicians consider HBOT more frequently and develop a prophylactic referral pattern. Materials/Methods: A retrospective 3-year (2013-2015) chart review of a prospectively maintained database was performed. Thirty-three patients were evaluated with a median age of 62 (range 37-80), 16 F, 17 M. Sites of initial therapeutic RT included truncal and extremity soft tissue sarcoma (12%), squamous cell and adenocarcinoma, anorectum (9%), adenocystic vulvar cancer (3%), adenocarcinoma, prostate (12%), squamous cell carcinoma, head and neck (12%), adenocarcinoma, breast (6%), and squamous cell carcinoma, cervix (9%). RT induced toxicities were non-healing soft tissue wounds (39%), mandibular ORN (37%), radiation cystitis (15%), and rectal bladder fistula (3%). The median time from end of radiation therapy to HBOT initiation was 7 years, and median follow-up was 8 months. Patients were treated with a median of 35 HBOT treatments (range 5-90.) All patients were treated at the NYU Hyperbaric Center with no adverse

effects. Results: Each RT injury category was evaluated. Symptoms associated with RT soft tissue injury included chronic wound infection, vaginal bleeding/pain, rectal pain, dyspareunia, and perineal pain. 38% of patients had complete resolution of symptoms after HBOT alone, 31% underwent adjuvant flap closure with complete wound healing, and 31% experienced no wound healing. For radiation cystitis, 60% had complete symptom resolution within a one month period after HBOT. A single patient treated for a rectal bladder fistula enjoyed complete resolution of the fistula with cessation of rectal urine drainage within one month after HBOT. Patients with ORN of the mandible with BRONJ stage I experienced complete resolution of intraoral deficits. Patients with BRONJ stage 2 experienced complete resolution of infection after HBOT with adjuvant debridement. Patients with BRONJ stage 3 experienced complete fracture healing after HBO with adjuvant mandibulectomy. Conclusion: The NYU experience demonstrates both safety and efficacy in ameliorating symptoms and improving patient quality of life with various types of RT morbidity. Our data encourages early referral to HBOT in an effort to save patients time, medical costs, energy, and psychological stress associated with ineffective medical measures. This study encourages further research with longer follow-up to better define the benefit and durability of HBOT.

SSC09

Neuroradiology/Head and Neck (Thyroid and Parathyroid Imaging)

Monday, Nov. 30 10:30AM - 12:00PM Location: N229



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Laurie A. Loevner, MD, Gladwyne, PA (*Moderator*) Stockholder, General Electric Company; Stockholder, Pfizer Inc; Stockholder, Merck & Co, Inc; Stockholder, Johnson & Johnson; Stockholder, Amgen Inc; Stockholder, GlaxoSmithKline plc
Mark E. Mullins, MD, PhD, Atlanta, GA (*Moderator*) Nothing to Disclose

Sub-Events

SSC09-01 The Role of Core-Needle Biopsy as a First-line Diagnostic Tool for Initially Detected Thyroid Nodules

Monday, Nov. 30 10:30AM - 10:40AM Location: N229

Participants

Chong Hyun Suh, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jung Hwan Baek, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jeong Hyun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Jun Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Kyun Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role of core-needle biopsy (CNB) as a first-line diagnostic tool for initially detected thyroid nodules.

METHOD AND MATERIALS

This observational study was approved by the institutional review board and informed consent was obtained from all patients. From October 2008 to December 2011, we evaluated 632 initially detected thyroid nodules from 632 consecutive patients who underwent CNB. CNB readings were categorized into the same six categories of the Bethesda System. Final malignant results were diagnosed after surgery or CNB. Final benign results were diagnosed by surgery, twice of benign biopsy results, or benign cytology with a stable size at one year follow-up. The incidences of non-diagnostic, inconclusive results, diagnostic performance, unnecessary surgery, and complications were evaluated. Subgroup analysis according to nodule size was performed. The risk factors of inconclusive results were evaluated by multivariate logistic regression analysis.

RESULTS

CNB achieved 1.3% of non-diagnostic and 5.9% of inconclusive results. The diagnostic accuracy, sensitivity, specificity, positive predictive value and negative predictive value for diagnosis of malignancy were 97.6%, 90.5%, 100%, 100% and 92.7%, respectively. The unnecessary surgery was 0.6% and complication rate was 0.2%. Subgroup analysis showed that diagnostic performance was not significant according to nodule size. There were no independent risk factors associated with inconclusive results.

CONCLUSION

Our study demonstrated that CNB achieved low non-diagnostic, inconclusive results and high diagnostic accuracy for patients with initially detected thyroid nodules. CNB also minimize unnecessary surgery. Therefore, CNB seems to be a promising diagnostic tool for patients with initially detected thyroid nodules.

CLINICAL RELEVANCE/APPLICATION

CNB can be an alternative to FNA for patients with initially detected thyroid nodules to minimize non-diagnostic, inconclusive results and unnecessary surgery. CNB seems to be a promising diagnostic tool for patients with initially detected thyroid nodules.

SSC09-02 Optimal Follow-up Interval and Follow-up Management of Initial Non-diagnostic Thyroid Nodules 10 mm or Larger in Size

Monday, Nov. 30 10:40AM - 10:50AM Location: N229

Participants

Hee Jung Moon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jieun Koh, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun-Kyung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Young Kwak, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hyun Yoon, MD, Seongnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the optimal follow-up interval in initial non-diagnostic thyroid nodules 10 mm or larger on ultrasonography-guided fine needle aspiration (US-FNA).

METHOD AND MATERIALS

This retrospective study was approved by the Institutional Review Board, and informed consent was waived. A total 228 nodules were classified into the 3, 6, and 12 months groups according to when the first follow-up US was performed or the length of the

US-FNA intervals, within 3 months, from 3 to 9 months, and 9 months after initial US-FNA. Nodules were classified according to size change. US features were reassessed using the Thyroid Imaging Reporting and Data System (TI RADS). Malignancy detection rate, malignancy risk, and clinico-pathological characteristics were compared among 3, 6, and 12 months groups and according to size change.

RESULTS

Seven (3.1%) were malignant. Malignancy detection rates, extrathyroidal extension and lymph node metastasis were not significantly different among the three groups. 13 (5.7%) of 228 showed increased size at least 10.7 months after initial US-FNA. One (7.7%) of the 13 was minimally invasive follicular carcinoma without lymph node metastasis found at 63.2 months. Of 177 without change, six papillary thyroid carcinomas less than 20 mm (3.4%) were found at a mean 10.4 months. The malignancy risks of 177 nodules with TI RADS category 3, 4a, 4b, and 4c were 1.7%, 0%, 3.3%, and 21.4%. None of the 38 nodules with decreased size were malignant. and 9 months after initial US-FNA.

CONCLUSION

The follow-up of initial non-diagnostic thyroid nodules 10 mm or larger in size can be performed around 12 months with US. The decision to perform repeat US-FNA can be made based on initial and follow-up US features.

CLINICAL RELEVANCE/APPLICATION

dealing with non-diagnostic thyroid nodules) 'The follow-up of initial non-diagnostic thyroid nodules 10 mm or larger in size can be performed around 12 months with US'

SSC09-03 Radiofrequency Ablation: New Perspectives in the Treatment of Malignant and Benign Thyroid Diseases

Monday, Nov. 30 10:50AM - 11:00AM Location: N229

Participants

Rosa Cervelli, Pisa, Italy (*Presenter*) Nothing to Disclose
Salvatore Mazzeo, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Valentina Battaglia JR, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Carla Cappelli, MD, PhD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Benedetta Pontillo Contillo, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Luigi De Napoli, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Bartolozzi, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Aim of this study was to evaluate the safety and the efficacy of ultrasound-guided percutaneous RFA in the treatment of benign thyroid nodules, and in selected cases of recurrent thyroid cancers (RTC).

METHOD AND MATERIALS

This study included 40 patients: 30/40 affected by nodular goiter contraindicated to surgery; 10/40 affected by RTC and excluded from surgery/ radiometabolic therapy. Pre treatment diagnostic protocol included a CT and US examinations performed within 1month, in order to evaluate lesions' volumes. All RFA procedures were performed under US guidance by using a 18-gauge electrode, with a single 1-cm active, internally cooled, tip. Response to therapy was evaluated by means of contrast enhanced ultrasound in benign goiters (follow-up ranging from 6 to 18 months) and by means of CT in RTCs (follow-up ranging from 3 to 12 months). Mean Volume Reduction Rate (MVRR) was evaluated in respect to the pre-treatment lesions' volumes.

RESULTS

RFA was well tolerated by all patients: significant complication (permanent, laryngeal nerve lesion) was observed only in one patients. MVRR in goiters at 6, 12 and 18 months resulted to be 71,9±13,3%, 75,8±14,3% and 83,0±6,5% respectively; RCTs' MRVV at 3, 6 and 12 months were 57,2±27,5%, 82,4±13,0%, and 75,4±6,6% respectively.

CONCLUSION

All multinodular goiters showed excellent volume reduction; all patients presented a reduction of the compression symptoms. The neoplastic lesions demonstrated a good therapeutic response with slowing of disease progression.

CLINICAL RELEVANCE/APPLICATION

RFA is a reliable alternative to surgery in patients affected by benign goiter; moreover RFA might be considered as a valid approach for the debulking of RTC in non surgical cases.

SSC09-04 Sonographic and Demographical Features Associated with BRAF and RAS Mutations in the Follicular Variant of Papillary Thyroid Carcinoma

Monday, Nov. 30 11:00AM - 11:10AM Location: N229

Participants

Luzeng Chen, Boston, MA (*Presenter*) Nothing to Disclose
Manish Dhyani, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Abstract Co-Author*) Consultant, Pfizer Inc; Consultant, General Electric Company; Consultant, PAREXEL International Corporation; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Toshiba Corporation; Research Grant, General Electric Company; Research Grant, Samsung Electronics Co, Ltd; Research Grant, Analogic Corporation; Research support, SuperSonic Imagine; Research support, Hitachi, Ltd

PURPOSE

The follicular variant of Papillary thyroid carcinoma (FVPTC) is the second common subtype of Papillary thyroid carcinoma. FVPTC harbors two common genetic mutations; BRAF and RAS, and nodules with BRAF mutations are more aggressive. The purpose of the study was to identify demographic and US features that might be useful for differentiating BRAF and RAS positive FVPTC's.

METHOD AND MATERIALS

The data of 61 patients with > 1 cm FVPTCs diagnosed between November 2000 and April 2011 were reviewed retrospectively. The patients were divided by mutation status into 3 groups: (1) BRAF positive group, (2) RAS positive group and (3) mutation negative group. Two radiologists with more than 10 years of thyroid sonography experience reviewed the sonographic characteristics of the FVPTC nodule while blinded to the results of the genetic analysis. Ultrasound features and patient demographics were compared.

RESULTS

The BRAF mutation was detected in 16 (26.2%) patients. The RAS mutation was detected in 25 (41%) patients. Patients with RAS positive FVPTC were significantly younger than patients in the BRAF mutation group ($p=0.022$) and the no mutation group ($p=0.034$). The nodule longest dimension of the BRAF group was smaller than the RAS group ($p=0.036$) and no mutation group ($p=0.002$). An indistinct nodule border was more common in the BRAF group than in the RAS group in both radiology assessments ($p=0.002$, $p=0.002$ respectively, Kappa value 0.610, $p=0.000$). An indistinct nodule border was more common in the BRAF group than in the no mutation group too ($p=0.030$, $p=0.030$ respectively, Kappa value 0.468 $p=0.005$). One of the two Radiologists found the BRAF group to appear spiculated more commonly than the other groups (BRAF group (6/16) vs. the RAS group (0/25) $p=0.002$; BRAF group (6/16) vs. no mutation group (0/20) $p=0.004$), and one of the two Radiologists found echogenicity to be significantly lower in the BRAF group (BRAF group vs. RAS group $p=0.000$; BRAF group vs. no mutation group $p=0.007$). No significant differences were found between gender, tall/wide, halo sign, heterogeneity, calcification in nodule, or vessel in and around the nodule.

CONCLUSION

An indistinct sonographic boundary is associated with the BRAF mutation, and larger nodule size is associated with the RAS mutation in FVPTCs.

CLINICAL RELEVANCE/APPLICATION

Demography and ultrasound features may be helpful to differentiate BRAF and RAS positive in FVPTC.

SSC09-05 Role of Screening Thyroid Ultrasonography in Healthy Population and Imaging Analysis of Screening-detected Thyroid Cancer

Monday, Nov. 30 11:10AM - 11:20AM Location: N229

Participants

Jeongin Yoo, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

Sung Hee Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Objective : To evaluate the role of screening ultrasonography (US) in healthy population and analyze the US features of screening-detected thyroid cancer (SDTC).

METHOD AND MATERIALS

A total of 1845 persons participated in the study among 1923 healthy population who underwent screening thyroid US from March through August 2012 at our screening center; those who were lost to follow up ($n=60$) and those who underwent the previous operation on thyroid ($n=18$) were excluded. We evaluated detection rate of thyroid cancer and the average cost for detecting each cancer patient. (Presumed cost: \$100 for thyroid US and \$150 for fine-needle aspiration). We also analyzed the US features of screening-detected thyroid cancer.

RESULTS

Among 1845 participants 973 had benign disease (52.74 %, 63 by FNA and 910 with no change in 2 year-follow-up); 29 had thyroid cancer (1.57 %, 27 proven by FNA and 2 by surgery); 28 had PTC and 1 had follicular carcinoma. The cancer patients were predominantly women (69.0 %) and the mean age was 50.9 ± 9.825 . Imaging features that significantly differentiated malignant nodules from benign nodules were solid composition (100 % in malignant nodules), hypoechogenicity (100 %), taller than wide axis (82.8 %) and indistinct margin (86.2 %). Among 18 patients who underwent thyroidectomy, 14 (77.8 %) had pathologic tumor staging of T1 and 12 (85.71 %) had nodal staging of N0. The estimated average cost for detecting each cancer patient was \$6,838.

CONCLUSION

Screening thyroid US enables detection of early stage thyroid cancer in asymptomatic healthy population. The majority of screening-detected thyroid cancer was micropapillary carcinoma and showed solid and hypoechoic nodule on US.

CLINICAL RELEVANCE/APPLICATION

The majority of screening-detected thyroid cancer was micropapillary carcinoma. Screening thyroid US enables detection of early stage thyroid cancer in asymptomatic healthy population.

SSC09-06 Malignant Thyroid Nodule with Chronic Lymphocytic Thyroiditis: The Value of Core-Needle Biopsy

Monday, Nov. 30 11:20AM - 11:30AM Location: N229

Participants

Eunchae Lee, MD, Seongnam-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose

Yeo Koon Kim, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

Eun Ju Chun, MD, PhD, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

Sang Il Choi, MD, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The detection and diagnosis of thyroid cancer can be more difficult in patients with chronic lymphocytic thyroiditis (CLT). The aim of this study is to compare the diagnostic accuracy of fine-needle aspiration biopsy (FNAB) and core-needle biopsy (CNB) for malignant thyroid nodule in CLT patients.

METHOD AND MATERIALS

Institutional review board approved and waived informed consent for this retrospective study. From January 2010 to April 2014, 1815 CLT patients (183 men, 1632 women; mean age, 53.6 years; age range, 11-87 years) who underwent ultrasound-guided FNAB (FNAB group, 993 nodules in 970 patients; 90 men, 880 women; mean age, 55.5 years; age range, 18-87 years) or CNB (CNB group, 912 nodules in 845 patients; 93 men, 752 women; mean age, 52.1 years; age range, 11-86 years) for thyroid nodule were included. Final diagnosis with surgical resection was obtained for 353 nodules. Chi-square test was used to compare the inconclusive results from both groups. Diagnostic accuracy, sensitivity, specificity, positive predictive value, and negative predictive value for the diagnosis of thyroid cancer were calculated on the basis of binomial probabilities.

RESULTS

The rate of inconclusive results (nondiagnostic specimen or atypia of unknown significance) were significantly lower in CNB group (FNAB group, n=306 (30.8%); CNB group, n=33 (3.6%); $p < 0.001$). With correlation to final surgical pathology, the sensitivity and negative predictive value of FNAB were lower than CNB (49.5%, 18.9% vs. 83.5%, 63.6%)

CONCLUSION

Inconclusive results were significantly lower with CNB. CNB showed better diagnostic accuracy for thyroid cancer in patients with CLT.

CLINICAL RELEVANCE/APPLICATION

CNB can reduce the rate of inconclusive result in patients with CLT.

SSC09-07 Three-Dimensional Sonography more Accurately Localizes Preoperative Parathyroid Adenomas than Conventional 2D Sonography and Sestamibi

Monday, Nov. 30 11:30AM - 11:40AM Location: N229

Participants

Susan J. Frank, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Adam Goldman-Yassen, MD, MS, Bronx, NY (*Presenter*) Nothing to Disclose
Tova C. Koenigsberg, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Mordecai Koenigsberg, MD, Flushing, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Single parathyroid adenomas are the most common etiology of primary hyperthyroidism. If a single, enlarged parathyroid gland can be accurately identified before surgery, unilateral surgical dissection can be attempted, which has a lower morbidity than four-gland exploration. Two-dimensional ultrasound (2D US) and sestamibi scans are routinely used to evaluate patients with suspected primary hyperparathyroidism. Three-dimensional ultrasound (3D US) provides the surgeon with a coronal view, similar to a surgical perspective, and evaluates the typical vascularity of abnormal parathyroid glands. We compared the preoperative imaging of patients who underwent parathyroidectomy for primary hyperparathyroidism to determine the improvement of 3D US over 2D ultrasound and sestamibi for preoperative gland localization.

METHOD AND MATERIALS

We conducted a retrospective review of patients that underwent parathyroid surgery at our institution. We reviewed operative notes and pathology reports to identify final localization of abnormal parathyroid glands based on pathology and decrease in parathyroid hormone by 50% after gland excision in the OR. We evaluated preoperative ultrasound and sestamibi scan reports for gland localization.

RESULTS

118 patients underwent surgery for primary hyperthyroidism and underwent both preoperative ultrasound and sestamibi examinations at our institution between 2010 and 2014, 37 using 3D US. 3D US correctly identified the side of the abnormal parathyroid adenoma in 95% of cases (CI 81%-99%), compared with 57% of 2D US (CI 45%-68%), and the precise site of the abnormal gland in 81% of cases (CI 64%-92%), compared with 52% for 2D US (CI 40%-63%). Sestamibi scans correctly lateralized 82% of cases in our cohort (CI 73%-88%). 3D US and sestamibi concordantly lateralized the abnormal parathyroid in 92% of cases (CI 72%-96%), compared with 49% in 2D US cases (CI 38%-61%).

CONCLUSION

3D US is more sensitive than 2D US for correctly identifying the side and precise location of abnormal parathyroid glands in patients with primary hyperparathyroidism. 3D sonography may help provide more accurate gland localization before parathyroid surgery.

CLINICAL RELEVANCE/APPLICATION

Accurate localization of abnormal parathyroid glands before parathyroidectomy can reduce surgical morbidity and complications.

SSC09-08 Most Thyroid Cancers Lack Intranodular Vascularity on Color Doppler

Monday, Nov. 30 11:40AM - 11:50AM Location: N229

Participants

Grace C. Yang, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Karen O. Fried, MD, New York, NY (*Presenter*) Nothing to Disclose

PURPOSE

'Intranodular hypervascularity' has been reported to be associated with thyroid cancers in radiology literature. The aim of this study is to test this assumption with detailed pathology follow-up.

METHOD AND MATERIALS

Over a period of 8 years, 149 ultrasound-guided thyroid fine needle aspiration biopsies had both ultrasound images and histology

slides for review. Color Doppler images were reviewed and intranodular vascularity was graded from 0 to 3+ (0:no color). Recuts from index nodule were reviewed and divided into malignant and benign categories and tumor subtype recorded.

RESULTS

There were 99 thyroid cancers (size: 0.6-7 cm, mean 2.1, median 1.8), and 50 benign nodules (size 0.4-9 cm, mean 3.06, median 2.9). The malignant nodules from 22 males and 77 females included 78 papillary carcinomas (PTC), 6 medullary carcinomas (MTC), 6 Hürthle cell carcinomas (HTC), 5 follicular carcinomas (FTC), and 4 poorly differentiated thyroid carcinomas (PDTC). Benign nodules from 11 males and 39 females included 32 follicular adenoma/adenomatoid nodules (FA), 13 Hürthle cell adenoma/adenomatoid nodules (HA) and 5 hyalinizing trabecular adenomas (HHA). As shown in Table 1, there were 58 (93.5%) cancers (50 PTC, 5 MTC, 2 PDTC, 1 FTC) and 4 (6.5%) benign nodules (3 HA, 1 FA) with no intranodular vascularity; 15 (88.2%) cancers (9 PTC, 1 MTC, 4 HTC, 1 PDTC) and 2 (11.8%) benign nodules (2 HA) had 1+ intranodular vascularity; 14 (93.3%) cancers (10 PTC, 2 HTC, 2 FTC) and 1 (0.7%) benign nodules (1 HA) had 2+ intranodular vascularity; 12 (21.8%) cancers (9 PTC, 2 FTC, 1 PDTC) and 43 (78.2%) benign nodules (31 FA, 7 HA, 5 HHA) had 3+ intranodular vascularity.

CONCLUSION

Most thyroid cancers have no intranodular vascularity and most hypervascular thyroid nodules are benign. This finding is not surprising, since most thyroid cancers are PTC, which is a tumor rich in lymphatic vessels. Follicular tumors are rich in blood vessels, but FTC is much less common than PTC.

CLINICAL RELEVANCE/APPLICATION

'Absence of intranodular vascularity' is recommended as one of the suspicious features of thyroid ultrasound that include 'hypoechoic', 'taller than wide', 'blurred margins' and 'microcalcifications'

SSC09-09 Role Played by Elasticity Imaging in the Evaluation of the Thyroid Nodule

Monday, Nov. 30 11:50AM - 12:00PM Location: N229

Participants

Francisco J. Campoy-Balbontin, MD, PhD, Seville, Spain (*Presenter*) Nothing to Disclose
Carmen Jurado-Gomez, MD, Bellavista, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose-Carlos Perez-Tejada, MD, PhD, Sevilla, Spain (*Abstract Co-Author*) Nothing to Disclose
Carmen Almeida, BMedSc, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Rafael Aznar Mendez, Sevilla, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate conventional ultrasonography (US) including color doppler and elasticity imaging (EI) in thyroid nodule malignancy prediction.

METHOD AND MATERIALS

This prospective study included 399 patients (mean age, 51.9 years; range 13-83 years), 294 women (86.7%) and 45 men (13.3%). In 426 nodules (N) US, doppler color, EI and fine needle acquisition (FNA) were performed. The cytological results were classified according to the Bethesda System. No-apt sample and atypia or follicular proliferation of uncertain origin, were excluded (60N). 339 nodules in 335 patients were studied, divided in a non-surgical group (benign or T2, 292N) and a surgical group (follicular neoplasm-T4, 33N; suspicious for papillary carcinoma-T5, 9N; and Papillary carcinoma-T6, 5N). Comparison among US, vascularization, EI and cytology was performed, by using the χ^2 tests and the non-parametric Mann-Whitney U test, for categorical variables (statistical significance <0.05). Multivariate logistic regression analysis was performed to assess the independent variables for surgical group prediction.

RESULTS

Findings associated to surgical nodules are heterogeneity (24/51%; odds ratio (OR):2.584), very hypoechoic (4/8.5%; OR:5.195), Hypoechoic (24/51.1%; OR:4.160), increased vascularization (12/27.9%; OR:3.233), infiltrative margin (8/17%; OR:6.450), irregular border (5/10.6%; OR:4.211), hard in EI (19/40.4%; OR:2.073). Findings linked to benignity are to be isoechoic (197/67.5%) and spongiform (153/52.4%). In the multivariate regression analysis only very hypoechoic and hypoechoic are independent criteria related for the surgical group ($p < 0.05$), whereas spongiform is the only independent criteria associated to benignity.

CONCLUSION

EI could help in combination with the other US features to choose the nodule to perform FNA, but it does not seem to be independent criteria to indicate FNA

CLINICAL RELEVANCE/APPLICATION

EI properly used is a helpful tool, to be considered always in combination with US features, to indicate FNA.

MSRO26

BOOST: Head and Neck-Case-based Review (An Interactive Session)

Monday, Nov. 30 3:00PM - 4:15PM Location: S103CD

HN **NR** **RO**

AMA PRA Category 1 Credits™: 1.25
ARRT Category A+ Credits: 1.50

Participants

Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose
Carol R. Bradford, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Francis P. Worden, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review common tumors of the head and neck. 2) Review imaging findings in head and neck malignancies that specifically change staging. 3) Review the value of imaging in directly affecting management and treatment.

ABSTRACT

This session will be tumor board that includes a head and neck radiologist, head and neck surgeon, medical oncologist and radiation oncologist. We will discuss a variety of head and neck cancer cases and illustrate the value-added benefits and highlight of imaging affects staging, treatment and management.

SSE16

Nuclear Medicine (Endocrine and Gastrointestinal Imaging)

Monday, Nov. 30 3:00PM - 4:00PM Location: S505AB



AMA PRA Category 1 Credit™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants

M. Elizabeth Oates, MD, Lexington, KY (*Moderator*) Nothing to Disclose
Samuel E. Almodovar-Reteguis, MD, Birmingham, AL (*Moderator*) Nothing to Disclose

Sub-Events

SSE16-01 Parathyroid Imaging with Simultaneous Acquisition of Tc-99m-Sestamibi and I-123: The Relative Merits of Pinhole Collimation and SPECT-CT.

Monday, Nov. 30 3:00PM - 3:10PM Location: S505AB

Participants

Paraag R. Bhatt, MD, Aurora, CO (*Presenter*) Nothing to Disclose
William C. Klingensmith III, MD, Englewood, CO (*Abstract Co-Author*) Nothing to Disclose
Brian M. Bagrosky, MD, MS, Castle Pines, CO (*Abstract Co-Author*) Nothing to Disclose
Jacob C. Walter, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose
Kim McFann, PhD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Robert McIntyre Jr., MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Christopher Raeburn, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Phillip J. Koo, MD, Aurora, CO (*Abstract Co-Author*) Advisory Board, Bayer AG; ; ;

PURPOSE

To determine the relative localization utility of three state-of-the-art parathyroid imaging protocols: 1) single time point simultaneous acquisition of Tc-99m-sestamibi and I-123 images with pinhole collimation in the anterior and bilateral anterior oblique projections, 2) single time point simultaneous acquisition of Tc-99m-sestamibi and I-123 images with SPECT-CT, and 3) the combination of protocols one and two.

METHOD AND MATERIALS

Fifty-nine patients with surgical proof of parathyroid adenomas were evaluated retrospectively. All three protocols included perfectly co-registered subtraction images created by subtracting the I-123 images from the Tc-99m-sestamibi images, plus an anterior parallel hole collimator image of the neck and upper chest. The pinhole protocol was performed first followed by the SPECT-CT protocol. Three image sets were derived from each study in each patient according to the above protocols. Two experienced observers recorded the size, location and degree of certainty of any identified lesion.

RESULTS

The 59 patients had sixty-one adenomas. For the two observers combined, the localization success rate was 88% for the pinhole protocol, 69% for the SPECT-CT protocol, and 81% for the combined protocol. The pinhole protocol detected more adenomas than the SPECT-CT protocol and missed fewer adenomas than either the SPECT-CT protocol or the combined pinhole and SPECT-CT protocol ($P < 0.01$). The two protocols that included SPECT-CT provided superior anatomic information relative to the location and size of the parathyroid adenomas.

CONCLUSION

Overall, the pinhole protocol localized significantly more adenomas than the SPECT-CT protocol. However, the protocols that included SPECT-CT provided more anatomic information than pinhole imaging alone.

CLINICAL RELEVANCE/APPLICATION

Accurate preoperative identification and localization of parathyroid adenoma(s) allows surgeons to perform image guided minimally invasive surgery with improved success rates, shorter operating times, and less morbidity. Consequently, it is important to optimize the accuracy of preoperative imaging in determining the presence, size, and location of parathyroid adenomas. Our hope with this study is to determine the most accurate imaging protocol with current available imaging modalities to overall optimize patient outcomes.

SSE16-02 Influence of Multigland Parathyroid Disease on Tc-99m-Sestamibi SPECT/CT Sensitivity

Monday, Nov. 30 3:10PM - 3:20PM Location: S505AB

Participants

Kenneth Nichols, PhD, New Hyde Park, NY (*Presenter*) Royalties, Syntermed, Inc;
Gene G. Tronco, MD, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Palestro, MD, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Tc-99m-sestamibi (MIBI) imaging is a mainstay for preoperative parathyroid lesion localization in pts with primary hyperparathyroidism (PHP). Decreased sensitivity in multigland disease (MGD) compared to single gland disease (SGD) is a well recognized phenomenon for planar and SPECT protocols, but few data are available on the effect of MGD on the sensitivity of MIBI parathyroid SPECT/CT.

METHOD AND MATERIALS

We retrospectively analyzed 272 pts (220 female pts, 52 male pts, age = 59±13 years) with PHP who underwent preoperative MIBI SPECT/CT. We used surgical and pathology reports to confirm numbers and weights of excised parathyroid lesions. Two experienced physicians read SPECT/CTs on 2 separate occasions without reference to each other's readings or final diagnoses. Lesion certainty was graded on a 5-point scale (0 = normal, 1 = probably normal, 2 = equivocal, 3 = probably abnormal, 4 = definitely abnormal). Mean scores were obtained for the 2 observers. Readings were compared for MGD and SGD lesions matched by weight and location.

RESULTS

230 pts had SGD, 42 had MGD (28 pts with 2 lesions, 11 pts with 3 lesions and 3 pts with 4 lesions). Lesion weight decreased progressively with increasing numbers of lesions (888±941 mg for 1 lesion, 436±570 mg for 2 lesions, 395±686 mg for 3 lesions, 89±120 mg for 4 lesions, $p = -0.43$, $p < 0.0001$). It was possible to match equal numbers of SGD and MGD lesions by weight for 132 lesions, with similar mass (526±678 versus 525±686 mg, $p = 0.99$), and similar location distributions ($p = 0.47$). Despite being matched by weight and location, reading confidence was significantly lower for MGD than SGD lesions (2.0±1.4 versus 3.4±0.8, $p < 0.0001$); confidence decreased progressively with increasing lesion numbers (2.2±1.3 for 2 lesions, 1.8±1.5 for 3 lesions, 1.0±0.9 for 4 lesions, $p = -0.51$, $p < 0.0001$). Sensitivity was significantly lower for MGD than SGD lesions (64% versus 98%, $p < 0.0001$); sensitivity decreased progressively with increasing lesion numbers (67% for 2 lesions, 65% for 3 lesions, 25% for 4 lesions, $p = -0.45$, $p < 0.0001$).

CONCLUSION

As with planar and SPECT MIBI, in PHP, Tc-99m-MIBI SPECT/CT reading confidence and sensitivity are significantly lower in multigland disease than in single gland disease.

CLINICAL RELEVANCE/APPLICATION

MIBI SPECT/CT is less sensitive for detecting lesions in MGD than lesions in SGD and therefore it must be used together with rapid intraoperative parathyroid hormone assay to ensure that all offending lesions are removed.

SSE16-03 Prognostic Value of FDG-PET/CT in Papillary Thyroid Cancer with the TENIS Syndrome

Monday, Nov. 30 3:20PM - 3:30PM Location: S505AB

Participants

Kunihiro Nakada, Sapporo, Japan (*Presenter*) Nothing to Disclose
Hiroki Sugie, MD, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose
Ysushi Furuta, MD, PhD, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiromasa Takahashi, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoya Hattori, MD, PhD, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayuki Sakurai, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Postsurgical papillary thyroid cancer (PCA) with thyroglobulin elevation and negative iodine scintigraphy (TENIS) generally show resistance to high-dose I-131 therapy. However, prognostic factors for PCA with the TENIS syndrome have not been well established. The aim of the study was to determine whether FDG uptake is linked with clinical behavior of the tumor in the TENIS syndrome.

METHOD AND MATERIALS

93 patients with PCA, who had previously underwent total thyroidectomy and remnant tissue ablation and were diagnosed as the TENIS syndrome, underwent FDG-PET/CT. Serum Tg levels at PET/CT ranged 2.9- 225.4(ng/ml). Uptake of FDG was visually assessed and classified as positive or negative. When FDG uptake was positive, semi-quantitative analysis (SUVmax) was performed. If a patient had multiple tumors, average of SUVmax in the 2 largest tumors were used for evaluation. Patients were followed up for 28- 83 months (median 46). Tg levels were measured at least 5 times or more after imaging of FDG-PET/CT. to determine Tg doubling time (Tg-DT). As a rule, changes in the tumor size were evaluated based upon RECIST1.1.

RESULTS

Of 93 patients, 74 showed positive FDG uptake while the remaining 19 showed negative FDG uptake. In the FDG positive group, 21 (28%) showed Tg-DT of < 1yr. Progressive disease (PD) was observed in 32 pts. (42%). SUVmax was significantly higher in patients with PD than others (6.7 vs.4.1, $p < 0.01$). 5 pts. died of PCA. In contrast, all patients in the FDG negative group had Tg-DT of either ≥ 3 yrs. or minus value regardless of baseline Tg value. PD was seen in only 1(5%). Cancer-associated death was not observed in any of the patients. There was an inverse correlation between SUVmax and Tg-DT in the positive FDG uptake group ($r = -0.56$).

CONCLUSION

Positive FDG uptake in the TENIS syndrome indicates shorter Tg-DT and higher risk of PD. In contrast, negative FDG uptake is associated with longer Tg-DT and gentle behavior of the tumor. FDG-PET/CT is helpful in characterizing prognosis of postsurgical PCA with the TENIS syndrome

CLINICAL RELEVANCE/APPLICATION

In patients with TENIS who have high FDG uptake, early start of additional therapies such as external radiation, local ablation therapy such as RFA or PEI, or chemotherapy using sorafenib or lenvatinib may improve their prognosis. In contrast, the majority of patients with negative FDG uptake do not require aggressive additional treatments.

SSE16-04 Effectiveness of Semi-quantitative Analysis in I-123 Metaiodobenzylguanidine Scintigraphy for Diagnosing Pheochromocytoma

Monday, Nov. 30 3:30PM - 3:40PM Location: S505AB

Participants

Yoshiyuki Kitamura, Fukuoka, Japan (*Presenter*) Nothing to Disclose

Shingo Baba, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Takuro Isoda, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuhiro Maruoka, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Keiichiro Tahara, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Akihiro Nishie, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayuki Sasaki, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

I-123 Metaiodobenzylguanidine (MIBG) scintigraphy is a sensitive and specific imaging tool for the diagnosis of suspected adrenal pheochromocytoma. Hybrid single photon emission computed tomography / computed tomography (SPECT/CT) is expected to provide additional anatomical information and more efficient diagnostic capability. Visual evaluation is usually used to diagnose the abnormality. However, evaluation standard is not yet established. In addition, the appearance of fusion image of SPECT /CT is largely depend on the window level of SPECT image. This may lead to equivocal or wrong diagnosis. In this study, we introduced a semi-quantitative method for the evaluation of I-123 MIBG. The purpose of this study is to evaluate the performance of this method with that of conventional visual evaluation.

METHOD AND MATERIALS

Twenty six patients (Male/Female=17/9, Age=57.5±14.4) with suspected pheochromocytoma were incorporated in this study. I-123 MIBG scintigraphy and adrenal SPECT/CT was performed in all patients. Twelve pheochromocytomas and 14 cortical adenoma were diagnosed histopathologically or based on the clinical course including MRI. For semi-quantitative analysis, tumor-to-liver ratio (T/L) was defined as ratio of maximum count of adrenal mass divided by maximum count of normal liver of right lobe. For visual evaluation of planar scintigraphy and SPECT/CT fusion image, adrenal uptake was classified as visual score (1 = lower than liver, 2 = equal to liver and 3 = higher than liver). Diagnostic performances of the three methods (T/L: SPECT, visual: planar and visual: SPECT/CT) were compared using receiver operating characteristic (ROC) analyses.

RESULTS

In ROC analysis, AUC of SPECT, planar and SPECT/CT were 0.98, 0.67 and 0.76 with cut-off value of 2.26, 3 and 3, respectively. There were significant difference between SPECT and planar ($p < 0.01$), SPECT and SPECT/CT ($p < 0.01$). No significant difference between planar and SPECT/CT ($p = 0.50$).

CONCLUSION

Semi-quantitative method using SPECT/CT was more sensitive and specific than visual evaluation in the diagnosis of pheochromocytoma in patients with adrenal tumor.

CLINICAL RELEVANCE/APPLICATION

Semi-quantitative method using SPECT/CT was more sensitive and specific than visual evaluation in the diagnosis of pheochromocytoma in patients with adrenal tumor.

SSE16-05 Postablation Radioiodine Scintigraphy SPECT/CT: Functional and Anatomic Correlation

Monday, Nov. 30 3:40PM - 3:50PM Location: S505AB

Participants

Ana M. Franceschi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Robert Matthews, MD, Stony Brook, NY (*Presenter*) Nothing to Disclose
Lev Bangiyev, DO, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Dinko Franceschi, MD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

SPECT/CT was utilized to localize radioiodine uptake in thyroid carcinoma patients status post radiiodine ablation. Anatomic correlation with central neck uptake evident on planar I-131 scintigraphy was assessed.

METHOD AND MATERIALS

In this retrospective study, one nuclear medicine physician and one neuroradiologist reviewed SPECT/CT findings to assess accuracy of radioiodine uptake localization on planar whole-body images in the central neck region. Inclusion criteria included thyroid carcinoma patients at our institution who underwent postablation planar and SPECT/CT I-131 scintigraphy from October 1, 2013 to June 1, 2014. Radioiodine dose was 50-200 mCi.

RESULTS

44 consecutive patients were included in the study (10 male, 34 female). Age range was 20 - 74. Most of the patients, 40 (91%) had obvious foci of radioiodine uptake in the central neck on planar and SPECT imaging, while remaining 4 patients had no significant radioiodine uptake in the neck. Of the patients with radioiodine uptake in the neck, 12 (27%) had uptake within the thyroid bed region only, 13 (30%) had focal uptake corresponding just to the thyroglossal duct remnant, and 15 (34%) had uptake within both, thyroid bed region and thyroglossal duct remnants. Therefore, majority of the patients with central neck uptake 28/40 (70%) had visualization of the thyroglossal duct remnant activity.

CONCLUSION

The anatomic CT correlation with planar and SPECT images demonstrated the majority of the focal radioiodine uptake to be located exclusively within the thyroid bed and thyroglossal duct remnant.

CLINICAL RELEVANCE/APPLICATION

In low risk patients with thyroid cancer, our findings may support low dose consideration prior to radioiodine ablation.

SSE16-06 Evaluate Correlation of Duodenogastric Reflux Detected on Tc-99m Mebrofenin Hepatobiliary Scintigraphy with Symptomatic Gastroesophageal Reflux Disease: A Retrospective Study

Participants

Ammar A. Chaudhry, MD, Corona, CA (*Abstract Co-Author*) Nothing to Disclose

Maryam Gul, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose

Abbas A. Chaudhry, BSc, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose

Robert Matthews, MD, Stony Brook, NY (*Presenter*) Nothing to Disclose

PURPOSE

GERD is thought to result primarily from gastric acid reflux. Recent literature suggests that symptomatic GERD also occurs from duodenogastric reflux of bile acids. This has been termed alkaline variant GERD and appears to be more damaging to the esophagus and has a more symptomatic clinical course. We aim to evaluate whether the presence of duodenogastric reflux (DGR) seen on Tc-99m mebrofenin hepatobiliary scintigraphy (MHBS) correlates with presence of clinical GERD and whether degree of DGR seen correlates with clinical severity of GERD.

METHOD AND MATERIALS

300 Tc-99m MHBS exams conducted from January 2011-December 2014 were included in this study and were evaluated for presence of DGR. Patients' chart were reviewed to identify for clinical diagnosis of GERD and the severity of GERD that was determined using clinical data points including endoscopic evaluation of GERD, oral medications for treatment of GERD and presence/absence Barrett's esophagus, etc.

RESULTS

83 patients (45 females and 38 males) with mean age 47.9 (range: 13 - 93 years old) were identified to have evidence of DGR. Of these patients, 31.3% patients were diagnosed with cholecystitis and 7.2% patients were diagnosed with biliary colic. 25.3% patients had only clinical history of GERD and no additional significant history. Of the patients with clinical evidence of GERD, 42.9% patients had evidence of severe DGR, 38.1% had moderate DGR and 19% had mild DGR noted. 4.7% patients with GERD and severe DGR had histopathologic evidence of Barrett's esophagus.

CONCLUSION

DGR is easily detected and frequently identified on Tc-99m MHBS. Our study shows 25% of patients with otherwise unremarkable Tc-99mMHBS scintigraphy have evidence of DGR and majority of these have moderate to severe GERD. As emerging literature is demonstrating stronger correlation between bile acid reflux and symptomatic GERD, DGR is an important diagnostic consideration as the cause of patients presenting symptoms in an otherwise normal HIDA study.

CLINICAL RELEVANCE/APPLICATION

DGR is easily detected and frequently identified on Tc-99m MHBS and a significant proportion patients with scintigraphic evidence of DGR have GERD. Reporting severity of reflux in report can facilitate patient management by alerting clinician to DGR as an important diagnostic consideration as the cause of patients presenting symptoms in an otherwise normal HIDA study.

MSRO29

BOOST: Head and Neck-eContouring

Monday, Nov. 30 4:45PM - 6:00PM Location: S104B



AMA PRA Category 1 Credits™: 1.25
ARRT Category A+ Credits: 1.50

Participants

Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose

Clifton D. Fuller, MD, PhD, Houston, TX (*Presenter*) In-kind support, General Electric Company; Research Grant, Elekta AB; ; ;

LEARNING OBJECTIVES

- 1) Review the pertinent anatomy of the upper aerodigestive tract.
- 2) Discuss the spread patterns of various head and neck tumors.
- 3) Illustrate the importance of multimodality imaging for tumor contouring.

ABSTRACT

This e-contouring session will be given by a head and neck radiologist and radiation oncologist. This session will review the pertinent anatomy of the upper aerodigestive tract, discuss the spread patterns of various head and neck tumor and Illustrate the importance of multimodality imaging for tumor contouring.

SPDL30

RSNA Diagnosis Live™: 'Tic Tac D'Oh' - Test Your Diagnostic Skills at the Crack of Dawn

Tuesday, Dec. 1 7:15AM - 8:15AM Location: E451B



AMA PRA Category 1 Credit™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Adam E. Flanders, MD, Penn Valley, PA (*Presenter*) Nothing to Disclose

Christopher G. Roth, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

Sandeep P. Deshmukh, MD, Philadelphia, PA, (sandeep.deshmukh@jefferson.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

MSCC31

Case-based Review of Nuclear Medicine: PET/CT Workshop-Head and Neck Cancers (In Conjunction with SNMMI) (An Interactive Session)

Tuesday, Dec. 1 8:30AM - 10:00AM Location: S406A



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Janis P. O'Malley, MD, Birmingham, AL (*Director*) Nothing to Disclose

Jonathan E. McConathy, MD, PhD, Saint Louis, MO (*Presenter*) Research Consultant, Eli Lilly and Company; Research Consultant, Blue Earth Diagnostics Ltd; Research Consultant, Siemens AG; Research support, GlaxoSmithKline plc

LEARNING OBJECTIVES

1) Participants will use FDG-PET/CT more effectively in their clinical practice through better understanding of the anatomy, clinical scenarios, and differential diagnoses relevant to the diagnostic imaging of head and neck cancers.

Contemporary Thyroid and Parathyroid Imaging: The Incidental Thyroid Nodule Through 4DCT

Tuesday, Dec. 1 8:30AM - 10:00AM Location: N227



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC306A Managing the Incidental Thyroid Nodule

Participants

Jenny K. Hoang, MBBS, Durham, NC, (jennykh@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the recommendations for workup an incidental thyroid nodule detected on imaging. 2) Examine the implications and costs of workup of incidental thyroid nodules.

ABSTRACT

Facts about incidental thyroid nodules on imaging Majority of thyroid nodules detected incidentally do not have suspicious clinical history or imaging findings to differentiate a malignant from benign nodule. Incidental thyroid nodules are common whereas thyroid cancer is uncommon. Only 1.6% of patients with one or more thyroid nodules will actually have thyroid cancer [1]. Health care costs of workup of incidental thyroid nodules add up. Other costs to consider are patient anxiety, time lost, and potential complications of diagnostic lobectomy. Facts about incidental thyroid cancers Small thyroid cancers are typically indolent and most patients die with rather than of thyroid cancer. The observed incidence of thyroid cancer is increasing exponentially and has doubled in the last decade [2]. Mortality has not changed significantly despite this trend which raises concern that the apparent increase in incidence is due to overdiagnosis of subclinical thyroid cancers. How should we be reporting thyroid nodules on imaging? In 2015 the American College of Radiology published a white paper on the management of Incidental Thyroid Nodules [3]. References: 1. Smith-Bindman R, Lebda P, Feldstein VA, et al. Risk of thyroid cancer based on thyroid ultrasound imaging characteristics: results of a population-based study. *JAMA Intern Med* 2013; 173:1788-17962. Davies L, Welch HG. Current thyroid cancer trends in the United States. *JAMA Otolaryngol Head Neck Surg* 2014; 140:317-3223. Hoang JK, Langer JE, Middleton WD, et al. Managing Incidental Thyroid Nodules Detected on Imaging: White Paper of the ACR Incidental Thyroid Findings Committee. *J Am Coll Radiol* 2015; 12:143-150

RC306B Imaging Thyroid Cancer

Participants

Ashley H. Aiken, MD, Atlanta, GA, (ashley.aiken@emoryhealthcare.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the American Thyroid Association (ATA) recommendations for preoperative imaging evaluation of thyroid cancer. 2) Recognize the indications for cross-sectional imaging in the pre-operative evaluation of thyroid cancer. 3) Use pre-operative cross-sectional imaging to accurately stage the primary tumor and regional lymph nodes.

ABSTRACT

Differentiated thyroid cancer (DTC), including papillary and follicular subtypes, is the most common (90%) primary thyroid malignancy. The remaining 10% of thyroid cancers include medullary, anaplastic and lymphoma. The American Thyroid association (ATA) guidelines currently recommend ultrasound (US) as the preoperative study for uncomplicated thyroid cancer. Cross-sectional imaging adds important anatomical information and should be recommended for cases with clinical evidence of invasive disease (vocal cord palsy, fixed mass, dysphagia, or respiratory symptoms), large size or mediastinal extent not well seen on US or rapid enlargement. Cross-sectional imaging is also recommended by the ATA when there is US or clinical evidence of bulky LAD or US expertise is not available. When interpreting a CT or MRI for preoperative evaluation, the radiologist should assess the primary tumor for extrathyroidal extension. The critical structures to assess for local invasion include the infrahyoid strap muscles (T3), larynx, trachea, or esophagus (T4a), recurrent laryngeal nerve (T4a), carotid encasement (T4b) and prevertebral fascia (T4b). The second role of imaging is to assess for regional nodal disease. It is important for the radiologist to recognize that lateral neck dissections are NOT part of routine management and identification of nodal disease in the lateral neck will alter the surgical plan. Radiologists should pay close attention to the typical drainage pathways including the central neck (level VI), lateral neck (levels III, IV), superior mediastinum (VII) and retropharyngeal nodes. Nodal metastases in papillary thyroid cancer may be characteristically cystic or calcified on CT or hyperintense on T1 weighted MRI. However, metastatic nodes may also be small and reactive appearing, so that clustered nodes in the paratracheal and mediastinal locations should increase suspicion. PET/CT may play a role in dedifferentiated tumors that no longer concentrate iodine, especially for surveillance in patients with elevated thyroglobulin but negative 131I WBS.

Active Handout: Ashley Hawk Aiken

<http://abstract.rsna.org/uploads/2015/15001959/RC306B.pdf>

RC306C Parathyroid Imaging

Participants

Deborah R. Shatzkes, MD, New York, NY, (shatzkes@hotmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Key anatomic features of both normal and variant parathyroid anatomy. 2) The imaging modalities available for the work-up of primary hyperparathyroidism and their relative pros and cons. 3) The surgical techniques that have driven the development of contemporary parathyroid imaging.

ABSTRACT

The advent of minimally invasive parathyroid surgery (MIPS) has driven the development of improved localization techniques for parathyroid adenoma. The most successful imaging techniques are those that combine excellent anatomic detail with functional information that will help differentiate parathyroid adenoma from other nodules in the region. Ultrasound remains a very useful modality, because of its availability, cost and absent ionizing radiation. Radionuclide scanning, typically utilizing Tc99m Sestamibi, adds more specific functional information, and when combined with CT, good anatomic detail. Recently, there has been increasing interest in parathyroid CT, also known as 4DCT. This is essentially a CTA study whereby the characteristic hyperperfusion of parathyroid adenomas allows them to be differentiated from lymph nodes and exophytic thyroid nodules. There remains considerable controversy regarding technical details of 4DCT, particularly the number of phases required. The associated ionizing radiation remains a significant concern. Often, a combination of two imaging modalities is performed in order to increase reliability. The high incidence of ectopic parathyroid glands, the position of the glands at the root of the neck, the proximity to often multinodular thyroid tissue and what appears to be a rising incidence of multi glandular disease are challenges that relate to all imaging modalities.

SSJ19

Neuroradiology/Head and Neck (ENT Oncology)

Tuesday, Dec. 1 3:00PM - 4:00PM Location: N228



AMA PRA Category 1 Credit™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Ashley H. Aiken, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Barton F. Branstetter IV, MD, Pittsburgh, PA (*Moderator*) Nothing to Disclose

Sub-Events

SSJ19-01 Lymph Node Imaging Reporting and Data System for Ultrasound and Real-time Elastography of Cervical Lymph Node: A Pilot Study

Tuesday, Dec. 1 3:00PM - 3:10PM Location: N228

Participants

Kyeong Hwa Ryu, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kwanghui Lee, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jiyeon Baik, MD, Busan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ji-Hwa Ryu, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hee Son, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To analyze ultrasound (US) and real-time elastography (RTE) features of cervical lymph node and propose a structural reporting system for lymph node.

METHOD AND MATERIALS

Between 2013 and 2014, 291 consecutive patients underwent US guided biopsies and follow-up for cervical lymph nodes were enrolled in a single institution. US features were analyzed as follows; shape, margin, echogenicity, echogenic hilum, gross necrosis, calcification, matting and vascular pattern. RTE features were analyzed; elasticity score and strain ratio. By logistic regression analysis, a score for each significant factor was assigned and multiplied by the β coefficient, and then fitted probability of malignancy was calculated. The risk of malignancy of lymph node was determined, based on the number of suspicious features.

RESULTS

Imaging features to be significantly associated with malignancy were round shape, not circumscribed margin, hyperechogenicity, absence of hilum, presence of gross necrosis and calcification, peripheral/mixed vascularity, elasticity score 3 and 4, and high strain ratio ($p < 0.05$). The fitted probability and risk of malignancy increased, as a number of suspicious features increased. Lymph node imaging reporting and data system (LNRADS) was established using a 5-point scale; 1 (probably benign), 2 (low suspicion for malignancy), 3 (moderate suspicion for malignancy), 4 (high suspicion for malignancy), and 5 (highly suggestive for malignancy). The risk of malignancy according to LNRADS categories was as follows; 1: 3.3%, 2: 10.9%, 3: 26.7%, 4: 51.8%-74.4%, 5: 90.6%-98.8%.

CONCLUSION

LNRADS was proposed using risk stratification of cervical lymph node according to the number of suspicious US and RTE features.

CLINICAL RELEVANCE/APPLICATION

LNRADS will help to determine the optimal strategies for management of cervical lymph node.

SSJ19-02 How Can We Differentiate Follicular Nodular Lesions with Ultrasonographic Features?

Tuesday, Dec. 1 3:10PM - 3:20PM Location: N228

Participants

Sun Hye Jeong, MD, Bucheonsi, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyun-Sook Hong, MD, PhD, Bucheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Hye Lee, MD, Bucheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bora Lee, Bucheon-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We retrospectively evaluated the ultrasonographic (US) features used to differentiate follicular nodular lesions of thyroid gland (or follicular cell-derived thyroid nodules) and tried to identify specific US features of nodular hyperplasia (NH).

METHOD AND MATERIALS

The study included 178 patients (mean age 46.6 (range 17-82) years) with surgically confirmed NH (n=100), follicular adenoma (FA) (n=56), or follicular carcinoma (FC) (n=22). Two radiologists retrospectively analyzed the US features. To determine the predictors of follicular-patterned lesions, univariate and multivariate multinomial logistic regression analyses were conducted. Receiver operating characteristic (ROC) analyses were performed to determine the effectiveness of the final model at predicting NH, FA, and FC. The inter-observer agreement was calculated.

RESULTS

Tumor diameter, margin, echotexture, cystic changes, calcification, hypoechoic rim, and vascularity were significant in the

univariate analyses. The multivariate multinomial logistic regression analyses revealed that tumor diameter (FA: $p=0.002$, odds ratio (OR) =1.75, 95% confidence interval (CI) 1.22, 2.51; FC: $p=0.001$, OR=2.02, 95% CI 1.32, 3.10), absence of cystic changes (FA: $p=0.127$, OR=2.21, 95% CI 0.80, 6.13; FC: $p\leq 0.001$, OR=17.74, 95% CI 4.00, 78.73), and spongiform appearance (FA: $p=0.234$, OR=0.31, 95% CI 0.04, 2.15; FC: $p<0.001$, OR=1673.46, 95% CI 671.35, 4171.38) differed significantly among the three follicular nodular lesions, with NH as a reference group. The area under the curve (AUC) for NH, FA, and FC was 0.844, 0.858, and 0.705, respectively. The sensitivity for NH, FA, and FC was 0.698, 0.868, and 0.755, respectively, and the specificity was 0.820, 0.690, and 0.580. Using this model, the diagnostic accuracy of the original data was 72.6%. The inter-observer agreement was moderate to almost perfect.

CONCLUSION

Tumor diameter, cystic changes and spongiform appearance differed significantly among follicular nodular lesions. Using the US criteria, there was moderate diagnostic ability for NH, FA, and FC.

CLINICAL RELEVANCE/APPLICATION

Tumor diameter and the presence of cystic changes differed significantly among NH, FA, and FC (or follicular nodular lesions).

SSJ19-03 The Added Diagnostic Value of DW-MRI to Conventional Parameters in Characterization of Cervical Lymphadenopathy

Tuesday, Dec. 1 3:20PM - 3:30PM Location: N228

Participants

A M Aboelsouad, MSc, Assiut, Egypt (*Presenter*) Nothing to Disclose
Haisam A. Atta, MD, Assiut, Egypt (*Abstract Co-Author*) Nothing to Disclose
Mohamed M. Abd Ellah, MD, Innsbruck, Austria (*Abstract Co-Author*) Nothing to Disclose
Hisham M. Imam, MBBCH, MD, Assiut, Egypt (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess what can DW-MRI add to conventional parameters (Short axis diameter, presence or absence of hilum and presence or absence of necrosis) in prediction of malignant cervical lymphadenopathy.

METHOD AND MATERIALS

The study population included 72 patients having cervical lymphadenopathy underwent MRI with diffusion on 1.5T machine before they underwent biopsy. The cutoff short axis diameter (determined by ROC curve and Youden index), presence or absence of hilum, presence or absence of necrosis and cutoff ADC value (determined by ROC curve and Youden index) were assessed and finding their ability to predict malignant cervical lymphadenopathy each parameter alone, all parameters and comparing DW-MRI efficacy with that of conventional parameters.

RESULTS

The short axis diameter achieved 72.13%,45.45 %,88%,22.73% and 68.06% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively. Absent hilum criterion achieved 63.9%,27.3%, 83%,12% and 58.3% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively. Present necrosis criterion achieved 21.3%,72.7%,81.3%,14.3% and 29.2% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively. Combined conventional criteria achieved 86.9%,0%,82.8%,0% and 73.6% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively. The DWI with its cutoff ADC achieved 80.33%,63.64%, 92.45%,36.84% and 83.33% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively. The combined conventional parameters and DWI achieved 98.4%,0%,84.5%,0% and 83.3% sensitivity, specificity, positive predictive value, negative predictive value and accuracy respectively.

CONCLUSION

DWI is carrying the highest sensitivity, specificity and accuracy among all conventional parameters, each alone and nearby lower sensitivity with higher specificity and accuracy than combined conventional parameters, thus use of DWI added significant diagnostic value to the ability of conventional parameters to predict malignant cervical lymphadenopathy with no extra time consuming.

CLINICAL RELEVANCE/APPLICATION

DW-MRI is non invasive and non time consuming method that can predict malignancy in cervical lymphadenopathy and its addition to conventional parameters increases their sensitivity with no significant extra time consuming.

SSJ19-04 Proposal for an MRI-based Score to Differentiate Pleomorphic Adenoma and Warthin Tumor in Patients with Benign Parotid Neoplasms

Tuesday, Dec. 1 3:30PM - 3:40PM Location: N228

Participants

Beatrice Sacconi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Angelo Iannarelli, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Renato Argiro, Rome, Italy (*Presenter*) Nothing to Disclose
Marta Bottero, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Emanuela Basile, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Piero Cascone, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Mario Bezzi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic efficacy of an MRI-based score in the differential diagnosis between parotid pleomorphic adenoma (PA) and Warthin tumor (WT).

METHOD AND MATERIALS

Twenty patients (M=10, F=10; mean age=63.5 years, range=35-87) complaining of long-standing (stable for at least 3 months) painless parotid mass underwent a 3T MR (Discovery MR750, GE); T2-weighted, DWI and T1-weighted sequences before and after contrast administration (Gadobenic acid, 0,1 ml/Kg) were performed. The lesions were evaluated by three radiologists in consensus using a complex score based on three-point scales rating four different MR features (T2-signal intensity, Apparent Diffusion Coefficient values, enhancement pattern, bilateral/multiple location); total scores of ≤ 3 and > 3 were respectively considered as suggestive of PA or WT. Final diagnosis was based on pathology reports after US-guided fine-needle-aspiration cytology (FNAC) or surgical resection.

RESULTS

Twenty-four lesions were imaged; three lesions were excluded because of MR features suggesting less common histotypes (lipoma, sialolipoma, haemangioma, all confirmed at surgery). Radiologists correctly identified 6/6 PAs and 13/13 WTs; two lesions, defined as PAs, revealed to be an oncocytoma and a granulomatous lymph node (diagnostic accuracy 90.5%).

CONCLUSION

The score allowed the differential diagnosis in all cases of PAs and WTs; an oncocytoma and a granulomatous lymph node were misdiagnosed, but the incidence of benign lesions other than PA and WT is expected to be low. These data need to be confirmed in larger patient cohorts.

CLINICAL RELEVANCE/APPLICATION

In case of benign parotid lesions, the surgical plan depends on histology. MRI can suggest tumor histology in case of uncertain cytologic diagnosis and provide information over the entire neoplasm.

SSJ19-05 Parotid Gland Tumors: Diagnostic Value of Combining Conventional MR Imaging, Diffusion-weighted MR Imaging and Dynamic Contrast Enhanced MR Imaging

Tuesday, Dec. 1 3:40PM - 3:50PM Location: N228

Participants

Gongxin Yang, Shanghai, China (*Presenter*) Nothing to Disclose
Yu Qiang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Pingzhong Wang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Yingwei Wu, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Huimin Shi, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Wenjing Zhu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Xiao-Feng Tao, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Xin Gong, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Weiqing Gao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic value of the combination of echo-planner diffusion-weighted MR imaging (DWI), dynamic contrast enhanced MR imaging (DCE-MRI) and conventional MR imaging in the characterization of solid neoplasms from parotid gland.

METHOD AND MATERIALS

148 subjects (101 benign and 47 malignant) involved with parotid gland tumors were recruited in the study. Prior to surgery and pathologic verification, conventional maxillofacial MR imaging, DWI with b factor of both 0 and 1000 s/mm² and DCE-MRI were performed on each subject. Logistic regression analysis was performed to see differences of morphological MR features (margin, shape, envelope and signal intensity of masses) between benign and malignant groups. Mean ADC value was calculated from ADC map, and then ADC threshold values between benign and malignant tumors was obtained. Time-intensity curve (TIC) with parameters were obtained from DCE-MRI. Sensitivity, specificity, accuracy, and positive and negative predictive values were calculated for the combination of relative parameters.

RESULTS

Ill-defined margin, irregular shape, no envelope, ADC value lower than cut-off point of $1.12 \times 10^{-3} \text{ mm}^2/\text{s}$ and TIC pattern with time to peak less than 120s and low washout ratio ($< 30\%$) were the valuable parameters for predicting malignancy ($P=0.005, 0.004, 0.001, < 0.001, < 0.001$, respectively). However, no significant difference was found in signal intensity of tumors between benign and malignant lesions. A combination of ADC value and TIC pattern yielded a sensitivity, specificity and diagnostic accuracy of 91.5%, 97.0% and 95.3%, respectively. Positive and negative predictive value for distinguishing benign and malignant tumors was 93.5% and 96.1% respectively.

CONCLUSION

Conventional MR imaging combined DWI and DCE-MRI has the ability to improve the diagnostic accuracy in distinguishing between benign and malignant parotid gland tumors.

CLINICAL RELEVANCE/APPLICATION

It will be helpful for clinical diagnosis of Parotid gland tumors

SSJ19-06 Intravoxel Incoherent Motion Diffusion-weighted Magnetic Resonance Imaging for Monitoring of ZD6474 Therapy in Human Nasopharyngeal Carcinoma Xenografts

Tuesday, Dec. 1 3:50PM - 4:00PM Location: N228

Participants

Yanfen Cui, Shanghai, China (*Presenter*) Nothing to Disclose
Caiyuan Zhang, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Huanhuan Liu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Dengbin Wang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the value of intravoxel incoherent motion (IVIM) diffusion-weighted (DW) imaging biomarkers for monitoring the early response to ZD6474 in an experimental tumor model by quantitative assessments of tumor microcirculation parameters with histopathological validation.

METHOD AND MATERIALS

Twenty-four female BALB/c nude mice bearing human nasopharyngeal carcinoma xenografts were scanned at baseline and after 1, 3, and 7 days of treatment with ZD6474 (n = 12) or vehicle (n = 12) at a 3T magnetic resonance imager using a custom-built 8-channel receiver coil with 2.5cm inner diameter. For IVIM DW imaging, parameters including apparent diffusion coefficient (ADC), true diffusion coefficient (D), perfusion fraction (f), and blood pseudodiffusion coefficient (D*) were measured with 12 b-values ranging from 0 to 2000 s/mm². All IVIM DW imaging parameters at different time points were compared between the treated and control groups using Student's t tests or Mann-Whitney tests. Parameters were also analyzed within the treated group by one-way analysis of variance (ANOVA). The relationships between histopathological staining for Ki-67, TUNEL, or CD31 and all IVIM parameters were evaluated by Spearman's rank correlation.

RESULTS

The percent change of the perfusion-related parameters f and D* decreased significantly in the treated group as early as the 1-day follow-up compared with those in the control group. In contrast, the diffusion-related parameters ADC and D were significantly higher in the treated group compared with the control group beginning on day 3 (P < 0.05). The substantial decreases in f at day 1 and D* at day 3 were moderately correlated with the smaller increase in tumor size over the week-long study (r = 0.66 and 0.58, respectively; P < 0.05 for both). Moderate correlations were found between microvessel density and the perfusion-related parameters f and D* and between increased TUNEL index or decreased Ki-67 index and the diffusion-related parameters ADC and D.

CONCLUSION

IVIM DW imaging was sensitive to ZD6474-induced changes in the tumor microenvironment. In particular, the f parameter had the potential to allow early prediction of tumor response to anti-angiogenic treatment.

CLINICAL RELEVANCE/APPLICATION

IVIM DW imaging was sensitive to ZD6474-induced changes in the tumor microenvironment. In particular, the f parameter had the potential to allow early prediction of tumor response to anti-angiogenic treatment.

RC406

Head and Neck College Bowl! (An Interactive Session)

Tuesday, Dec. 1 4:30PM - 6:00PM Location: E450B



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

C. Douglas Phillips, MD, New York, NY (*Presenter*) Stockholder, MedSolutions, Inc Consultant, Guerbet SA
Richard H. Wiggins III, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose
Lawrence E. Ginsberg, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review important head and neck imaging differentials. 2) Recognize imaging appearances of common head and neck pathologies. 3) Understand important head and neck pathologies relationships to normal anatomy. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

A fun and light-hearted review of important head and neck imaging anatomy and pathology important differentials. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: <https://www.rsna.org/Honored-Educator-Award/>

Richard H. Wiggins III, MD - 2012 Honored Educator

RC410

Ultrasound Elastography

Tuesday, Dec. 1 4:30PM - 6:00PM Location: S406B



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC410A Thyroid Elastography

Participants

Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Corporation; Research Grant, Esaote SpA

LEARNING OBJECTIVES

1) Explain the difference between strain and shear wave elastography. 2) Understand the techniques to be able to perform thyroid ultrasound elastography. 3) Apply ultrasound elastography into routine clinical practice of thyroid nodules.

ABSTRACT

Thyroid nodules are very common and work-up of these nodules remains challenging. Fine needle aspiration has been the method of choice for diagnosing suspicious lesions with a sensitivity of 54%-90% and specificity of 60-96% for detection of malignant lesions. Malignant thyroid lesions are statistically stiffer than benign lesions. Ultrasound elastography can assess the stiffness of thyroid lesions. Several studies have been performed evaluating strain and shear wave elastography to characterize thyroid nodules. Strain elastography is qualitative while shear wave elastography is quantitative. These studies suggest that ultrasound elastography may improve sensitivity and specificity of characterizing thyroid lesions over B-mode imaging alone. There is a learning curve for performing adequate thyroid ultrasound elastography. Both cystic lesions and calcified lesions are difficult to evaluate with elastography. There is some overlap of stiffness values between benign and malignant thyroid nodules and elastography should not eliminate biopsy of suspicious lesions based on B-mode imaging. Stiff lesions on elastography should increase the suspicion for malignancy. This presentation will discuss the differences between strain and shear wave elastography, discuss technique and pitfalls in performing the examination, review the literature, and discuss published guidelines.

RC410B Renal Elastography: Where Are We?

Participants

Nicolas Grenier, MD, Bordeaux CEDEX, France, (nicolas.grenier@chu-bordeaux.fr) (*Presenter*) Advisory Board, Supersonic Imagine; Travel support, Guerbet SA

LEARNING OBJECTIVES

1) To become familiar with the advantages and limits of the different elastography technologies applied to kidney. 2) To understand the factors affecting reliability and reproducibility of elasticity measurement within the kidney. 3) To learn about the intrarenal changes responsible for elasticity changes. 4) To learn about the clinical impact of elasticity measurement in renal parenchymal diseases. 5) To learn about the clinical impact of elasticity measurement in renal tumors.

ABSTRACT

Ultrasound elastography is a new imaging technique under development that provides information about renal stiffness. Kidney elasticity quantification with ultrasound should be better performed with a quantitative technique, based on shear wave velocity measurements (ARFI or SSI methods). Kidney stiffness changes can be affected by mechanical factors such as external pressure induced by the probe and intrarenal characteristics such as tissue anisotropy, which is high in renal medulla, vascularization, which is high within the cortex, and hydronephrosis. Chronic kidney disease (CKD) incidence and prevalence are increasing in Western countries, due particularly to diabetes mellitus and hypertension-related nephropathies. During progression of such renal parenchymal diseases, cellular density may increase, mainly during acute inflammatory phases, and the interstitial matrix may be invaded by fibrosis. All components of these tissue changes may induce an increase of renal elasticity which is not specifically related to fibrosis. Tubular, glomerular, interstitial and vascular changes may also be responsible for an increase of stiffness. This is why, further studies are now necessary before to understand the real impact of elastography measurement in clinical nephrology. Considering characterization of renal tumors with elastography, clinical experience is still limited. Preliminary results show that benign tumors seem to have lower values of elasticity than malignant ones, but, here too, more experience is also necessary.

RC410C Liver Elastography

Participants

Paul S. Sidhu, MRCP, FRCR, London, United Kingdom, (paulsidhu@nhs.net) (*Presenter*) Speaker, Bracco Group; Speaker, General Electric Company

LEARNING OBJECTIVES

1) To understand the concept of liver fibrosis grading and the implications for healthcare management. 2) To review the basis for the assessment of liver fibrosis using elastography, with emphasis on the different techniques. 3) To understand the differences in the techniques and the variability in measurement assessment. 4) To achieve an overview of the need and position of this technique in clinical care.

ABSTRACT

Liver fibrosis and cirrhosis from many causes is an important cause of long term morbidity and mortality. Most cases are a consequence of chronic viral disease (Hepatitis B and C) with alcoholic liver disease an important aetiological factor. The degree of liver fibrosis, and the presence of established cirrhosis confer different management strategies, with imaging playing an important role in the non-invasive assessment of patients with chronic liver disease. Fibrosis grading traditionally performed using the Metavir or Ishak scoring system is essentially a histological grading system. Ultimately the possibility to avoid a liver biopsy is the aim, if a non-invasive technique can stage the grade of fibrosis, establishing correct patient management. Liver ultrasound elastography is a developing technique that offers this possibility, with varying methods of assessment ranging from strain methods and shear wave methods. These techniques will be explained, the status of the current standing of the techniques will be summarised, and the level of technology offered by different machines will be reviewed. An overall summary of the current status and the implications for clinical practice will be discussed.

MSRT41

ASRT@RSNA 2015: Face Transplantation and Surgical Planning

Wednesday, Dec. 2 8:00AM - 9:00AM Location: N230

HN

AMA PRA Category 1 Credit™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Presenter*) Research Grant, Toshiba Corporation;

LEARNING OBJECTIVES

1) To describe the principles of face transplantation from a surgical perspective. 2) Protocols for evaluation of bony structures, including 3D printed models. 3) Pre- and post- face transplantation vasucular imaging to define and follow-up the vascular anastomoses. 4) Detail insights of transplantation biology enable by 320-detector row CT.

ABSTRACT

Face transplantation is now accepted as the only option to restore form and function in patients with severe facial deformity. The transplanted tissue comes from an organ donor and is called an "allograft". The allograft tissues can include bone, regions of forehead, eyelid, nose, lips, chin, and cheeks. Surgical planning uses CT, MR, and 3D printed models typically printed from CT images. For all steps, the radiology technologist plays a critical role working in concert with the radiologists and surgeons. Bone is shown in 3d reformatted images and 3D printed models. The vascular anastomosis is the most critical aspect for successful engraftment. CT angiography (CTA) noninvasively images vessels for anastomoses. Patients typically have altered vascular anatomy of the external carotid circulation because of the injury and/or lesions that require face transplantation. Both arterial and venous mapping is required. Post-operatively, both CTA and MRA are used to evaluate patients for surveillance and when potential complications arise. Volumetric rendering of all relevant structures is important in surveillance and can be achieved by 3D printing soft tissue structures. Post-operative CTA has yielded insights to the vascular physiology and pathology of tissue transplantation.

RC506

Sinonasal and Orbital Imaging

Wednesday, Dec. 2 8:30AM - 10:00AM Location: S406B



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC506A Sinonasal Inflammatory Disease

Participants

Rebecca S. Cornelius, MD, Cincinnati, OH (*Presenter*) Stockholder, Gilead Sciences, Inc; Stockholder, HCP, Inc; Stockholder, CVS Health Corporation; Stockholder, 3M Company; Spouse, Stockholder, Gilead Sciences, Inc; Spouse, Stockholder, HCP, Inc; Spouse, Stockholder, CVS Health Corporation; Spouse, Stockholder, 3M Company; Spouse, Stockholder, Celgene Corporation; Spouse, Stockholder, E. I. du Pont de Nemours & Company

LEARNING OBJECTIVES

1) Recognize imaging findings in chronic rhinosinusitis. 2) Recognize imaging findings of orbital and intracranial complications of sinonasal inflammatory disease. 3) Differentiate between types of fungal sinus disease.

Active Handout: Rebecca Sue Cornelius

[http://abstract.rsna.org/uploads/2015/15001949/Active RC506A.pdf](http://abstract.rsna.org/uploads/2015/15001949/Active_RC506A.pdf)

RC506B Sinonasal Tumors

Participants

Iлона M. Schmalfluss, MD, Gainesville, FL, (schmai@radiology.ufl.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe differentiating imaging features between the different sinonasal tumors. 2) Discuss extension patterns of sinonasal malignancies. 3) Outline critical areas of involvement that impact treatment of sinonasal tumors.

RC506C Orbital Differential Diagnosis

Participants

Michelle A. Michel, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recommend optimal imaging modality for evaluating diverse pathology of orbit. 2) Discuss approach to orbital lesion diagnosis based upon patterns of disease, patient demographics, and presenting symptoms. 3) Recognize orbital pathologies occurring in key differential diagnoses.

ABSTRACT

Sinonasal Inflammatory Disease Rhinosinusitis is one of the most commonly diagnosed diseases in the United States, affecting >16% of the US population annually. There are acute, subacute and chronic forms defined by duration. Imaging is indicated in patients with chronic disease. Complications of rhinosinusitis include spread into adjacent superficial tissues, orbital extension and intracranial extension. Types of sinusitis will be defined, characteristics of chronic disease and fungal disease discussed and imaging examples of complications reviewed. Sinonasal Tumors Sinonasal tumors (benign and malignant) present with non-specific symptoms such as nasal obstruction or drainage, leading to work up with CT. Associated facial, oral, ocular, or central nervous system symptoms should raise the concern for an advanced, often malignant tumor and evaluated with MRI. Distinguishing imaging features will be presented for the different sinonasal tumors to facilitate the correct diagnosis, prevent complications, determine the extent of the tumor, and provide accurate staging for optimal treatment planning purposes and improved patient prognosis. Orbital Differential Diagnosis Orbital pathology is diverse and lesions can appear similar on imaging. There are differential diagnoses (DDx) to understand that aid in making an accurate diagnosis. Clinical information should also be correlated with imaging findings. The DDx's that will be discussed include: intraocular lesions, ocular calcification, optic nerve-sheath complex lesions, intraconal lesions, extraconal lesions, extraocular muscle enlargement, infiltrative lesions, and lacrimal gland lesions. Although there are a large number of pathologies that can affect the orbit, knowledge of these key differential diagnoses, patterns of disease, and clinical features can be very helpful to the imager in distinguishing these lesions.

Active Handout: Michelle A. Michel

<http://abstract.rsna.org/uploads/2015/15001951/RC506C-Active.pdf>

RC522

Personalized Medicine: Head and Neck

Wednesday, Dec. 2 8:30AM - 10:00AM Location: S102D

HN **NR** **RO** **PH**

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Kristy K. Brock, PhD, Ann Arbor, MI (*Moderator*) License agreement, RaySearch Laboratories AB;

ABSTRACT

Sub-Events

RC522A IGRT and Anatomical Adaptation

Participants

Emilie Soisson, PhD, Montreal, QC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the evolution of adaptive radiotherapy and relevant technological advances as they pertain to head and neck radiotherapy. 2) Understand the clinical rationale for plan adaptation in the head and neck patient population. 3) Describe possible routes to clinical implementation. 4) Discuss risks associated with adaptive planning workflows and appropriate quality assurance.

ABSTRACT

This session will focus on the practical implementation of adaptive radiotherapy for head and neck cancer. Although the concept of adaptive radiation therapy (ART) has been around for more than two decades, routine plan adaptation has not become standard practice in the management of head and neck cancer despite huge technological advances in imaging, image registration software, and dose calculation speed. The remaining challenges in implementing ART for head and neck cancer in 2015 as well as an update of the demonstrated clinical need will be discussed. Features of successful adaptive radiotherapy implementations will be highlighted as well as a summary of useful clinical tools and required quality assurance.

RC522B Functional Targeting and Adaptation

Participants

Robert Jeraj, Madison, WI (*Presenter*) Founder, AIQ Services

LEARNING OBJECTIVES

1) To learn about appropriate anatomical and imaging modalities for selection and delineation of target volumes in HN. 2) To learn about biologically conformal approaches (dose painting) in HN. 3) To learn about quantitative imaging requirements for RT in HN.

ABSTRACT

Anatomical and molecular imaging is used to tailor radiation treatment by enabling proper selection and delineation of target volumes and organs, which in turn lead to dose prescriptions that take into account the underlying tumor biology. Dose modulation to different parts of target volume may also be used to match variable tumor radiosensitivity (so-called biologically conformal radiotherapy or dose-painting). For accurate implementation of targeted and adaptive IMRT, tools and procedures, such as accurate image acquisition and reconstruction, automatic segmentation of target volumes and organs at risk, non-rigid image and dose registration, and dose summation methods, need to be developed and properly validated.

SSK14

Neuroradiology/Head and Neck (Head and Neck Tumors)

Wednesday, Dec. 2 10:30AM - 12:00PM Location: N229

HN NR MR

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Suresh K. Mukherji, MD, Northville, MI (*Moderator*) Nothing to Disclose
Yoshimi Anzai, MD, Salt Lake Cty, UT (*Moderator*) Nothing to Disclose

Sub-Events

SSK14-01 Application of Diffusion-weighted Imaging and Dynamic Contrast-enhanced MRI in Differentiating Nasopharyngeal Carcinoma and Nasopharyngeal Lymphoma

Wednesday, Dec. 2 10:30AM - 10:40AM Location: N229

Participants

Chengru Song, Zhengzhou, China (*Presenter*) Nothing to Disclose
Jingliang Cheng, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yong Zhang, DO, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Shanshan Xie, BMedSc, MMed, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Mengtian Ssun, Zheng-Zhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the utility of dynamic contrast-enhanced MRI and diffusion weighted imaging (DWI) in the differentiation of nasopharyngeal carcinoma (NPC) and nasopharyngeal lymphoma (NPL).

METHOD AND MATERIALS

Forty-two patients with pathologically confirmed NPC and 27 patients with NPL were recruited and underwent conventional MRI and dynamic contrast-enhanced MRI. The MR signals, time signal-intensity curves (TIC) types, time to peak (TTP), enhancement peak (EP), maximum contrast enhancement ratio (MCER), mean apparent diffusion coefficient (ADC) value, and relative apparent diffusion coefficient (rADC) value of all the subjects were calculated and analyzed, thereafter, inter-group comparison was performed. The threshold values of ADC and rADC for differentiating NPC from NPL were determined using a receiver operating characteristic curve (ROC) analysis.

RESULTS

For NPC group, 32 cases (76.19%) demonstrated obvious heterogeneous enhancement. The mean TTP, EP, MCER and WR were (48.29±12.20)s, 1475.38±77.76, (136.89±24.41)% and 16.81±8.36, respectively. For NPL group, 24 cases (88.89%) demonstrated obvious homogeneous enhancement. The mean TTP, EP, MCER and WR were (63.21±14.29)s, 1161.82±64.04, (113.47±28.52)% and 7.39±6.21, respectively. The ADC value and rADC value were (842.34±94.66)×10⁻⁶ mm²·s⁻¹ and 0.74±0.08 in NPC, whereas (652.15±83.47)×10⁻⁶ mm²·s⁻¹ and 0.56±0.08 in NPL. The differences of TTP, EP, MCER, WR, ADC, rADC between NPC and NPL were statistically significant (P<0.05). The TTP of NPC was lower than that of NPL, whereas the opposite for the remaining parameters. The best differentiate threshold value of ADC and rADC were 736.5×10⁻⁶mm²·s⁻¹, 634.0×10⁻⁶mm²·s⁻¹, respectively. While the areas under the ROC curve (AUC), sensitivity, specificity and Youden index of ADC and rADC were 0.943, 0.909, 0.852, 0.761, and 0.951, 0.955, 0.852, 0.77, respectively. rADC value was slightly superior to ADC value in differentiating NPC from NPL.

CONCLUSION

DWI and Dynamic contrast-enhanced MRI are effective in differentiating NPC from NPL.

CLINICAL RELEVANCE/APPLICATION

Dynamic contrast-enhanced MRI and DWI can be applied in the differential diagnosis of NPC from NPL.

SSK14-02 Finding the Primary: Detection of Cervical CUP Based on Integrated PET/MRI versus MRI Alone

Wednesday, Dec. 2 10:40AM - 10:50AM Location: N229

Participants

Lale Umutlu, MD, Essen, Germany (*Presenter*) Consultant, Bayer AG
Markus Ruhlmann, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas C. Lauenstein, MD, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang Sauerwein, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Benedikt M. Schaarschmidt, MD, Dusseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Forsting, MD, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marc U. Schlamann, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Verena Ruhlmann, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate and compare the diagnostic potential of 18F-FDG PET/MRI to MRI alone for detection of a potential primary cancer in patients suspect for cervical CUP (cancer of unknown primary).

METHOD AND MATERIALS

A total of 21 patients with suspected cervical CUP underwent a simultaneous 18F-FDG PET/MRI examination (Biograph mMR, Siemens). The scan protocol comprised: 1) T1 TSE, 2) T2 TSE, 3) DWI, 4) T1 fs post-contrast VIBE and 5) T1 fs TSE imaging after the application of 0.05 mmol kg/bw Gadoteric acid (Dotarem, Guerbet). The corresponding datasets (PET/MRI and MRI alone) were read separately by two radiologists for detection and identification of potential primary cancer lesions (2 point ordinal scale), lesion conspicuity as well as diagnostic confidence (3 point ordinal scale). All available data (histology, prior examinations, PET/MRI, follow-up examinations) served as standard of reference. Mean values were compared using Wilcoxon rank sum test.

RESULTS

Cervical primary cancer was present in 13 of 21 patients. 18F-FDG PET/MRI enabled correct identification of all 13 (100%), while MRI alone allowed for detection of 9/13 malignancies (69.4%). Lesion conspicuity and diagnostic confidence were rated significantly higher for 18F-FDG PET/MRI compared to MRI alone datasets (e.g. diagnostic confidence: PET/MRI:2.7±0.3; MRI alone 1.8±0.5; $p < 0.05$).

CONCLUSION

PET/MRI was shown to be superior towards MRI alone for detection of cervical CUP, offering a significantly higher diagnostic confidence in the discrimination of malignant lesions.

CLINICAL RELEVANCE/APPLICATION

Based on the significantly improved detection of malignant lesions while maintaining equal acquisitions times to MRI alone, integrated PET/MRI can be considered a highly valuable tool for assessment of cervical CUP.

SSK14-03 Post-treatment Change versus Recurrence of Squamous Cell Carcinoma in the Head and Neck: Histogram Analysis of the Area under the Curves Ratio from Dynamic Contrast-enhanced T1-weighted Perfusion MRI

Wednesday, Dec. 2 10:50AM - 11:00AM Location: N229

Participants

Se Jin Cho, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeong Hyun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Hyun Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Eun Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Darlene Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mi Sun Chung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyo Weon Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Jun Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hwan Baek, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the predictive value of the histogram parameters of AUCR (initial and final area under the time signal-intensity curves ratio) derived from dynamic contrast-enhanced perfusion MR imaging (DCE MRI) for differentiation of tumor recurrence from post-treatment change of in patients with squamous cell carcinoma in the head and neck (HNSCC).

METHOD AND MATERIALS

Forty-six patients after definitive treatment for HNSCC with contrast-enhancing lesions at the primary sites on follow-up MRI were assessed using conventional and DCE MRI. We calculated and correlated the time signal-intensity curve parameters (initial and final area under the time signal-intensity curves, the maximum signal-intensity from time of arrival to time to peak (Emax), the time at Emax (Tmax), initial slope of signal-intensity increase) and the cumulative histogram parameters of AUCR (AUCR50, AUCR75, AUCR90 and AUCR95) with the final pathologic or clinical diagnosis. The best predictor for differentiation of tumor recurrence from post-treatment change was determined by receiver operating characteristic curve analyses. We assessed the added value of AUCR histogram parameters to inconclusive results of conventional MRI alone after blinded review of conventional MR images by a neuroradiologist.

RESULTS

46 patients were subsequently classified as having tumor recurrence (n=17) or post-treatment change (n=29). Tumor recurrence group showed significantly shorter Tmax and significantly higher AUCR50, AUCR75 and AUCR90 compared to those of post-treatment change group ($P < 0.05$). AUCR90 was the best predictor for tumor recurrence ($A_z = 0.77$; 95% CI, 0.64-0.91) with the estimated cut-off of 1.02. When AUCR90 was added on inconclusive results of conventional MRI alone, 17.6 % of recurrent tumors were more detected without significant difference in the diagnostic specificity.

CONCLUSION

Tumor recurrence of HNSCC can be differentiated from post-treatment change by using the histogram parameters of AUCR. The added value of AUCR histogram analysis is 17.6 % of more detection of recurrent tumors without compromise of diagnostic specificity.

CLINICAL RELEVANCE/APPLICATION

Our study signifies that recurrent HNSCC can be differentiated from post-treatment change by using the histogram parameters of AUCR. The added value of AUCR90 on inconclusive results of conventional MRI alone is 17 % more detection of tumor recurrence without compromise of diagnostic specificity

SSK14-04 Gaussian and non-Gaussian Diffusion MRI of the Head and Neck: The Effect of the Choice of B Values

Wednesday, Dec. 2 11:00AM - 11:10AM Location: N229

Participants

Mami Iima, MD, PhD, Kyoto, Japan (*Presenter*) Nothing to Disclose
Akira Yamamoto, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose

Shigeru Hirano, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Tateya, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Morimasa Kitamura, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kaori Togashi, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Nihon Medi-Physics Co, Ltd Research Grant, Shimadzu Corporation Research Grant, Toshiba Corporation Research Grant, Covidien AG

PURPOSE

Diffusion MRI has been widely used for the diagnosis and monitoring of head and neck lesions. Non-Gaussian diffusion parameters (e.g. mean diffusion, ADC₀, and kurtosis, K) have the potential to provide important information on tissue microstructure beyond ADC. The aim of this study was to investigate the value of quantitative diffusion assessment in the diagnosis of head and neck lesions.

METHOD AND MATERIALS

This IRB approved prospective study included 46 (27 malignant/19 benign) patients suspected of head and neck tumors between June 2014 and February 2015. Head and neck MRI was performed using a 3-T system equipped with a dedicated 16-channel head and neck coil. A read-out segmented EPI (RS-EPI) sequence combined with GRAPPA parallel acquisition and 2D-navigator-based reacquisition was used with 9 b values of 0, 75, 150, 300, 600, 1000, 1400, 1800, 2200 sec/mm². Parametric maps of Gaussian and non-Gaussian diffusion parameters (K, ADC₀ and ADC) were generated by fitting the diffusion MRI signal using variable combinations of b values.

RESULTS

The performance (AUC) of ADC₀-1400 (ADC derived from b values of 0 and 1400) (0.802) was higher than ADC₀-600 or ADC₀-1000 (0.753, 0.748) and ADC₁₅₀-1400 (0.768). AUC of ADC₀-1400 was significantly higher than that of ADC₁₅₀-1000 (0.727, P<0.05). K or ADC₀ (0.71, 0.685, using all b values) didn't significantly change depending on the choice of b values, and gave the different information than ADC on their parametric maps.

CONCLUSION

The choice of b values could significantly affect the diagnostic performance of ADCs in head and neck lesions. Non-Gaussian diffusion parameters showed stable results regardless of the choice of b values, and their parametric maps have the potential to provide new information on tumor characteristics in addition to ADC.

CLINICAL RELEVANCE/APPLICATION

Non-Gaussian diffusion parameters beyond ADC give the stable results regardless of the choice of b values in head and neck lesions, easier to make comparison between facilities.

SSK14-05 Differentiation of Malignant and Benign Solid Nodules of the Thyroid Gland on Unenhanced Computed Tomography

Wednesday, Dec. 2 11:10AM - 11:20AM Location: N229

Participants

Ahmed-Emad Mahfouz, MD, Doha, Qatar (*Presenter*) Nothing to Disclose
Hanan Sherif, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose
Ahmed Sayedin, MBBCh, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The natural iodine content of benign thyroid nodules may be higher than that of malignant nodules. The purpose of this study is to assess the value of unenhanced computed tomography (CT) in differentiation of malignant and benign solid nodules of the thyroid gland based on this hypothesis.

METHOD AND MATERIALS

80 patients with solid thyroid nodules, initially seen on ultrasonography have been examined by an identical protocol of unenhanced and contrast-enhanced CT, including 48 patients with pathologically-proven thyroid carcinoma and 32 patients with pathologically-proven nodular goiter. The attenuation value of the lesions on unenhanced CT has been measured. Statistical analysis has been done by the Student's t- test and the Chi-square test.

RESULTS

The attenuation value of malignant nodules on unenhanced CT has been 34±11 HU, while the attenuation value of benign nodules has been 56±21 HU. The difference has been statistically significant (p< 0.001). When the cut-off value for diagnosis of malignancy is ≤50 HU, the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for the diagnosis of malignancy have been 89.6%, 68.8%, 81.1%, 81.5%, and 81.3% respectively compared to 72.9%, 71.9%, 79.5%, 63.9%, and 72.5% at a cut-off value of ≤40 HU and 93.8%, 53.1%, 75.0%, 85.0%, and 77.5% at a cut-off value of ≤55 HU respectively.

CONCLUSION

Malignant thyroid nodules have a statistically-significant lower attenuation value than benign nodules on unenhanced CT. Attenuation value ≤50 HU has an accuracy of 81.5% for diagnosis of thyroid carcinoma.

CLINICAL RELEVANCE/APPLICATION

Unenhanced CT of the thyroid gland may be useful in differentiation of benign and malignant nodules of the thyroid and needs therefore to be included as part of the protocol of CT of the thyroid gland.

SSK14-06 Prospective Assessment of the Accuracy of Radiologic CT Staging of Extrinsic Tongue Muscle Involvement in Oral Cavity Cancer

Wednesday, Dec. 2 11:20AM - 11:30AM Location: N229

Participants

Jacqueline Junn, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Kristen L. Bagnon, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Eduardo Lacayo, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Patricia A. Hudgins, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Kelly Magliocca, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Mark El-Deiry, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
J T. Wadsworth, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Mihir Patel, R., Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Jonathan J. Beitler, MD, MBA, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Ashley H. Aiken, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Pre-operative imaging plays an important role in staging advanced oral cavity cancer (OCC) treated with surgical resection followed by chemoradiation. Extrinsic tongue muscle invasion (ETMI) was added as a T4a classification in the 3rd edition of AJCC. The purpose of this prospective study was to examine the accuracy of preoperative contrast enhanced CT (CECT) and surgical assessment of ETMI using pathologic evaluation as the gold standard.

METHOD AND MATERIALS

This IRB approved prospective study recruited 34 consecutive patients with primary OCC between August 2014 and February 2015. Inclusion criteria were untreated primary OCC, available pre-operative CECT and surgical resection with pathological gross examination. Two neuroradiologists blindly reviewed the images for ETMI using the following scale: yes (Y), probably yes (PY), no (N), and probably no (PN). Three Head and Neck surgeons assessed for ETMI intra-operatively using the scale: Y, N or indeterminate. A single pathologist reviewed all gross examination notes for ETMI.

RESULTS

Twenty-five of the 34 patients met inclusion criteria. Six patients had pathologically proven ETMI. For statistical analysis, a radiologic score of yes/probably yes was scored as a yes and no/probably no as a no. Sensitivity (SN), specificity (SP), positive predictive value (PPV) and negative predictive value (NPV) for Radiologist 1 and 2 were: 83%, 84%, 62.5%, and 94%, and 100%, 84%, 67%, and 100%, respectively. Two intra-operative cases rated indeterminate by the surgeons were considered a no, leading to an overall intraoperative assessment SN, SP, PPV, and NPV of: 80%, 100%, 100%, 95%.

CONCLUSION

Although this preliminary study suggests that imaging findings on CECT may have a higher SN but lower SP than surgical observation, both radiographic and surgical determination of ETMI had equivocal cases. This highlights the importance of systematic assessment of the gross specimen to facilitate accurate pathologic ETMI to minimize unnecessary upstaging. Ongoing investigation with specific pathologic focus on ETMI would be needed to confirm the reproducibility of pathologic staging and follow up of clinical outcomes to determine the clinical significance.

CLINICAL RELEVANCE/APPLICATION

Radiographic ETMI should be verified with pathological findings and interdisciplinary communication between pathologists, surgeons, and radiologists to minimize unnecessary upstaging.

SSK14-07 Short-Term Effects of Concurrent Radiochemotherapy on Hypopharyngeal and Laryngeal Squamous Cell Carcinoma: Evaluated with Dual-Energy CT Quantitative Parameters

Wednesday, Dec. 2 11:30AM - 11:40AM Location: N229

Participants

Liang Yang, Beijing, China (*Presenter*) Nothing to Disclose
Dehong Luo, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yanfeng Zhao, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Li Lin, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Meng Lin, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the value of dual-energy spectral computed tomography(CT) quantitative parameters in predicting short-term effects of concurrent radiochemotherapy on hypopharyngeal and laryngeal squamous cell carcinoma(SCC), and provide valuable evidence for early judging the response of the tumor to therapy in clinical practice.

METHOD AND MATERIALS

This study was approved by the ethics committee and all patients provided written informed consent. Spectral parameters of 34 patients with laryngeal and hypopharyngeal SCC who underwent dual-energy spectral CT(GE Discovery CT 750 HD) scan with spectral mode before therapy were analyzed retrospectively, all cases were proven by pathological findings. Spectral parameters contained IC-L (iodine concentration of lesion), WC-L (water concentration of lesion) and λ HU (slope of spectral HU curve), which were obtained by analyzing pretherapy CT scan data with GSI Volume Viewer software in AW4.6 workstation. The following scans were taken at the 4th week after concurrent radiochemotherapy ended. By therapeutic effects, all patients were divided into treatment-sensitivity group (28 cases) and treatment-resistant group (6 cases). Parameters between two groups were compared, and the diagnosis experiment was evaluated.

RESULTS

Mean IC-L and λ HU in treatment-sensitivity group were 16.80 ± 4.61 mg/cm³, 2.28 ± 0.63 respectively, while the two parameters were 23.84 ± 5.04 mg/cm³, 3.23 ± 0.68 in the other group. IC-L and λ HU were significantly different between two groups ($P < 0.05$).

However, WC-L was showing no significant difference ($P > 0.05$). Receiver operating characteristic (ROC) analysis of IC-L, and λ HU in prediction of treatment-sensitivity showed: AUC (the area under curve) of IC-L was 0.81, larger than the AUC of λ HU (AUC=0.79). With $IC-L \leq 18.43$ mg/cm³ as diagnosis threshold in prediction of treatment-sensitivity, the sensitivity, specificity, positive predictive value, negative predictive and Youden's index value were 72.73%, 83.33%, 88.89%, 62.50%, 0.56 respectively.

CONCLUSION

IC-L could be helpful in the prediction short-term effects of concurrent radiochemotherapy on hypopharyngeal and laryngeal squamous cell carcinoma.

CLINICAL RELEVANCE/APPLICATION

Dual-energy spectral CT has a potential value in clinical treatment options of hypopharyngeal and laryngeal SCC.

SSK14-08 Role of Magnetic Resonance Imaging in Thyroid Nodules ; Evaluation of the Magnetic Resonance Spectroscopy and Diffusion Weighted in Differentiating Benign from Malignant Thyroid Nodules

Wednesday, Dec. 2 11:40AM - 11:50AM Location: N229

Participants
Pratiksha Yadav, Pune, India (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic benefits of MRI in evaluation of thyroid lesion To evaluate the role of DWI WITH ADC mapping To evaluate the characteristic pattern of MR spectroscopy in various benign and malignant pathologies of thyroid

METHOD AND MATERIALS

This is prospective study carried out in 39 patients with already known thyroid nodules diagnosed on ultrasonography. All studies were done on 1.5 T Siemens Magnetom machine. Precontrast T1WI sagittal, axial, STIR, T2WI coronal and axial, post contrast fat saturated axial T1WI were taken. DWI with ADC mapping, single voxel MR spectroscopy were also done. Findings of MRI correlate with the final diagnosis on histopathological examination

RESULTS

Study was done on 39 cases. There were 19 cases of multinodular goiter, 5 cases of adenomas, 6 cases of thyroiditis and 9 cases of malignant lesion. The mean ADC value of the thyroid malignant lesion was significantly lower than the mean ADC value of thyroid benign lesions. High Choline peak was observed in the malignant lesions. Sensitivity of combined DW, ADC mapping and MRS show sensitivity of 98.9% sensitivity to detect the malignant lesion with specificity of 93.4%

CONCLUSION

Thyroid lesions routine imaging could not differentiate malignant lesion from benign lesion. Diffusion weighted imaging with ADC mapping and Magnetic resonance Spectroscopy are good noninvasive investigation to diagnose malignancy.

CLINICAL RELEVANCE/APPLICATION

MRI evaluation of thyroid lesions combined with DWI & MRS are a good noninvasive test to diagnose the malignant lesion. It is useful to see the extent of the tumor, involvement of the surrounding structures, retrosternal extension and lymph nodal involvement.

SSK14-09 Prediction Study on Energy Spectrum Parameters in Larynx and Hypopharyngeal Squamous Cell Carcinoma with Different Pathological Grades

Wednesday, Dec. 2 11:50AM - 12:00PM Location: N229

Participants
Liang Yang, Beijing, China (*Presenter*) Nothing to Disclose
Dehong Luo, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yanfeng Zhao, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Lin Li, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Meng Lin, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To discuss the effect of energy spectrum parameters in sDECT (single-source dual-energy spectral CT) on evaluating larynx and hypopharyngeal squamous cell carcinoma (SCC) with different pathological grades.

METHOD AND MATERIALS

Retrospective analysis was carried out in 60 patients with confirmed pathological diagnosis of larynx and hypopharyngeal SCC from January to August in 2014. They were all scanned by sDECT (Discovery CT 750 HD) before treatment. After scanning, all data was analyzed with GSI Volume Viewer software of GE AW4.6 workstation. IC-L (iodine concentration of lesion), WC-L (water concentration of lesion), s-SHC (slope of spectral HU curve), CT value in 70KeV monoenergetic image, IC-C (iodine concentration of carotid sinus), WC-C (water concentration of carotid sinus), sIC (standardized IC) and sWC (standardized WC). According to cell differentiation, all the patients were divided into low differentiated group and mid-high differentiated group. Parameters between two groups were compared, and the diagnosis experiment was evaluated.

RESULTS

Mean IC-L, s-SHC and sIC in low differentiated group were 15.61 mg/cm³ \pm 5.06 mg/cm³, 2.07 ± 0.77 and 15.61 mg/cm³ \pm 5.06 mg/cm³ respectively, while the three parameters were 20.29 ± 7.40 mg/cm³, 2.68 ± 1.04 and 20.29 ± 7.40 mg/cm³ in the other group. All three parameters were significantly different between two groups ($P < 0.05$). However, WC-L, CT value and sWC were showing no significant difference ($P > 0.05$). ROC (receiver operating characteristic) analysis of IC-L, s-SHC, and sIC in prediction of low differentiated larynx and hypopharyngeal SCC showed: AUC (the area under curve) of sIC was 0.79, larger than the AUC of IC-L and s-SHC. AUC difference between s-SHC and sIC was significant ($P < 0.05$), while it was not significant between IC-L and sIC ($P > 0.05$). With $sIC > 5$ as diagnosis threshold in prediction of low differentiated SCC, the sensitivity, specificity, positive predictive

value and negative predictive value were 84.21%, 75.61%, 61.5% and 91.2% respectively.

CONCLUSION

sIC could be helpful in the prediction of larynx and hypopharyngeal SCC with different pathological grades.

CLINICAL RELEVANCE/APPLICATION

sDECT maybe a potential method for judgeing the differentiation of pathological grade of Larynx and Hypopharyngeal SCC

MSES44

Essentials of Neuro Imaging

Wednesday, Dec. 2 3:30PM - 5:00PM Location: S100AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

MSES44A Cystic Neck Masses

Participants

Barton F. Branstetter IV, MD, Pittsburgh, PA, (BFB1@pitt.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Categorize cystic neck masses in adults and children. 2) Indicate specific differentiating diagnostic criteria.

ABSTRACT

A nonenhancing, fluid-filled mass is a common finding on cross-sectional imaging of the neck. The location of the mass and its relationship to surrounding structures are critical for categorization of the mass and for providing a specific diagnosis. While congenital causes of cystic neck masses are often discussed, they are less frequent than infectious, developmental, or neoplastic causes. The purpose of this session is to review common and uncommon causes of cystic neck masses and to review the imaging characteristics that differentiate them. Potential pitfalls of imaging will be emphasized.

Active Handout: Barton F. Branstetter

<http://abstract.rsna.org/uploads/2015/15001762/MSES44A.pdf>

MSES44B Adult Orbital Neoplasms

Participants

Tanya J. Rath, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the relevant compartmental anatomy of the orbit. 2) Differentiate the characteristic imaging features of benign and malignant adult orbital neoplasms. 3) Define the role of cross-sectional imaging in the management of orbital neoplasms. 4) Review non-neoplastic mimics of orbital neoplasms.

ABSTRACT

Cross-sectional imaging complements ophthalmologic examination in the evaluation of orbital neoplasms. A relevant succinct differential diagnosis for an orbital mass can be generated based on the morphology, location and extent of a lesion. MRI is critical for treatment planning by characterizing the orbital compartments involved and assessing for intracranial and perineural spread of disease. The purpose of this session is to review the characteristic imaging features of benign and malignant orbital neoplasms. Non-neoplastic processes that can mimic orbital neoplasms will also be discussed. Imaging findings that affect management will be emphasized.

Active Handout: Tanya Jaitley Rath

<http://abstract.rsna.org/uploads/2015/15001763/MSES44B AA 12.2.15 FINAL RSNA ORBITS.pdf>

MSES44C Imaging Dementia and Memory Loss

Participants

Meike W. Vernooij, MD, Rotterdam, Netherlands, (m.vernooij@erasmusmc.nl) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the minimum requirements for an MRI protocol to image patients suspected of dementia. 2) Read scans from a memory clinic in a standardized way, using available rating scales. 3) Construct a structured radiological report with useful recommendations for the referring clinician.

Active Handout: Meike Willemijn Vernooij

http://abstract.rsna.org/uploads/2015/15001764/MSES44C handouts_RSNA 2015_Meike Vernooij.pdf

MSSR44

RSNA/ESR Emergency Symposium: General Principles, Pediatric and ENT Emergencies (An Interactive Session)

Wednesday, Dec. 2 3:30PM - 5:00PM Location: S402AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Ronald J. Zagoria, MD, San Francisco, CA, (ron.zagoria@ucsf.edu) (*Moderator*) Nothing to Disclose
Andras Palko, MD, PhD, Szeged, Hungary (*Moderator*) Medical Advisory Board, Affidea Group;

Sub-Events

MSSR44A Polytrauma

Participants

Ulrich Linsenmaler, MD, Munich, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate general principles of diagnostic imaging in Emergency Radiology in traumatic and non-traumatic emergencies. 2) Analyze ethiology, background and management of common radiological emergencies. 3) Identify the role, indications and protocols for US, CR, MDCT in modern emergency radiology.

ABSTRACT

Multiple trauma / polytrauma remains the leading cause of death in a patient population below the age of 45 years. Modern Emergency Radiology plays today a key role in an interdisciplinary team guiding diagnosis and treatment in the initial clinical workup. This lecture will cover the following topics: To describe background, incidence and regional differences in patients with polytrauma / multiple trauma. To appreciate the clinical significance and to analyze critical triage criteria to undergo ER / shock room admission and concepts of initial clinical management (ATLS). To review imaging techniques and radiological management and logistic concepts for patients with polytrauma / multiple trauma within a clinical algorithm. To review the use of whole body computed tomography (WBCT), CTA as well as conventional radiography (CR) and ultrasound (US) in the initial work-up. To describe common and uncommon imaging findings. Image reading and data management, individualized CT protocols and outcome control.

MSSR44B Challenges of Imaging Pediatric Abdominal Emergencies

Participants

Susan D. John, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the variations of pathology that cause abdominal pain and vomiting in infants and children. 2) Plan safe and effective imaging protocols using US, CT, and MRI. 3) Recognize pitfalls in the diagnosis of pediatric abdominal emergencies with imaging.

ABSTRACT

MSSR44C Imaging in ENT Emergencies

Participants

Diego B. Nunez JR, MD, MPH, New Haven, CT, (diego.nunez@yale.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Analyze imaging findings in patients presenting with acute head and neck conditions using a systematic spatial approach. 2) Demonstrate understanding of the role and indications of CT and MR in acute non-traumatic ENT case management. 3) Identify the extent of disease and recognize specific complications of cervicofacial infections.

ABSTRACT

MSCN51

Case-based Review of Neuroradiology (An Interactive Session)

Thursday, Dec. 3 8:30AM - 10:00AM Location: S100AB

HN NR

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Pina C. Sanelli, MD, Manhasset, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve basic knowledge and skills relevant to clinical practice. 2) Practice formulating a differential diagnosis for pathologic diseases involving the brain, spine, head and neck. 3) Apply principles of critical thinking to challenging diagnostic imaging cases.

ABSTRACT

The learning objectives are to enable attendees to: 1. Improve basic knowledge and skills relevant to clinical practice. 2. Practice formulating a differential diagnosis for pathologic diseases involving the brain, spine, head and neck. 3. Apply principles of critical thinking to challenging diagnostic imaging cases.

Sub-Events

MSCN51A Adult Brain

Participants

Pamela W. Schaefer, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the key neuroimaging characteristics of various adult cerebral disease entities. 2) Use pertinent imaging features and key clinical factors to formulate a pertinent differential diagnosis for various adult cerebral pathologies. 3) Discuss the utility of various imaging techniques for evaluating various adult cerebral disorders. 4) Review pertinent anatomy as it pertains to common adult cerebral pathologies.

MSCN51B Adult Spine

Participants

Gordon K. Sze, MD, New Haven, CT (*Presenter*) Investigator, Remedy Pharmaceuticals, Inc

LEARNING OBJECTIVES

1) To analyze findings on imaging examinations of the spine. 2) To characterize unusual findings and provide a differential diagnosis.

ABSTRACT

Lesions of the spine and of the spinal cord can be divided into broad categories. Use of an organized approach to the analysis of difficult cases will allow one to refine a differential diagnosis. Cord lesions, in particular, often superficially resemble one another. By exploring and applying the broad categories of diseases that affect the cord, subtle differences can be brought out.

MSCN51C Adult Head and Neck

Participants

Hugh D. Curtin, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To use imaging findings to differentiate head and neck lesions that can occur in similar locations. 2) To identify and evaluate imaging landmarks that determine changes in treatment.

RC606

Open Wide! Imaging the Oral Cavity and Jaw

Thursday, Dec. 3 8:30AM - 10:00AM Location: E451B



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC606A Odontogenic and Non-odontogenic Diseases of the Jaw

Participants

Joel K. Cure, MD, Birmingham, AL, (jcure@uabmc.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Perform technically optimized CT examinations to evaluate jaw lesions. 2) Identify imaging features that predict an odontogenic vs. non-odontogenic origin of imaged jaw lesions. 3) Stratify a differential diagnosis for jaw lesions by employing principles conveyed in this presentation. 4) Identify cases requiring clinical action.

ABSTRACT

After considering the clinical presentation and patient demographics, a differential diagnosis for imaged jaw lesions is facilitated by optimized imaging and identification of features that predict an odontogenic vs. non-odontogenic lesion origin and that predict lesion behavior. Location of the lesion in tooth-bearing vs. non-tooth-bearing portions of the jaw, the spatial relationship of the lesion to individual teeth, and the condition of the affected/involved dentition are all noteworthy features. Analysis of lesion attenuation, margins, growth patterns, and soft tissue components can help discriminate similar-appearing lesions and inform patient management.

RC606B Benign Oral Cavity Disease

Participants

Kristen L. Baugnon, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Differentiate the spaces of the oral cavity and develop a differential diagnosis for lesions arising in those locations. 2) Identify some of the most frequently encountered benign lesions in the oral cavity, including anatomic variant, infectious/inflammatory, developmental, and benign neoplastic lesions. 3) Recommend optimal imaging techniques for detection of oral cavity pathology.

ABSTRACT

Benign lesions in the oral cavity can often be detected incidentally on imaging, and can present a diagnostic challenge. The imaging findings of the most frequently encountered benign lesions in the oral cavity are depicted, including anatomic variants, infectious/inflammatory, developmental, and benign neoplastic lesions. The spaces of the oral cavity, including the root of the tongue, sublingual space, and submandibular space are reviewed, and a systematic approach to assessing lesions occurring in these locations is presented. CT and MRI imaging techniques and pitfalls in imaging the oral cavity are discussed.

Active Handout:Kristen Lloyd Baugnon

[http://abstract.rsna.org/uploads/2015/15001973/RC606B Benign oral cavity disease.KLB.handout.updated.pdf](http://abstract.rsna.org/uploads/2015/15001973/RC606B%20Benign%20oral%20cavity%20disease.KLB.handout.updated.pdf)

RC606C Malignant Oral Cavity Disease

Participants

Kristine M. Mosier, DMD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be familiar with the most common malignant neoplasms of the oral cavity and the key elements for differential diagnosis. 2) To understand staging of oral cavity cancer and be familiar with the critical elements for accurate staging.

ABSTRACT

In this session we will review the most common oral cavity malignant neoplasms with practice pearls to help guide the differential diagnoses of these lesions, as well as less common lesions. We will review current staging for oral cavity cancer and identify those key anatomical features critical to staging. Finally we will review spread patterns for oral cavity cancer.

RC613

Peds Neuro

Thursday, Dec. 3 8:30AM - 10:00AM Location: E350



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC613A Imaging of Sensorineural Hearing Loss in Children

Participants

Maura E. Ryan, MD, Chicago, IL, (mryan@luriechildrens.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review pertinent anatomy of the inner ear structures. 2) Describe pathologic CT and MRI findings of the inner ear, membranous labyrinth and cochlear nerve associated with pediatric sensorineural hearing loss.

Active Handout:Maura E. Ryan

http://abstract.rsna.org/uploads/2015/15002058/RC613A_MR.pdf

RC613B Imaging Approach to Seizures in Children

Participants

Luke L. Linscott, MD, Cincinnati, OH, (luke.linscott@cchmc.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify major causes of seizures in children. 2) Understand importance of optimal MR imaging technique for epilepsy evaluation.

RC613C Perinatal Imaging of Congenital Posterior Fossa Anomalies

Participants

Ashley J. Robinson, MBChB, Doha, Qatar, (ASH@RADIOLOGIST.NET) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Revise the relevant embryology of the posterior fossa, including the brainstem, cerebellum and cisterna magna. 2) Review several criteria for evaluation of congenital posterior fossa anomalies using a case-based approach.

ABSTRACT

Active Handout:Ashley James Robinson

<http://abstract.rsna.org/uploads/2015/15002062/RC613C.pdf>

US for Thyroid Cancer: Diagnosis, Surveillance, and Treatment

Thursday, Dec. 3 8:30AM - 10:00AM Location: E351



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Jill E. Langer, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Kathryn A. Robinson, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Sheila Sheth, MD, Cockeysville, MD, (ssheth@jhmi.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the sonographic characteristics of thyroid nodules that are suspicious for malignancy. 2) a. Discuss the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. b. Describe the indications for two new genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. 3) a. Describe the technique of US-guided biopsy of thyroid nodules and cervical lymph nodes in patients who have undergone thyroidectomy for thyroid cancer. b. Discuss the rationale and method of performance of US-guided ethanol ablation of malignant cervical adenopathy in post thyroidectomy patients.

ABSTRACT

This presentation will consist of a three individual presentations. The first will review the sonographic characteristics of thyroid nodules that are suggestive of malignancy. Recommendations for selecting which thyroid nodules require ultrasound-guided biopsies which have been provided by both Radiology consensus conferences and published Endocrinology guidelines will be discussed. The second presentation will review with the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. Additionally this presentation describes the indications for two new genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. The last presentation will provide a detailed description of the technique for performing ultrasound guided biopsy of thyroid nodules and cervical lymph nodes. Various methods will be discussed and required equipment outlined. Possible complications, though rare, will be described. A comparison of the typical sonographic features of normal versus abnormal lymph nodes will be presented in an effort to identify those patients in whom sonographic follow up can be used instead of biopsy. A discussion of the possible advantages of adding thyroglobulin assay to cytologic evaluation will be provided. The rationale for and technique of performing ultrasound guided ethanol ablation of malignant cervical lymph nodes in patients with thyroid cancer will be undertaken.

MSCN52

Case-based Review of Neuroradiology (An Interactive Session)

Thursday, Dec. 3 10:30AM - 12:00PM Location: S100AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Pina C. Sanelli, MD, Manhasset, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve basic knowledge and skills relevant to clinical practice. 2) Practice formulating a differential diagnosis for pathologic diseases involving the brain, spine, head and neck. 3) Apply principles of critical thinking to challenging diagnostic imaging cases.

ABSTRACT

The learning objectives are to enable attendees to: 1. Improve basic knowledge and skills relevant to clinical practice. 2. Practice formulating a differential diagnosis for pathologic diseases involving the brain, spine, head and neck. 3. Apply principles of critical thinking to challenging diagnostic imaging cases.

Sub-Events

MSCN52A Pediatric Brain

Participants

Tina Y. Poussaint, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To select the appropriate modality or modalities in evaluating a suspected or diagnosed case of pediatric CNS disease with focus on MR imaging. 2) To review key MR imaging features of pediatric brain diseases. 3) To evaluate neuroimaging of pediatric CNS disease as it relates to understanding the developing brain in childhood.

ABSTRACT

Pediatric brain diseases will be discussed in a case based format.

MSCN52B Pediatric Spine

Participants

Christopher G. Filippi, MD, Grand Isle, VT, (cfilippi@nshs.edu) (*Presenter*) Research Consultant, Regeneron Pharmaceuticals, Inc; Research Consultant, Syntactx

LEARNING OBJECTIVES

1) Identify the basic anatomic, physiologic and pathologic features of diseases affecting the pediatric spine. 2) Identify the key imaging features of various common pediatric spine diseases. 3) Recognize common patterns for spine and spinal cord pathology and organize these patterns into categories of diseases processes.

ABSTRACT

Common pediatric spine and spinal cord diseases will be discussed in a case-based format.

MSCN52C Pediatric Head and Neck

Participants

Laurie A. Loevner, MD, Gladwyne, PA (*Presenter*) Stockholder, General Electric Company; Stockholder, Pfizer Inc; Stockholder, Merck & Co, Inc; Stockholder, Johnson & Johnson; Stockholder, Amgen Inc; Stockholder, GlaxoSmithKline plc

LEARNING OBJECTIVES

1) Identify the salient imaging features of common pathologies of the pediatric head and neck. 2) Identify pertinent anatomy in the neck and skull base through the illustration of head and neck pathology. 3) Recognize patterns for disease that allow a succinct differential diagnosis. 4) Apply radiologic findings to identify next appropriate steps in patient work-up.

RC706

The Temporal Bone: Anatomy, Inflammation and Tumors

Thursday, Dec. 3 4:30PM - 6:00PM Location: E450A



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC706A Temporal Bone Imaging: Anatomy

Participants

John I. Lane, MD, Rochester, MN, (lane.john@mayo.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The learner will be able to easily identify the clinically relevant anatomic structures of the temporal bone after completing the course. 2) The learner will have a better appreciation of the orientation of the auditory ossicles and the benefits of multiplanar oblique reconstructions from MDCT datasets for demonstrating normal ossicular anatomy and pathology. 3) The learner will have a better appreciation of the normal and pathologic appearance of the cochlea, vestibule, semicircular canals, and vestibular aqueduct on high resolution CT and MR.

RC706B Temporal Bone Imaging: Inflammation

Participants

Joel D. Swartz, MD, Gladwyne, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The learner will be able to understand and analyze the most common varieties of inflammation involving the external auditory canal, middle ear, mastoid and inner ear. 2) The learner will understand the appropriate use of computed tomography and MRI. 3) The learner will be able to differentiate cholesteatoma from other middle ear maladies and understand the pathophysiology of the entities discussed in the presentation. 4) The learner will understand the imaging approach to inner ear inflammation.

ABSTRACT

This presentation will follow an anatomically organized template. The external ear entities emphasized will include necrotizing external otitis, keratosis obturans, granulation tissue and EAC cholesteatoma. There will be special attention to middle ear cholesteatoma with a discussion of diffusion weighted imaging and differentiation of this lesion of granulation tissue and cholesterol granuloma. The pathophysiology of labyrinthitis will also be emphasized.

RC706C Temporal Bone Imaging: Tumor

Participants

Amy F. Juliano, MD, Boston, MA, (amy_juliano@meei.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand temporal bone anatomy and identify the various portions of the temporal bone. 2) Know the most common neoplasms that occur in different areas of the temporal bone, and recognize their imaging characteristics. 3) Know the differential diagnosis of tumors in the temporal bone region by location and imaging appearance.

ABSTRACT

Temporal bone neoplasms are overall not very common. It is useful to think of the temporal bone in terms of its various subsites, as the tumors that may be found in each subsite is different, and being able to localize an imaging finding to a particular subsite greatly aids in establishing a differential diagnosis. When there are classic imaging features, one can even quite easily arrive at the specific diagnosis. The subsites to be discussed are: the internal auditory canal/cerebellopontine angle cistern, middle ear cavity, mastoid, external auditory canal, petrous apex, and the facial nerve.

RC710

Thyroid and Neck Ultrasound (An Interactive Session)

Thursday, Dec. 3 4:30PM - 6:00PM Location: S402AB



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC710A Thyroid Nodules: When and What to Biopsy

Participants

Jill E. Langer, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the sonographic characteristics that are associated with a high probability that a thyroid nodule is likely malignant or likely benign. 3) Gain an understanding of the rationale of the current guidelines for recommending thyroid fine needle aspiration.

ABSTRACT

As an overview, this presentation will review the epidemiology of thyroid nodules and correlate the sonographic findings with the risk of malignancy or the likelihood that the appearance represents a benign hyperplastic thyroid nodule rather than a true neoplasm. Additionally, the rationale for current guidelines for recommending thyroid fine needle aspiration will be discussed. The prevalence of palpable thyroid nodules is estimated to be 6.4% in women and 1.5% in men between 30 to 60 years of age, living in iodine-sufficient regions. However, high resolution sonography of the neck has been shown to be a much more sensitive technique than palpation, detecting nodules in 19 to 67% of randomly selected adults, with detection rates greater in women and increasing with age for both genders. Fortunately the vast majority of sonographically detected thyroid nodules are benign, hyperplastic regions of the thyroid. Fine-needle aspiration biopsy (FNA) is still considered the most reliable diagnostic test to determine if a thyroid nodule is malignant. Malignant nodules account for approximately 5% of all nodules that undergo palpation-guided FNA and approximately 10 to 15% of nodules that undergo sonography-guided FNA procedures. Analysis of the sonographic features of thyroid nodules has become the preeminent non-invasive tool for analyzing the risk of malignancy of thyroid nodules and aids in selecting which nodules should undergo fine needle aspiration (FNA). A number of recently published guidelines and consensus statements emphasize that the sonographic appearance of a nodule is a superior predictor of malignancy compared with nodule size or palpability and that when sonographic features of malignancy are noted, the nodule should undergo FNA. A number of sonographic features have shown a high specificity for the diagnosis of thyroid cancer and include marked hypoechogenicity, the presence of microcalcifications, infiltrating or micro-lobulated borders, and a taller-

RC710B Post-Thyroidectomy Neck

Participants

Carl C. Reading, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the sonographic appearance of recurrent and metastatic disease, and other abnormalities, in the post-operative neck.

ABSTRACT

In the post-thyroidectomy neck, ultrasound surveillance is a highly effective method to evaluate for residual and recurrent disease. Recurrence can occur anywhere within the neck, but typically is located in the mid and low internal jugular chains and thyroid bed region. Abnormal cervical lymph nodes can be recognized with a high degree of accuracy due to abnormal size, shape, internal architecture, and color Doppler appearance. In patients with suspected metastatic papillary cancer, the presence of internal fluid or calcifications is highly predictive of malignancy. Abnormal nodal color Doppler flow including peripheral (non-hilar), increased, and irregular flow is highly predictive of malignancy. Within the post-operative thyroid bed, itself, residual thyroid tissue, tumor recurrence, and suture granulomas can occur. FNA for cytologic analysis of suspected abnormalities can be performed, and the addition of thyroglobulin and calcitonin assay of the specimen, for papillary and medullary cancer, respectively, adds a high degree of accuracy to this procedure.

RC710C Parathyroid and Other Neck Masses

Participants

Mary C. Frates, MD, Sharon, MA, (mfrates@partners.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify abnormal parathyroid glands based on sonographic characteristics 2) Develop an accurate differential for cystic lesions in the neck based on sonographic characteristics, lesion location and clinical circumstances. 3) List the most common etiologies of solid lesions located between the thyroid and the superior mediastinum.

ABSTRACT

RC713

Pediatric Fetal (An Interactive Session)

Thursday, Dec. 3 4:30PM - 6:00PM Location: E351



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

LEARNING OBJECTIVES

Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC713A Fetal Ear and Orbital Anomalies

Participants

Maria A. Calvo-Garcia, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify major fetal external ear and orbital malformations. 2) Apply useful search patterns during US and fetal MRI evaluation of external ear and orbital anomalies.

ABSTRACT

Assessment of the fetal face is an important part of the sonographic structural survey. Craniofacial abnormalities occur as an isolated phenomenon or in the context of syndromes, chromosomal abnormalities or environmental insults. Along the course of this presentation we will review the standard facial anatomic survey with US and the main embryologic steps involved in the development of the face. Subsequently we will discuss major malformations involving the external ear and orbits and their expected association. The presentation will include clinical cases evaluated with US and fetal MRI and their postnatal correlations.

RC713B Fetal Chest Anomalies

Participants

Teresa Victoria, MD, PhD, Philadelphia, PA, (victoria@email.chop.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the most common fetal lung masses. 2) To identify imaging algorithms and patterns that can be helpful in reaching a diagnosis.

ABSTRACT

Accurate diagnosis of fetal lung lesions is crucial for appropriate counseling and management of the abnormalities in hand. During the lecture, the normal appearance of the fetal chest will be briefly done, in order to approach a review of the most common pulmonary lesions encountered during the fetal period. Diagnostic clues that will guide accurate diagnosis will be discussed. Rare lung lesions and their imaging diagnostic approach will also be discussed.

RC713C Fetal GI Anomalies

Participants

Erika Rubesova, MD, Stanford, CA (*Presenter*) Researcher, Siemens AG

LEARNING OBJECTIVES

1) After the presentation, the learners should be able to recognize the normal appearance of developing fetal bowel, as well as the most common and uncommon presentations of congenital bowel anomalies on ultrasound and MRI. They will become familiar with the specific information provided by each of the two modalities. The course will present a review of bowel anomalies of the fetus and will be illustrated by representative cases with the objective for the learners to understand the systematic approach of image analysis that can lead to the accurate diagnosis or limited list of differential diagnoses.

ABSTRACT

Diagnosis of fetal bowel anomalies usually presents on ultrasound as bowel dilatation or echogenic bowel. Echogenic bowel is associated with multiple other congenital conditions such as chromosomal anomalies, viral infections or cystic fibrosis. Dilatation of bowel may have various etiologies and systematic review of the findings including bowel wall thickening, number of distended bowel loops or the increased echogenicity of the content may help to localize bowel obstruction and narrow the list of differential diagnosis. Fetal MRI adds precious information to the ultrasound thanks the larger field of view, better tissue contrast but mainly thanks to high T1 signal intensity of meconium. Meconium is formed in the entire bowel and accumulates in the rectum that acts as a reservoir. While meconium is seen in the small bowel and colon in the second trimester, it is mainly seen in the fetal colon after 30 weeks of gestational age. Meconium acts as intraluminal contrast, similar to a barium enema. Systematic review of the distribution of meconium and analysis of the bowel caliber in comparison to normal values for gestational age helps to establish or narrow the list of differential diagnoses of fetal gastrointestinal abnormalities. In this presentation, we will review the advantages and limitations of ultrasound and MRI for diagnosis of fetal anomalies, we will discuss and illustrate, by representative cases, the approach to the most common and some more rare or atypical congenital bowel anomalies on ultrasound and MRI, in order to establish a single or short list of differential diagnoses.

Handout:Erika Rubesova

[http://abstract.rsna.org/uploads/2015/15002067/Rubesova GI RSNA 2015.pptx](http://abstract.rsna.org/uploads/2015/15002067/Rubesova_GI_RSNA_2015.pptx)

RC806

Head and Neck Emergency!

Friday, Dec. 4 8:30AM - 10:00AM Location: E450B



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC806A Adult Non-Traumatic Emergencies

Participants

Karen L. Salzman, MD, Salt Lake City, UT, (karen.salzman@hsc.utah.edu) (*Presenter*) Consultant, Reed Elsevier; Stockholder, Reed Elsevier

LEARNING OBJECTIVES

1) Review imaging techniques of nontraumatic adult head and neck emergencies. 2) Recognize non-traumatic adult head and neck emergencies and diagnose the extent of disease and its complications.

RC806B Pediatric Non-Traumatic Head and Neck Emergencies

Participants

Caroline D. Robson, MBChB, Boston, MA (*Presenter*) Editor with royalties, Reed Elsevier; Author with royalties, Reed Elsevier;

LEARNING OBJECTIVES

1) Familiarize the audience with imaging protocols that should be used for assessing pediatric head and neck emergencies. 2) Recognize pediatric head and neck emergencies and effectively diagnose the extent of disease and its complications. 3) Provide reports that enable the referring clinician to effectively treat pediatric head and neck emergencies.

ABSTRACT

The talk will focus on pediatric airway obstruction. Please see attached pdf of the talk including two articles for reference regarding pediatric nasal lesions.

Abstract Handout: Caroline Diana Robson

<http://abstract.rsna.org/uploads/2015/15001963/RC806B Pediatric Non-Traumatic Head and Neck Emergencies.pdf>

RC806C Traumatic Head and Neck Emergencies

Participants

Lindell R. Gentry, MD, Madison, WI, (lgentry@uwhealth.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the most common traumatic lesions that are encountered in the head and neck. 2) Discuss the important traumatic complications of the face, orbit, skull base, temporal bone, and blood vessels. 3) Discuss imaging strategies to effectively diagnose these traumatic lesions and their complications.

ABSTRACT

Traumatic injury of the head and neck is one of the most important and common diagnostic problems that radiologists will encounter in daily practice. Because of the vulnerability of important bony and soft tissue structures in this region, significant traumatic and potentially life-altering complications may be encountered with blunt and penetrating traumatic forces. Traumatic forces may cause injury of the bony and soft tissue structures of the orbit, including the globe, extraocular muscles, optic nerve, and 3rd-6th cranial nerves. This may result in ocular rupture, extraocular muscle entrapment, retrobulbar hemorrhage, proptosis, traumatic optic neuropathy, and superior orbital fissure syndrome. Diagnosis and management of these orbital injuries will be reviewed. Significant dental malocclusion or malunion may arise from displaced fractures of the mandible. Critical airway compromise may be caused by traumatic injury of the mandible, larynx, and trachea. Skull base and temporal bone trauma may produce a number of important complications that will be addressed in this lecture. These include conductive and sensorineural hearing loss, cerebrospinal fluid leak, traumatic facial palsy, lower cranial nerve injury, as well as cerebrovascular injury. Cerebrovascular injury is one of the most important and potentially life-altering complications that may be encountered with both blunt and penetrating craniocervical trauma. The vulnerable position of the extracranial and intracranial cerebral vasculature makes these vessels highly susceptible to traumatic injury. Fractures of the skull base or cervical spine may cause a variety of critically important traumatic lesions (dissection, pseudoaneurysm, occlusion, rupture, arteriovenous fistula). This lecture will discuss high risk imaging signs that suggest the possibility of cervical or intracranial cerebrovascular trauma. The rationale for effective imaging workup and identification of these injuries will be emphasized.

SPNM61

Theranostics: Contributions of Diagnostic Nuclear Medicine and Targeted Radionuclide Therapy in Clinical Oncology (In Conjunction with SNMMI)

Friday, Dec. 4 8:30AM - 12:00PM Location: S504AB



AMA PRA Category 1 Credits™: 3.25
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants

LEARNING OBJECTIVES

1) An important aspect of Nuclear Medicine and Molecular Imaging is that the same core compound of the administered radiopharmaceutical can be labeled with both gamma emitters (for diagnostic) and beta (or alpha) emitters (for therapy), allowing for the targeted treatment of lesions. This is an expression of theranostics, the combination of therapy and diagnostics that is based on the specific tumor biology of each patient's disease. This proposed session will provide several examples of such paired diagnostic studies and treatments using Nuclear Medicine methods.

Sub-Events

SPNM61A Radioactive Iodine and Thyroid Cancer - Current Use and Controversies

Participants

Douglas Van Nostrand, MD, Washington, DC, (douglas.van.nostrand@medstar.net) (*Presenter*) Speakers Bureau, sanofi-aventis Group

LEARNING OBJECTIVES

1) Define remnant ablation, adjuvant treatment, and treatment of locoregional/distant metastases. 2) Discuss the indications and controversies of ¹³¹I for each. 3) Discuss the range of prescribed activity of ¹³¹I for each.

SPNM61B Bone Scintigraphy and the Use of Radionuclides in the Management of Patients with Metastatic Castrate-Resistant Prostate Cancer

Participants

Hossein Jadvar, MD, PhD, Los Angeles, CA, (jadvar@med.usc.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review bone scintigraphy with single photon and PET radiotracers in the imaging evaluation of patients with prostate cancer. 2) To summarize the results of the ALSYMPCA clinical trial for ²²³Ra dichloride therapy in patients with castrate resistant metastatic prostate cancer.

SPNM61C Updates on the Use of PET/CT (and PET/MRI) and Radioimmunotherapy in NHL

Participants

Erik S. Mittra, MD, PhD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPNM61D Peptide Receptor Radionuclide Imaging and Therapy: Where Are We in Europe and What Shall the US Do to Catch Up?

Participants

Frederik L. Giesel, MD, MBA, Heidelberg, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the concept of theragnostic. 2) Identify promising candidates for PRRT. 3) Challenges and limitations of PRRT. 4) Future perspective using alpha-emitters.

ABSTRACT

Well-differentiated neuroendocrine tumors (NETs) demonstrate modest responses to conventional chemotherapy due to their slow proliferation rate. However, the expression of somatostatin receptors by NET enables targeting with high affinity peptides. When these octreotide analogue peptides are labelled with beta emitters such as ⁹⁰Y or ¹⁷⁷Lu promising anti-tumor effects have been observed. The presentation will introduce the concept of theragnostic (⁶⁸Ga-DOTATOC and ⁹⁰Y/¹⁷⁷Lu-DOTATOC) for improved patient stratification. Today, PRRT is well established for a long time in NET-patients. However challenges and limitations will be discussed in regard to other systemic therapies such as everolimus or sunitinib. Finally, outlook will be given in regard to the novel of targeted alpha therapy in NET-patients and its implication to other tumor entities.

URL

SPNM61E **Participant 1** **Basic Internal Radiation Therapy for Hepatic Malignant Lesions**

Ghassan El-Haddad, MD, Tampa, FL, (ghassan.elhaddad@moffitt.org) (*Presenter*) Speaker Bureau, Bayer AG

LEARNING OBJECTIVES

View learning objectives under main course title.

SST10

Neuroradiology/Head and Neck (New Techniques in Head and Neck Imaging)

Friday, Dec. 4 10:30AM - 12:00PM Location: N227



AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Gaurang V. Shah, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

SST10-01 Using Semi-quantitative Dynamic Contrast-enhanced Magnetic Resonance Imaging Parameters to Evaluate Tumor Hypoxia: A Preclinical Feasibility Study in a Maxillofacial VX2 Rabbit Model

Friday, Dec. 4 10:30AM - 10:40AM Location: N227

Participants

Lin-Feng Zheng, MD, PhD, Shanghai, China (*Presenter*) Nothing to Disclose
Yujie Li, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Zhuoli Zhang, MD, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Gui-Xiang Zhang, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To test the feasibility of semi-quantitative dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) parameters for evaluating tumor hypoxia in a maxillofacial VX2 rabbit model.

METHOD AND MATERIALS

Eight New Zealand rabbits were inoculated with VX2 cell solution to establish a maxillofacial VX2 rabbit model. DCE-MRI were carried out using a 1.5 Tesla scanner. Semi-quantitative DCE-MRI parameters, maximal enhancement ratio (MER) and slope of enhancement (SLE), were calculated and analyzed. The tumor samples from rabbits underwent hematoxylin-eosin (HE), pimonidazole (PIMO) and vascular endothelial growth factor (VEGF) immunohistochemistry (IHC) staining, and the PIMO area fraction and VEGF IHC score were calculated. Spearman's rank correlation analysis was used for statistical analysis.

RESULTS

The MER values of eight VX2 tumors ranged from 1.132 to 1.773 (1.406 ± 0.258) and these values were negatively correlated with the corresponding PIMO area fraction ($p = 0.0000002$), but there was no significant correlation with the matched VEGF IHC score ($p = 0.578$). The SLE values of the eight VX2 tumors ranged from 0.0198 to 0.0532 s⁻¹ (0.030 ± 0.011 s⁻¹). Correlation analysis showed that there was a positive correlation between SLE and the corresponding VEGF IHC score ($p = 0.0149$). However, no correlation was found between SLE and the matched PIMO area fraction ($p = 0.662$). The VEGF positive staining distribution predominantly overlapped with the PIMO adducts area, except for the area adjacent to the tumor blood vessel.

CONCLUSION

The semi-quantitative parameters of DCE-MRI, MER and SLE allowed for reliable measurements of the tumor hypoxia, and could be used to noninvasively evaluate hypoxia during tumor treatment.

CLINICAL RELEVANCE/APPLICATION

This preclinical feasibility study shows that DCE-MRI could serve as a potentially non-invasive and translational tool for tumor pathophysiological feature evaluation in clinical practice.

SST10-02 Improved Image Quality in Head and Neck CT Using a 3D Iterative Approach to Reduce Metal Artifacts

Friday, Dec. 4 10:40AM - 10:50AM Location: N227

Participants

Wolfgang Wust, MD, Erlangen, Germany (*Presenter*) Speakers Bureau, Siemens AG
Michael M. Lell, MD, Erlangen, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Speakers Bureau, Siemens AG; Research Grant, Bayer AG ; Speakers Bureau, Bayer AG; Research Consultant, Bracco Group; ;
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Bracco Group; Speakers Bureau, Siemens AG; Research Grant, Siemens AG;
Matthias S. May, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG

PURPOSE

Metal artifact from dental fillings and other devices degrades image quality and may compromise the CT detection and evaluation of lesions in the oral cavity and oropharynx. The aim of this study was to evaluate the effect of iterative metal artifact reduction (IMAR) on CT of the oral cavity and oropharynx.

METHOD AND MATERIALS

Data from 50 consecutive patients with metal artifact from dental hardware were reconstructed with standard filtered backprojection (FBP), linear interpolation metal artifact reduction (MAR) and IMAR. The image quality of slices containing metal was analyzed for the severity of artifacts and diagnostic value.

RESULTS

A total of 455 slices, 9.1 ± 4.1 slices per patient, contained metal and were evaluated with each reconstruction method. Slices without metal were not affected by the algorithms and demonstrated identical image quality. 38% of the slices were considered nondiagnostic with FBP, 31% with MAR, but only 7% with IMAR. 33% of slices had poor image quality with FBP, 46% with MAR, and 10% with IMAR. 13% of slices with FBP, 17% with MAR and 22% with IMAR were of moderate, 16% of slices with FBP, 5% with MAR and 30% with IMAR were of good and 1% of slices with MAR and 31% with IMAR of excellent image quality.

CONCLUSION

IMAR yields the highest image quality in comparison to FBP and MAR in patients with metal hardware in the head and neck area.

CLINICAL RELEVANCE/APPLICATION

The 3D iterative approach to metal artifact reduction can significantly improve the imaging of the head and neck region whenever dental hardware might disturb clinical imaging.

SST10-03 Role of Arterial Spin Labelling in Characterizing Skull-Base Lesions

Friday, Dec. 4 10:50AM - 11:00AM Location: N227

Participants

Nadya Pyatigorskaya, Paris, France (*Presenter*) Nothing to Disclose
Stephanie Trunet, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Sophie Gerber, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Bruno Law-Ye, JD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Melika Sahli Amor, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Samia Belkacem, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Peggy Bienvenot, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Damien P. Galanaud, MD, PhD, Paris, France (*Abstract Co-Author*) Research Consultant, Olea Medical
Didier Dormont, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Delphine Leclercq, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Classical dynamic susceptibility-contrast MRI (DSC-MRI) is a challenging technique in studying the skull base because of the air-interface artefacts. This work was aimed at investigating whether the pseudo-continuous Arterial Spin Labeling (pcASL)-MRI perfusion method can be used to adequately evaluate tumor perfusion of skull base tumors, as well as evaluating the diagnostic value of characterizing tumors by the ASL method.

METHOD AND MATERIALS

Forty-eight patients with skull base lesions were retrospectively enrolled. The lesions found were meningiomas ($n=10$), schwannomas ($n=4$), paragangliomas (3), chondrosarcoma (1), plasmocytomas (4), metastatic lesions (4), parotid lesions (4), epidermoid carcinomas (5), pituitary adenomas (5), cholesteatoma (1), hemangioblastoma (1), lymphoma (1), cystic lesions (3), and infections (2). Relative Tumor Blood Flow (rTBF) was calculated based on the pcASL data. Two expert neuroradiologists analyzed all the images. PcASL imaging was correlated to the pathology results for the lesions that underwent surgical resection (33), to other post-contrast enhancement perfusion methods (9), to the lesion morphology, and to follow up results (10). The normalized rTBF values for the lesions in the same anatomical region were compared, at the significant level set to $p < 0.05$.

RESULTS

The pcASL method allowed characterizing all the enrolled lesions. Moreover, there was a significant rTBF difference between cerebellopontine angle schwannoma and meningioma and between schwannoma and metastasis. For pituitary lesions, there was a significant difference between pituitary adenoma and meningioma. For jugular foramen region, there was a significant difference between paraganglioma, chondrosarcoma, and cholesteatoma. Interestingly, one case of osteomyelitis, showed a pseudotumoral increased rTBF, and a plasmocytoma under treatment, showed low rTBF, in relation with treatment response.

CONCLUSION

The present preliminary study shows the interest of pcASL-MRI in evaluating tumor perfusion in the tumors that are located in the skull-base region. Moreover, pcASL can be helpful in the differential diagnosis of the tumors in this region without using contrast materials.

CLINICAL RELEVANCE/APPLICATION

This study shows that pcASL-MRI can be a powerful tool for detecting and characterizing skull-base lesions; it can be easily implemented in clinical practice.

SST10-04 Feasibility and Preliminary Experience of Quantitative T2 Star Mapping in the Differentiation of Benign and Malignant Thyroid Nodules in Comparison with Diffusion-weighted Imaging

Friday, Dec. 4 11:00AM - 11:10AM Location: N227

Participants

Lianming Wu, Shanghai, China (*Presenter*) Nothing to Disclose

PURPOSE

To investigate the feasibility of T2 star relaxation time for distinguishing benign from malignant thyroid node in comparison with diffusion-weighted (DW) imaging.

METHOD AND MATERIALS

A total of 56 consecutive patients (43 women and 13 men; age range, 23-76 years; mean [\pm SD] age, 51 ± 12.3 years) with thyroid nodules, who were referred for fine-needle aspiration biopsy by endocrinology or general surgery clinics, were prospectively underwent 3.0T magnetic resonance imaging by using a multi-echo T2 star and DW imaging (maximum b value, 800 sec/mm²).

Parametric maps were obtained for apparent diffusion coefficient (ADC) and T2 star value. Two radiologists reviewed these maps and measured ADC and T2 star value. Data were analyzed by using mixed-model analysis of variance and receiver operating characteristic curves.

RESULTS

The T2 star values of the cancerous node (mean: 23.21+ 0.87ms) were significantly lower ($P < 0.001$) than those of benign node (mean: 5.08+0.32ms). Adopting a threshold value of 12.35 ms. Quantitative T2 star mapping resulted in 91.2% sensitivity, 79.3% specificity in the identification of thyroid cancer. The ADC values of the cancerous node (mean: 0.83+ 0.37ms) were significantly lower ($P < 0.001$) than those of benign node (mean: 1.53+0.28ms). Adopting a threshold value of 1.03 ms, ADC mapping resulted in 90.3% sensitivity, 73.2% specificity. Quantitative T2 star mapping showed significantly greater specificity for differentiating cancerous node from benign node than ADC mapping 79.3% vs 73.2%, $P < 0.001$, with equal sensitivity (91.2% vs 90.3%, $P > 0.05$).

CONCLUSION

Preliminary findings suggest the feasibility of performing T2 star mapping of the thyroid node acquired by using multi-echo T2 star that may provide increased sensitivity to the diagnostic performance of thyroid cancer compared with DWI. Further larger studies to confirm these preliminary findings are warranted.

CLINICAL RELEVANCE/APPLICATION

Preliminary findings suggest the feasibility of performing T2 star mapping of the thyroid node may provide increased sensitivity to the diagnostic performance of thyroid cancer compared with DWI.

SST10-05 Quantitative Diffusion-weighted Imaging for Evaluating Papillary Thyroid Carcinoma at 3T MRI: Optimal b Value

Friday, Dec. 4 11:10AM - 11:20AM Location: N227

Participants

Ruo Yang Shi, Shanghai, China (*Presenter*) Nothing to Disclose

Lianming Wu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the quantitative diffusion-weighted imaging (DWI) in distinguish papillary thyroid carcinoma (PTC) from benign thyroid nodules, and to evaluate the efficiency of DWI under different b values in discriminating between PTC and benign thyroid nodules, with pathologic analysis after surgery as reference standard.

METHOD AND MATERIALS

DWI was performed in 32 patients with thyroid nodules followed by surgery. DWI was examined by single-shot echo planar imaging (SE-EPI) under different b values including 0, 250, 500, 750, 1000, 1500, 2000s/mm². The diffusion-weighted image quality of six b value groups was evaluated. Apparent diffusion coefficient (ADC) values were counted in region of interest (ROI) for b values of 0 and for each b value from 250 to 2000 s/mm². Mean ADC values in ROI and the difference between PTC regions and benign thyroid nodules were calculated using two independent sample t-test. Sensitivity, specificity and area under the curve (AUC) were acquired by ROC curve.

RESULTS

The contrast-to-noise ratio (CNR) and signal-to-noise ratio (SNR) were not satisfied when b value 1500 or 2000s/mm² was adopted. The qualitative image quality was not enough to meet diagnostic requirement. The mean ADC values (\pm standard deviation) of the PTC regions were 1.33 \pm 0.47, 0.92 \pm 0.35, 0.69 \pm 0.31, 0.57 \pm 0.26, 0.43 \pm 0.20, and 0.32 \pm 0.15 $\times 10^{-3}$ mm²/s and were significantly lower than those of benign thyroid nodules ($P < .005$). b=500 acquired the highest AUC among all the b values. Applying a threshold ADC value of 1.32 $\times 10^{-3}$ mm²/s at b=500, the sensitivity is 73.7% and the specificity is 92.3%.

CONCLUSION

Quantitative DWI can distinguish PTC from benign thyroid nodules. The optimal b value for DWI at 3T MRI to identify PTC may be 500s/mm².

CLINICAL RELEVANCE/APPLICATION

Quantitative DWI for thyroid can play important role in the diagnose of the thyroid nodules. The optimal b value may be 500s/mm².

SST10-06 Multi-parametric Advanced MR Imaging (IVIM, DCE-MR, 2D and 3D Tumor Metrics) as a Predictive Tool of Treatment Response in HPV Positive Oropharyngeal Squamous Cell Carcinoma Patients

Friday, Dec. 4 11:20AM - 11:30AM Location: N227

Participants

Ahmed Elakkad, MBCh, MSc, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Nabil A. Elshafeey, MD, Houston, TX (*Presenter*) Nothing to Disclose

Masumeh Hatami, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Aikaterini Kotrotsou, PhD, MEng, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Mohamed G. Elbanan, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Vinodh A. Kumar, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Ashok J. Kumar, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Rivka R. Colen, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Human papilloma virus (HPV) positive tumors carry a better prognosis than HPV negative ones. Although HPV positivity is proven to be independent of other known prognostic factors including age and TNM staging, yet treatment failure has been recorded. In our study we used Intra Voxel Incoherent Motion, dynamic contrast enhanced magnetic resonance perfusion imaging (DCEMRI) and 2D, 3D volumetric parameters to find out which is the best predictor of treatment response in HPV positive oropharyngeal squamous

carcinoma.

METHOD AND MATERIALS

Patients with pathologically proven HPV positive oropharyngeal SCC were included in this study under an IRB approved protocol with signed study specific informed consent forms as a part of prospective ongoing clinical trial. All patients underwent two MRI studies, baseline scan within 1week before treatment and mid-treatment scan. According to response to treatment, patients were then categorized into 2 groups; complete responders (CR) in whom the primary has completely disappeared and partial responders (PR) where there was still a residual tumoral tissue. All morphological image analyses and segmentation were done using 3D Slicer 4.3.1 (slicer.org) and reviewed in consensus by 2 neuroradiologists. Multiple quantitative imaging features were identified including IVIM (D, D*, and f), MR-Perfusion (Ktrans, Vp, Ve, and Kep) as well as 2D and 3D volumes of the primary tumor at the first time point.

RESULTS

Median of the time between the two MRI was 25 days. Based on the second MRI, 75% of patients had complete response to treatment. Mann-Whitney U Exact test was used to compare baseline variables between patient with complete and partial response to therapy. Kep mean and Ktrans mean significantly higher in patients who showed partial response to treatment. Logistic Regression analysis was performed to determine the association between each of the perfusion parameters and response to treatment. Higher Ktrans had a significant association with partial response to treatment.

CONCLUSION

Treatment response in HPV positive oropharyngeal squamous cell carcinoma patients can be reliably predicted through different advanced MRI parameters.

CLINICAL RELEVANCE/APPLICATION

HPV positive OPCC response to treatment are detected using multiple advanced and conventional MRI

SST10-07 Differentiation of the Metastatic Lymph Nodes from Thyroid Carcinoma and Squamous Cell Carcinoma and Lymphoma with Dual-Energy CT Monoenergetic Imaging

Friday, Dec. 4 11:30AM - 11:40AM Location: N227

Participants

Yang Yaying I, MD, Kunming, China (*Presenter*) Nothing to Disclose
Li Qing, MD, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Zhao Wei, MD, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Yang Bin, MD, Dali, China (*Abstract Co-Author*) Nothing to Disclose

Background

Objective To explore the value of dual-energy CT monoenergetic imaging in differential diagnosis of the metastatic cervical lymph nodes in thyroid carcinoma, squamous cell carcinoma and lymphoma.

Evaluation

The spectrum curve slope of arterial phase and parenchymal phase can be used to differentiate lymph node metastasis of in thyroid carcinoma, the metastatic lymph nodes from lymphoma in the neck.

Discussion

Results Of 79 enlarged lymph nodes, 23 were metastatic lymph nodes from thyroid carcinoma, 24 from squamous cell carcinoma and 32 were lymphoma. With the increase of keV values (from 60 to 180 keV), the corresponding CT values of the three kinds of malignant lymph nodes were decreased. The higher the keV value, the smaller the CT value decrease, and the spectrum curve appeared as "drop type". The spectrum slope curve of the metastatic lymph nodes of thyroid carcinoma in arterial phase (1.23 ± 0.41) and parenchymal phase (0.85 ± 0.33) are maximal and the slope curve of lymphoma in arterial phase (0.40 ± 0.16) and parenchymal phase (0.47 ± 0.09) are the lowest. The spectrum slope curve of metastatic lymph nodes from the squamous cell carcinoma in arterial phase and parenchymal phase is 0.88 ± 0.10 and 0.62 ± 0.28 , respectively. The spectrum curve slope of the three kinds of malignant lymph nodes have statistical significance. Comprehensive analysis showed, if $0.36 > K > 0.24$ in arterial phase, it is most probably lymphoma; If $0.81 \geq K \geq 0.78$, it is most probably the metastatic lymph nodes; and if $1.65 \geq K > 0.98$, it is most probably lymph node metastasis from thyroid carcinoma; in parenchymal phase, if $0.38 > K \geq 0.34$, it is most probably the metastatic lymph nodes, If $0.52 > K \geq 0.38$, it is most probably lymphoma, if $1.18 \geq K \geq 0.56$, it is most probably lymph node metastasis from thyroid carcinoma.

Conclusion

The spectrum curve slope of arterial phase and parenchymal phase can be used to differentiate lymph node metastasis of in thyroid carcinoma, the metastatic lymph nodes from lymphoma in the neck.

SST10-08 High Resolution Diffusion Weighted Imaging of Thyroid Gland Using Reduced FOV Technique: A Preliminary Clinical Application at 3T MRI

Friday, Dec. 4 11:40AM - 11:50AM Location: N227

Participants

Hao Yonghong, MD, Wuhan, China (*Presenter*) Nothing to Disclose
Wenzhen Zhu, MD, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Jianpin Qi, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

DWI has been shown to be useful for differentiation between benign and malignant thyroid nodules. However, due to severe susceptibility and distortion artifacts and image blurring, the diagnostic value of clinical thyroid DWI is limited. The purpose of this study was to evaluate the performance of reduced field of view (r-FOV) diffusion weighted imaging and compare the diagnostic value of r-FOV diffusion imaging and conventional diffusion imaging in patients with thyroid nodules.

METHOD AND MATERIALS

79 consecutive patients who were clinically suspected with thyroid malignant lesions by ultrasound or/and scintigraphy and 12 healthy controls were included in this study. All participants underwent r-FOV diffusion imaging and f-FOV diffusion imaging with a 3T MRI scanner. Image quality and lesion identifications were visually evaluated by two independent reviewers and image properties (SNR, CNR, geometric distortion) were quantified. The apparent diffusion coefficient values of thyroid lesions and normal thyroid parenchyma were calculated and compared between two diffusion methods. The ROC analyses for both DWI methods were performed and differences in the area under the curve were assessed.

RESULTS

Agreement between two reviewers was good for image quality and lesion identification. The image quality and lesion identification of r-FOV diffusion imaging was rated higher than that of f-FOV DW imaging ($p < 0.001$). The geometric distortions for f-FOV DW imaging were significantly higher than that for r-FOV imaging, while SNR of r-FOV imaging was slightly lower than that of conventional DW imaging. The mean ADCs of r-FOV diffusion imaging were lower than that of f-FOV diffusion imaging ignore of different tissue types ($1.42 \pm 0.44 \times 10^{-3} \text{ mm}^2/\text{s}$ vs $1.54 \pm 0.45 \times 10^{-3} \text{ mm}^2$, $p < 0.001$). There was significant difference among the ADCs of different tissue groups obtained from both r-FOV and f-FOV DWI. The areas under the curve for r-FOV (0.962) and conventional DW imaging (0.951) were not statistically different.

CONCLUSION

r-FOV diffusion imaging provide higher image quality and lesion identification than f-FOV diffusion imaging by reducing susceptibility artifacts, spatial distortion, image blurring, and were of comparable diagnostic values in nodules thyroid.

CLINICAL RELEVANCE/APPLICATION

high resolution DWI of thyroid could improve the identification and interpretation of nodules, especially for microcarcinoma.

SST10-09 The Optimization Weighting Factors of Linear Image Blending in Dual-Energy Computed Tomography for the Diagnosis of Laryngeal Carcinoma

Friday, Dec. 4 11:50AM - 12:00PM Location: N227

Participants

Mengxi Jiang, Beijing, China (*Presenter*) Research Grant, General Electric Company
Jian Jiang, MD, Beijing, China (*Abstract Co-Author*) Research Grant, General Electric Company
Yuan Jiang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoying Wang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the linear image-blending of varying weighting factors in dual-energy computed tomography of laryngeal carcinoma regarding subjective and objective image quality.

METHOD AND MATERIALS

Patients with biopsy-proven untreated primary laryngeal carcinoma who underwent DECT scan (100kVp/Sn140 kVp) of neck were retrospectively evaluated. Ten (9 men, 1 woman; age range, 46-76 years old) cases were enrolled. Linearly blended images series with 11 weighting factors (0 to 1.0 in steps of 0.1) were reconstructed. For objective assessment, attenuation of lesion, various anatomic landmarks, image noise, lesion contrast-to-noise ratio and signal-to-noise ratio were compared between different image datasets. For subjective assessment, two independent blinded radiologists rated overall image quality, lesion delineation, image sharpness, and image noise of each image dataset on a 5-point grading scale.

RESULTS

The mean attenuation of lesion, sternocleidomastoid muscle, internal jugular vein, and submandibular gland increased stepwise with decreasing tube voltage from Sn140 kVp through 100 kVp. CNR was the highest in the weighting factors of 0.8 (M_0.8; 12.5 ± 5.7). M_0.8 images showed no significant differences between linearly blended image series M_0.6 (11.7 ± 5.5 ; $P = 0.123$), M_0.7 (12.3 ± 5.6 ; $P = 1.000$), M_0.9 (12.5 ± 5.6 ; $P = 1.000$) and M_1.0 (12.2 ± 5.5 ; $P = 1.000$), but differed significantly compared to the linearly blended image series M_0, M_0.1, M_0.2, M_0.3, M_0.4 and M_0.5 ($P < 0.05$). SNR was the highest in the weighting factors of 0.7 (35.0 ± 6.1). M_0.7 images showed no significant differences between linearly blended image series M_0.6 (34.7 ± 6.1 ; $P = 1.000$). Overall image quality was higher in M_0.9 (4.7) and M_1.0 (4.7) images, although differences to the M_0.8 (4.4) images did not reach statistical significance ($P = 0.083$). Delineation of the tumour was rated significantly better in M_0.9 (4.4) and M_1.0 (4.5) images compared to other linearly blended image series. Scoring of the image sharpness revealed equally good results in all image series.

CONCLUSION

The linear-blending images of DECT data at the weighting factors of 0.9 and 1.0 can provide higher image quality for the diagnosis of laryngeal carcinoma.

CLINICAL RELEVANCE/APPLICATION

Linear image blending in DECT could provided more information about laryngeal carcinoma, which improved diagnostic confidence in the assessment of laryngeal carcinoma.

SPFR61

Friday Imaging Symposium: Neuroimaging Emergencies

Friday, Dec. 4 12:30PM - 3:00PM Location: E253CD



AMA PRA Category 1 Credits™: 2.50
ARRT Category A+ Credits: 3.00

Participants

Christopher P. Hess, MD, PhD, Mill Valley, CA, (christopher.hess@ucsf.edu) (*Moderator*) Research Grant, General Electric Company; Research Grant, Quest Diagnostics Incorporated; Research Grant, Cerebrotech Medical Systems, Inc;

Sub-Events

SPFR61A CNS Infection

Participants

Ashley H. Aiken, MD, Atlanta, GA, (ashley.aiken@emoryhealthcare.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize basic imaging patterns of CNS infection in the immunocompetent patient 2) Use imaging features of specific pathogens along with clinical characteristics to narrow the imaging differential diagnosis and guide treatment. 3) Recognize imaging features of opportunistic infections in the immunocompromised patient.

ABSTRACT

The radiologist plays a crucial role in identifying and narrowing the differential diagnosis of CNS infection. This case-based review aims to outline a practical imaging approach based on 5 basic imaging patterns: 1) Extra-axial infection 2) Ring-enhancing lesion 3) Temporal lobe lesion 4) Basal ganglia lesion 5) White matter abnormality. For extra-axial patterns of infection, it is key to search the paranasal sinuses, middle ear, and mastoid air cells for a source. It is also very important to look out for complications including brain abscess, dural sinus thrombosis, infarction, and hydrocephalus. The ring-enhancing pattern is the classic mimicker, and there is a long list of differential considerations. Frequently, the primary differential can be narrowed to infection versus neoplasm. However, close attention to the imaging features is critical to recognize non-operative ring-enhancing lesions such as tumefactive demyelination, subacute infarct, and subacute hematoma. The imaging characteristics that favor infection over neoplasm include a thin, smooth, ring-enhancement, "daughter cysts", a thinner ring of enhancement toward the ventricular surface and, of course, the "light bulb bright DWI" of a pyogenic abscess. When the temporal lobe imaging pattern is encountered, the primary diagnostic consideration should always be herpes encephalitis! Primary differential considerations for bilateral basal ganglia and white matter abnormalities include infection, toxic-metabolic etiologies, venous ischemia, hypoxic-ischemic injury and neoplasm. It is critical to know the patient's history and specifically their immune status. Within these broad imaging categories, a thorough understanding of the characteristic imaging features of specific pathogens and clinical history are essential to narrow the differential considerations and propose a more specific diagnosis. Neuroimaging also plays a pivotal role in diagnosing and monitoring the therapeutic response in opportunistic infections in the setting of HIV. This subset of infections will also be discussed within the context of the five basic imaging patterns listed above. References: 1) Aiken AH. Central Nervous System Infection. *Neuroimaging Clin N Am.* 2010 Nov; 20(4): 557-80

URL

Handout: Ashley Hawk Aiken

<http://abstract.rsna.org/uploads/2015/15002667/CNSinfection.handout.RSNA.12.4.15.pptx>

SPFR61B Evaluation and Management of Acute Stroke

Participants

Achala S. Vagal, MD, Cincinnati, OH (*Presenter*) Research Grant, F. Hoffmann-La Roche Ltd;

LEARNING OBJECTIVES

1) To review the classic imaging features of acute ischemic stroke. 2) To review the role of imaging selection in evaluation and management of acute stroke. 3) To review stroke mimics.

ABSTRACT

The landscape of acute ischemic stroke treatment is rapidly changing with multiple positive endovascular trials. In the current scenario, neuroimaging plays a vital role in the diagnosis, triage and treatment of acute ischemic stroke patients. Comprehensive evaluation of brain parenchyma, vessel status and tissue perfusion is critical in patient selection. This case based course will highlight the practical aspects of acute ischemic stroke evaluation in the emergency setting.

URL

SPFR61C Intracranial Hemorrhage: Pearls and Pitfalls

Participants

Jalal B. Andre, MD, Seattle, WA, (drjalal@uw.edu) (*Presenter*) Research Grant, Koninklijke Philips NV; Consultant, Hobbitview, Inc; Research Grant, Toshiba Corporation;

LEARNING OBJECTIVES

1) Gain a deeper understanding of how etiology, location, and timing of intracranial hemorrhage may affect patient disposition and

1) Gain a deeper understanding of how etiology, location, and timing of intracranial hemorrhage may affect patient disposition and outcome, and review pertinent associated radiological findings. 2) Explore recent imaging methods that better characterize intracranial hemorrhage and its components. 3) Discuss current treatment strategies for managing intracranial hemorrhage that are relevant to radiologists.

ABSTRACT

Intracranial hemorrhage has been traditionally classified as intra- versus extra-axial in location, and can arise from a variety of etiologies. We will focus on the above learning objectives through a case-based exploration of intracranial hemorrhage and associated complications as they pertain to the following locations: 1) Intraventricular 2) Intraparenchymal 3) Subarachnoid 4) Subdural 5) Epidural

URL

SPFR61D Spine Emergencies

Participants

Jason F. Talbott, MD, PhD, San Francisco, CA, (jason.talbott@ucsf.edu) (*Presenter*) Data Safety Monitoring Board, StemCells, Inc

LEARNING OBJECTIVES

1) Gain familiarity with the subaxial injury classification system (SLIC) for cervical spine trauma and AOSpine thoracolumbar injury classification system (TLICS) for thoracolumbar spine trauma. 2) Review standardized nomenclature for vertebral fracture morphology descriptions utilized by both SLIC and TLICS. 3) Review a systematic checklist for spinal imaging findings in the setting of suspected non-traumatic spinal emergencies.

ABSTRACT

The radiologist plays a critical role in evaluation of spinal emergencies, both traumatic and nontraumatic. With respect to traumatic spine emergencies, the primary focus of this review is to familiarize the radiologist with the increasingly utilized classification systems employed by many spine surgeons for (1) subaxial cervical spine trauma known as subaxial injury classification (SLIC) and (2) thoracolumbar spine trauma known as thoracolumbar lumbar injury classification system (TLICS) and the more recently updated AOSpine TLICS. These grading schemes were designed by surgeons to aid in surgical decision-making and share in common some descriptive nomenclature related to vertebral body fracture morphology, discoligamentous complex integrity, and frank spine displacement/translation injury. It is important that the radiologist interpreting spinal trauma studies is familiar with these classifications schemes as they are increasingly supplanting older classification systems for surgical decision-making. Finally, a case-based review of non-traumatic spinal emergencies will be undertaken to emphasize a systematic checklist for imaging findings suggesting emergent pathology.

URL

SPFR61E Head and Neck Emergencies

Participants

Jenny K. Hoang, MBBS, Durham, NC, (jennykh@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe imaging findings of acute head and neck diseases that are emergencies. 2) Apply a systematic checklist to identify key imaging findings that could lead in significant morbidity or mortality.

ABSTRACT

This will be a case-based presentation of imaging findings of head and neck emergencies categorized into 4 clinical scenarios: 1. Fever 2. Trauma 3. Difficulty breathing 4. Epistaxis

URL