

2013 RSNA (Filtered Schedule)

Sunday, December 01, 2013

10:45-12:15 PM • **SSA15** • Room: N226 • Neuroradiology/Head and Neck (Temporal Bones)
10:45-12:15 PM • **SSA16** • Room: N227 • Neuroradiology/Head and Neck (Vascular Disease of the Head and Neck)
02:00-03:30 PM • **RC106** • Room: E451A • Eye and Orbit

Monday, December 02, 2013

08:30-10:00 AM • **MSRO21** • Room: S103AB • BOOST: Head and Neck-Anatomy and Contouring (An Interactive Session)
08:30-10:00 AM • **RC206** • Room: E450A • Head and Neck Top Ten: Missed Diagnoses and Imaging Pearls (An Interactive Session)
10:30-12:00 PM • **MSCM22** • Room: S100AB • Case-based Review of Magnetic Resonance: Neuroradiology (An Interactive Session)
10:30-12:00 PM • **MSRO22** • Room: S103AB • BOOST: Head and Neck-Integrated Science and Practice (ISP) Session
03:00-04:15 PM • **MSRO23** • Room: S103AB • BOOST: Head and Neck-Case-based Review (An Interactive Session)
03:00-04:00 PM • **SSE18** • Room: N230 • Neuroradiology/Head and Neck (ENT Oncology)
04:45-06:00 PM • **MSRO29** • Room: S104B • BOOST: Head and Neck Hands-on Contouring (In Cooperation with ASTRO)

Tuesday, December 03, 2013

08:30-10:00 AM • **MSCC31** • Room: S406A • Case-based Review of Nuclear Medicine: PET/CT Workshop-Head and Neck Cancers (In Conjunction with SNMMI) (An Interactive Session)
08:30-10:00 AM • **RC306** • Room: E451A • Temporal Bone Imaging
04:30-06:00 PM • **RC406** • Room: N227 • Skull Base and Nerves

Wednesday, December 04, 2013

08:30-10:00 AM • **MSSR41** • Room: S402AB • RSNA/ESR Emergency Symposium: General Principles, Pediatric and ENT Emergencies (An Interactive Session)
08:30-10:00 AM • **RC506** • Room: E353C • Oral Cavity, Pharynx, Larynx
10:30-12:00 PM • **SSK15** • Room: N229 • Neuroradiology/Head and Neck (Head and Neck Tumors)

Thursday, December 05, 2013

08:30-10:00 AM • **RC606** • Room: S402AB • Neck Imaging
01:30-03:00 PM • **MSCN53** • Room: S100AB • Case-based Review of Neuroradiology: Head and Neck (An Interactive Session)
04:30-06:00 PM • **RC706** • Room: N228 • Salivary Glands
04:30-06:00 PM • **RC711** • Room: S505AB • Head and Neck Cancer PET Interpretation with Case Examples (An Interactive Session)

Friday, December 06, 2013

08:30-10:00 AM • **RC806** • Room: S406B • Sinonasal Imaging
08:30-10:00 AM • **RC831** • Room: E450B • US for Thyroid Cancer: Diagnosis, Surveillance, and Treatment (How-to Workshop)
10:30-12:00 PM • **SST09** • Room: N226 • Neuroradiology/Head and Neck (Advanced Head and Neck Imaging)

Neuroradiology/Head and Neck (Temporal Bones)

Sunday, 10:45 AM - 12:15 PM • N226



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SSA15 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Moderator
Richard H Wiggins, MD
Moderator
Ashley H Aiken, MD *

SSA15-01 • Image Quality and Radiation Dose Assessment in Temporal Bone CT Using an Ultra High Resolution Mode and an Iterative Reconstruction Algorithm Temporal Bone CT: Improved Image Quality and Potential for Decreased Radiation Dose Using an Ultra High Resol

Shuai Leng PhD (Presenter); **John I Lane** MD; **Kelly K Koeller** MD; **Felix E Diehn** MD; **Robert J Witte** MD; **Michael R Bruesewitz**; **Thomas J Vrieze** RT; **Cynthia H McCollough** PhD *

PURPOSE

To assess spatial resolution and image noise for a temporal bone CT imaging method that uses an ultra-high resolution (UHR) scan mode combined with iterative reconstruction (IR), and to compare to a protocol with reduced dose efficiency due to use of z-axis collimation (zUHR).

METHOD AND MATERIALS

Patients with prior temporal bone CT scans acquired using a zUHR protocol who received a follow-up scan using the UHR+IR technique were identified. Left and right side of temporal bone images were reconstructed in axial, coronal and Poschl planes. Spatial resolution was evaluated independently by 3 neuroradiologists with focus on the following structures: round and oval windows, incudomalleolar joint, incudostapedial joint, spiral lamina in the basal turn, and scutum. The zUHR and UHR+IR images were displayed side by side, with the order randomized and blinded to the readers. The following grading scale was applied to the UHR+IR images (relative to the zUHR images): 1=inferior resolution, degrades visualization, 2=slightly inferior resolution, not affect visualization, 3=equivalent, 4=slightly superior resolution, not affect visualization, 5=superior resolution, improves visualization. Image noise was measured in regions of interest over the posterior fossa and compared.

RESULTS

8 patients with 16 sets (left and right side) of temporal bones were identified, of which 3 sets were excluded due to surgery between the two exams (13 left). The average scores across readers for spatial resolution on the UHR+IR images compared to zUHR were 3.4, 3.5 and 2.9 in axial, coronal and Poschl planes, respectively, indicating comparable or slightly better spatial resolution using the UHR+IR technique. Wilcoxon signed-rank test showed significant differences (p

CONCLUSION

The UHR+IR scan mode has similar or slightly better resolution relative to the zUHR mode, but significantly lower (32%) image noise. An estimated 50% dose reduction may be achievable using the UHR+IR mode.

CLINICAL RELEVANCE/APPLICATION

Substantial dose reduction can likely be achieved for temporal bone CT imaging using the investigated combined UHR+IR technique.

SSA15-02 • The Dehiscent Bony Wall of Dural Sinus in Patients Presenting with Pulsatile Tinnitus: The Evaluation with CT

Angiography and Venography

Pengfei Zhao MD (Presenter) ; **Zhenchang Wang** MD, PhD ; **Junfang Xian** MD ; **Fei Yan** ; **Zhaohui Liu** MD ; **Hong Jiang** MD ; **Cheng Dong** ; **Han Lv** ; **Xiaoyi Han**

PURPOSE

To assess the imaging characteristics about dehiscent wall of dura sinus in patients presenting with pulsatile tinnitus (PT) on CT angiography and venography (CTA+V)

METHOD AND MATERIALS

Following approval of the institutional review board, we reviewed all hospitalized patients with PT from 2008 to 2013 who underwent thorough clinical and laboratory tests, including otomicroscopic and audiometric evaluations, CTA+V and DSA. Finally, 13 patients diagnosed with the dehiscent bony wall of dural sinus as the causative finding and cured by surgical reconstruction were enrolled. CTA+V images were blindly evaluated by 2 experienced neuroradiologists for the location, extent and amount of the bony dehiscence as well as the presence of arachnoid granulation, dominant venous system and high jugular bulb.

RESULTS

CONCLUSION

The dehiscence of dural sinus inducing PT mostly manifests as single defect of bony wall, involves the dominant side of venous system and the lateral wall of the dural sinus, coexists with a large arachnoid granulation beneath the transverse sinus and the high jugular bulb.

CLINICAL RELEVANCE/APPLICATION

This paper is about a new curable cause of PT. Our results benefit the intra-operative localization of the bony dehiscence of dural sinus so as to eliminate the symptom with less damage.

SSA15-03 • Sigmoid Plate Dehiscence: The Prevalence as an Incidental Finding in Patients without Pulsatile Tinnitus

Christopher Trimble MD, MBA (Presenter) ; **David Eisenman** MD ; **Dheeraj Gandhi** MBBS, MD ; **Robert E Morales** MD

PURPOSE

Dehiscence of the sigmoid plate overlying the sigmoid sinus has been reported as a surgically treatable cause of pulsatile tinnitus. We investigated the incidence of this as an incidental finding in patients without a documented history of pulsatile tinnitus.

METHOD AND MATERIALS

Using a retrospective review, we evaluated thin section (1 mm slice thickness) temporal bone CT scans of 125 consecutive trauma patients (102 male and 23 female, with an average age of 39 years) imaged according to a standard institutional trauma protocol during a 9 month period. Sigmoid plate dehiscence was defined as an imperceptible well defined osseous barrier between the sigmoid sinus and adjacent pneumatized mastoid air cells on at least three consecutive images reconstructed in the axial plane, parallel to the hard palate. This finding was confirmed on a second plane. Patients with temporal bone fractures were excluded.

RESULTS

Twenty-five patients in the series were excluded due to temporal bone fractures. Of the 100 remaining patients, 5 (3 male and 2 female) met criteria for sigmoid plate dehiscence. The areas of sigmoid plate dehiscence exclusively involved the junction of the transverse and sigmoid sinuses on the right side. The average dehiscent diameter was 5.8mm (min 3.8mm, max 7.6mm).

CONCLUSION

Though the prevalence of pulsatile tinnitus attributable to sigmoid plate dehiscence has been estimated at 20%, the prevalence of this finding in the asymptomatic population has not been previously reported. Using our diagnostic criteria, surveying 100 trauma patients, we found the prevalence to be 5%. Patients in our series demonstrated dehiscence exclusively on the right side and located at the junction of the transverse and sigmoid sinuses.

CLINICAL RELEVANCE/APPLICATION

The prevalence of sigmoid plate dehiscence in the asymptomatic population appears quite low; its CT diagnosis in evaluating pulsatile tinnitus is key because surgical treatment has high success rates.

SSA15-04 • Patterns of Ossification in Patients with Labyrinthitis Ossificans

Karen Buch MD (Presenter) ; **Alex Gutierrez** ; **Akifumi Fujita** MD ; **Anand Devaiah** MD ; **Osamu Sakai** MD, PhD *

PURPOSE

Labyrinthitis ossificans (LO) is a pathologic process involving ossification of the membranous labyrinth leading to hearing loss. Prior studies describe multiple causes of LO including infection, inflammation, trauma, surgery, and hematologic etiologies. However, no prior study describes the pattern of labyrinth involvement. The purpose of this study was to identify potential etiology-specific ossification patterns using CT scans of patients with LO.

METHOD AND MATERIALS

Following IRB approval, temporal bone CT scans of 34 LO patients were identified from scans done between November 2005-January 2012. Membranous labyrinth structures were evaluated for the degree of ossification and were assigned a grading score from 0-4 based on degree of ossification (0: no ossification, 1: 75%). Medical records were reviewed for etiology of LO.

RESULTS

Of the 34 patients with LO: 19 patients had local infection/inflammation or surgery, 6 had history of meningitis, 4 had sickle cell disease, and 5 had other etiologies. Overall, the lateral semicircular canal had the highest degree of ossification and the vestibule had the least. In cases of local infection/inflammation all of the semicircular canals were most severely affected followed by the basal cochlea, middle cochlea, apical cochlea, and lastly, the vestibule. In cases of meningitis, the posterior and superior semicircular canals were most affected followed by the middle cochlea, apical cochlea, basal cochlea, lateral semicircular canal, and lastly, the vestibule. In cases of SCD, the lateral semicircular canal was most severely affected, then followed by the other structures in the membranous labyrinth with an equal distribution.

CONCLUSION

LO results in specific patterns of membranous labyrinth involvement. Overall, the lateral semicircular canals were most severely affected and the vestibules were the least affected. Different causes of LO may result in different ossification patterns.

CLINICAL RELEVANCE/APPLICATION

Etiology specific patterns of ossification appear to occur in LO. These findings may identify an underlying cause or predict progression of ossification in patients with labyrinthitis ossificans.

SSA15-05 • MR Imaging of Inner Ear Endo-perilymphatic Spaces at 3 Tesla after Intratympanic Contrast Agent Administration in Definite Meniere's Disease

Marco Colasurdo MD ; **Simone Salice** MD (Presenter) ; **Antonella Centonze** ; **Giampiero Neri** ; **Armando Tartaro** MD

PURPOSE

MRI findings in Meniere's disease are not yet defined. The purpose of this study was to determine the main findings of endo-perilymphatic spaces in patients affected by Definite Meniere's disease using Magnetic Resonance Imaging (MRI) with intratympanic administration of contrast agent.

METHOD AND MATERIALS

Twelve patients with Definite Meniere's disease underwent 3 Tesla MRI. 3D FLAIR and 3D T2 SE sequences were acquired 24 hours after intratympanic administration of 0.4-0.5 ml of gadobutrol diluted eightfold with saline. Contrast agent was injected through the tympanic membrane with a 25 G needle. Multi Planar Reconstructed (MPR) images were analyzed. According to literature, vestibular endolymphatic hydrops was graded considering the ratio of the area of the endolymphatic space to the vestibular fluid space (sum of the endolymphatic space and perilymphatic space). Patients with no hydrops had a ratio of one third or less, those with mild hydrops had between one-third and a half and those with severe hydrops had a ratio of more than 50%. Cochlear and semicircular canals endolymphatic hydrops was defined as positive when a MRI signal void was detected.

RESULTS

No adverse events due to contrast agent administration were observed. Three patients didn't show perilymphatic enhancement thereby they were not considered for data analysis. Vestibular endolymphatic hydrops was observed in 100% of patients and it was severe in 7 out of 9 patients and mild in 2 out of 9. Whereas posterior semicircular canal endolymphatic hydrops was observed only in 5 out of 9 patients; lateral and superior semicircular canals endolymphatic hydrops was observed only in 4 out of 9 patients; cochlear endolymphatic hydrops was observed only in 5 out of 9 patients.

CONCLUSION

Our study confirms that endolymphatic hydrops can be detected at 3T MR images after intratympanic contrast agent administration and is the main finding in patients with Definite Meniere's disease. Moreover, our preliminary results seem to suggest that endolymphatic hydrops may affect more often the vestibule than cochlea or semicircular canals.

CLINICAL RELEVANCE/APPLICATION

3T MRI with intratympanic administration of contrast agent might open the door to objective evaluation of endolymphatic space and reveal Meniere's disease pathophysiology improving diagnostic efficacy.

SSA15-06 • Correlation of Ear Symptoms with Increased Cochlear Fluid-attenuated Inversion Recovery Signal in Patients with Acoustic Neuroma

Dae Yoon Kim (Presenter) ; **Jeong Hyun Lee** MD, PhD ; **Won-Jung Chung** ; **Young Jun Choi** MD ; **Sohyun Jo** ; **Jung Hwan Baek** ; **Ka-Gyoung Yoon** MD

PURPOSE

It is well-known that cochlear fluid-attenuated inversion recovery (FLAIR) signal is increased in patients with acoustic neuroma (AN). The purpose of this study was to investigate if cochlear FLAIR signal in patients with AN correlates with ear symptoms or audiometric findings, and if there is any difference in the cochlear signal according to the extent of AN in a large series.

METHOD AND MATERIALS

This retrospective study enrolled 102 patients with surgically confirmed or radiologically diagnosed AN from 2008 to 2012. There were 22 patients (M : F = 10 : 12; mean age: 50 ± 13.2 years) with AN confined to the internal auditory canal (AN_{IAC}) and 80 (M : F = 48 : 32; mean age: 49.9 ± 12.3 years) with AN located in the cerebellopontine angle cistern as well as in the IAC (AN_{CPA}). We quantitatively measured the signal intensity (SI) of the entire volume of the cochlea on the affected side by placing ROIs semi-automatically drawn on 3D T2-VISTA images of the same slices. We compared the SI ratios (rSI) of the cochlea to the brainstem with ear symptoms including tinnitus, hearing disturbance or vertigo and with the audiometric findings in AN_{IAC} and AN_{CPA}-patients, respectively.

RESULTS

The rSI of the cochlea was positively correlated with the audiometric findings in AN_{IAC} (r = 0.471; p=0.027), but showed no correlation in AN_{CPA} (p = 0.427). The rSI of the cochlea was significantly higher with the presence of hearing disturbance or tinnitus only in patients with AN_{IAC} (p = 0.001 and p = 0.004, respectively). There was no correlation between the rSI of the cochlea and the presence of hearing disturbance or tinnitus in patients with AN_{CPA} (p = 0.600 and p = 0.506, respectively). Both AN_{IAC} and AN_{CPA} did not show any difference of the rSI of the cochlea whether they had vertigo or not (p = 0.082, p = 0.782, respectively).

CONCLUSION

Cochlear FLAIR signal is significantly higher with the presence of hearing disturbance or tinnitus and shows positive correlation with the audiometric findings only in patients with AN limited to the IAC.

CLINICAL RELEVANCE/APPLICATION

The results of this study suggest that functional evaluation of the cochlea could be possible with FLAIR images in patients with acoustic neuroma limited to the IAC.

SSA15-07 • Imaging of the Inner Ear in Menière's Disease: Round and Oval Window Pathology as Possible Influential Factors for Restricted Contrast Medium Permeability

Wilhelm H Flatz MD (Presenter) ; **Robert Guerkov** ; **Maximilian F Reiser** MD ; **Birgit B Erti-Wagner** MD *

PURPOSE

To prospectively evaluate MRI- and CT-findings of the temporal bone, including the middle and inner ear as well as adjacent soft tissue, as potential causes for restricted diffusion of Gd-DTPA into the inner ear.

METHOD AND MATERIALS

We retrospectively evaluated 32 patients with suspected Meniere's disease who underwent both multislice-CT- and locally enhanced MR imaging of the temporal bone. 24 hours prior to the MRI-scan intratympanic Gd-DTPA was administered. In addition to structural MR-imaging of the brain, CISS-, FLAIR- and IR-sequences of the temporal bone were acquired on a 3 T MR scanner using a 32 channel head coil. Slice thickness of FLAIR- and IR-images was 0.5 mm and 0.6 mm respectively. Signal intensities of the endolymphatic spaces of the basal turn of the cochlea were evaluated using ROI-based analysis. CT images were reviewed by two blinded radiologists with regard to temporal bone pathology including sclerosis of the round and oval window membrane, middle ear findings and soft tissue assessment. Thickening/sclerosis of the round and oval windows membrane were evaluated using a 6-point scale with 1 being no sclerosis and 6 high grade sclerosis.

RESULTS

In 9 respectively 13 patients CT-analysis of the round window respectively oval window was not possible due to acquired slice thickness. 11 of 19 patients demonstrated sclerotic changes of the oval window (grades 2 to 6). 8 of 23 patients showed sclerotic changes of the round window (grade 2 to 6). Significant differences were observed between measured signal intensities of perilymphatic spaces of the basal turn of the cochlea and degree of oval window sclerosis (P=0.0143), but not between sclerotic changes of the round window and signal intensities of the endolymphatic spaces of the basal turn of the cochlea.

CONCLUSION

Sclerotic changes of the oval window may be responsible for a restricted diffusion of contrast medium from the middle ear into the inner ear.

CLINICAL RELEVANCE/APPLICATION

Sclerotic changes of the oval window may be responsible for a restricted diffusion of a whole variety of substances from the middle ear into the inner ear, including therapeutic agents.

SSA15-08 • Volumetric Assessment of the Membranous Vestibular System in Patients Presenting with Vertigo

Nagy N Naguib MSc (Presenter) ; **Ahmed F Emam** MBBCh ; **Nour-Eldin A Nour-Eldin** MD, MSc ; **Tatjana Gruber-Rouh** ; **Boris**

PURPOSE

To assess the volume of membranous vestibular system in patients presenting with vertigo and to compare the volume with the vestibular system volume in patients with normal vestibular function using three dimensional (3D) reconstruction of the high resolution MR-Imaging sequences.

METHOD AND MATERIALS

The study was retrospectively performed on 153 patients (74 females and 79 males) with a mean age of 48.9 year (standard deviation: 25.4, range: 5 month - 88 year). Of the 153 patients 61 patients presented with vertigo and 92 patients presented with other diseases of the ear and normal vestibular function. High resolution MR-Imaging was performed using a T2-weighted SPACE sequence with 0.6 mm slice thickness. 3D reconstructions were performed using Advantage Workstation for diagnostic imaging. Assessed were the volumes of the semicircular canals and the volume of vestibule. The difference between the volumes in patients with and without vertigo (normal vestibular function) was tested using the Two-Sample t-Test.

RESULTS

Three dimensional reconstructions were successfully performed in all patients. In patients with vertigo the mean volume of the semicircular canals was 0.258 mm³ (SD: 0.061, Range: 0.130 - 0.430 mm³) and the mean volume of the vestibule was 0.069 mm³ (SD: 0.013, Range: 0.040 - 0.110 mm³). In patients with no vertigo (normal vestibular function) the mean volume of the semicircular canals was 0.306 mm³ (SD: 0.074, Range: 0.180 - 0.550 mm³) and the mean volume of the vestibule was 0.075 mm³ (SD: 0.016, Range: 0.040 - 0.13 mm³). There was a statistically significant difference between the semicircular canal volume and the vestibular volume in patients with and without vertigo (normal vestibular function) ($p < 0.0001$ and $p = 0.0019$ respectively).

CONCLUSION

Patients presenting with vertigo show a statistically significant smaller volume of the semicircular canals and vestibule compared to patients not presenting with vestibular dysfunction or vertigo.

CLINICAL RELEVANCE/APPLICATION

A reduced volume of the membranous vestibular system might be the reason for vertigo symptomatic in patients presenting with vertigo.

SSA15-09 • New Grading System for Patients with Congenital Aural Atresia Scheduled for Active Middle Ear Implants

Henning Frenzel MD, PhD (Presenter) ; Gerlig Widmann ; Dirk Petersen MD ; Barbara Wollenberg ; Christian Mohr MD

PURPOSE

Active middle ear implants (aMEI) are being increasingly used for hearing restoration in congenital aural atresia. The existing gradings used for CT findings do not meet the requirements for these implants. Some items are expendable, whereas other important imaging factors are missing. We aimed to create a new grading system that could describe the extent of the malformation and predict the viability and challenges of implanting an aMEI as well as the hearing outcome.

METHOD AND MATERIALS

103 malformed ears were evaluated using HRCT of the temporal bone. The qualitative items middle ear and mastoid pneumatization, oval window, stapes, round window, tegmen mastoideum displacement and facial nerve displacement were included. An anterior- and posterior round window corridor, oval window and stapes corridor were quantified and novelly included. They describe the size of the surgical field and the sight towards the windows. 35 ears were implanted and evaluated for hearing outcome.

RESULTS

The ears were graded on a 16-point scale (16-13 easy, 12-9 moderate, 8-5 difficult, 4-0 high risk). The strength of agreement between the calculated score and the performed implantations with regard to the level of difficulty of the implantation was good. The comparison of the new 16-point scale with the Jahrsdoerfer score showed that both were able to conclusively detect the high-risk group; however the new 16-point scale was able to further determine which malformed ears were favorable for aMEI, which the Jahrsdoerfer score could not do. There was no correlation between the new 16-point scale and the hearing outcome using stapes attachment. The round window attachment in difficult cases may lead to inferior results.

CONCLUSION

The Active Middle Ear Implant Score for Aural Atresia (aMEI-score) allows more precise risk stratification and decision making regarding the implantation. The use of operative corridors seems to have significantly better prognostic accuracy than the Jahrsdoerfer score. The hearing outcome does not rely on the severity of deformation, once a successful coupling of the implant is achieved. The aMEI-score represents the likelihood of achieving a successful implantation.

CLINICAL RELEVANCE/APPLICATION

The Active Middle Ear Implant Score for Aural Atresia (aMEI-score) satisfies the new requirements for diagnostic imaging of congenital aural atresia with regard to active middle ear implants.

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

Sunday, 10:45 AM - 12:15 PM • N227



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SSA16 • AMA PRA Category 1 Credit™: 1.5 • ARRT Category A+ Credit: 1.5

Moderator

Majda M Thurnher, MD

SSA16-01 • Dose Savings and Image Quality in CT of the Neck Using Automated Selection of Tube Potential

Boris Bodelle MD (Presenter) ; Martin Beeres MD ; Sebastian Scheithauer ; Claudia Frellesen ; Boris Schulz MD ; Firas Al-Butmeh ; Nagy N Naguib MSc ; Ralf W Bauer MD * ; Thomas Lehnert MD ; Thomas J Vogl MD, PhD

PURPOSE

To investigate the impact of automated attenuation-based tube potential selection on image quality and radiation dose in patients undergoing CT of the neck.

METHOD AND MATERIALS

360 patients [median age 52 years (range 4 - 89)] underwent 128-slice CT of the neck. First group (n=40) was examined with fixed 120 kV with 180 ref.mAs and automated exposure control (AEC) modulating only mA output. The second group (n=320) underwent CT with AEC and topogram-based automated tube potential selection (Care-kV) by the scanner software with either 80 kV/406 ref.mAs, 100 kV/223 ref.mAs, 120 kV/180 ref.mAs or 140 kV/125 ref.mAs. CTDIvol, DLP, BMI, organ enhancement, image noise, SNR and subjective diagnostic image quality (5-point scale, 2 readers in consensus) were compared between the groups and sub-groups using Mann-Whitney-U test and Cohen's weighted kappa analysis for inter-observer agreement.

RESULTS

100 kV was automatically selected in 279 patients, 120 kV in 40 patients and 80 kV in 1 patient of the Care-kV group. Patients mean BMI (20 kg/m² at 80 kV, 24.2 kg/m² at 100 kV and 28.1 kg/m² at 120 kV) increased with higher kV settings. The average CTDIvol (9.7 vs.

12.2 mGy) and DLP (255 vs. 342 mGycm; $p < 0.05$) in the entire Care-kV group were 20%/25% lower than in group 1 with fixed 120 kV. This effect was even more pronounced in the patients in whom 100 kV was selected (CTDIvol 8.9 mGy, -27%; DLP 244 mGycm, -29%). Organ enhancement increased with lower kV, while image noise and SNR were at a stable level. Subjective diagnostic image quality (4.61 vs. 4.56, $p > 0.05$) were not rated significantly different with a good interobserver agreement for all tube potential levels ($\kappa = 0.5-0.8$).

CONCLUSION

Software-based automated selection of the tube potential allows for significant dose savings in CT of the neck while image quality is maintained or even improved.

CLINICAL RELEVANCE/APPLICATION

Automated selection of tube potential in CT of the neck allows significant dose reduction and preserves image quality, which is relevant for staging patients with lymphoma or head and neck cancer.

SSA16-02 • Metal Artefact Reduction from Dental Hardware in Carotid CT Angiography Using Iterative Reconstructions

Fabian Morsbach (Presenter) ; **Moritz Wurnig** ; **Andreas Krauss** PhD * ; **Bernhard Schmidt** PhD * ; **Spyros S Kollias** MD ; **Hatem Alkadhi** MD

PURPOSE

To determine the value of a metal artefact reduction (MAR) algorithm with iterative reconstructions for dental hardware in carotid CT angiography.

METHOD AND MATERIALS

Twenty-four patients (6 female, mean age 70 ± 12 years) with dental hardware undergoing carotid CT angiography were included. Datasets were reconstructed with filtered back projection (FBP) and using a MAR algorithm employing normalization and an iterative frequency-split (IFS) approach. Three blinded, independent readers measured CT attenuation values and evaluated image quality and degrees of artefacts using axial images, multi-planar reformations (MPR), and maximal intensity projections (MIP) of the carotid arteries.

RESULTS

CT attenuation values of the internal carotid artery on images with metal artefacts were significantly higher in FBP (324 ± 104 HU) datasets as compared to those reconstructed with IFS (278 ± 114 HU); $p < 0.05$.

CONCLUSION

The MAR algorithm with the IFS approach allowed for a significant reduction of artefacts from dental hardware in carotid CT angiography, hereby increasing image quality and improving the accuracy of CT attenuation measurements.

CLINICAL RELEVANCE/APPLICATION

Metal artifact reduction with an iterative frequency split approach can be used to increase diagnostic confidence in carotid CT angiography.

SSA16-03 • Variations in Carotid Bifurcation Geometry by MRI Are Associated with Carotid Atherosclerosis in Asymptomatic Individuals

Christopher Maroules MD (Presenter) ; **Kevin S King** MD ; **Colby Ayers** MS ; **Ronald M Peshock** MD ; **Jarett Berry** MD

PURPOSE

To investigate the relationship between objective measures of carotid bifurcation geometry and carotid atherosclerosis within asymptomatic individuals using MRI.

METHOD AND MATERIALS

We included 80 participants from the Dallas Heart Study (mean age 53 ± 9 years, 46% females) free of cardiovascular disease who underwent multi-sequence MRI of the distal common carotid artery (CCA), carotid bulb, and proximal internal and external carotid arteries (ICA and ECA, respectively) at 3 Tesla. Semiautomated techniques were used to define vessel wall contours, lipid-rich necrotic core (LRNC) volume, and the 3D geometry of the carotid bifurcation. We examined associations between carotid artery geometric parameters and both wall thickness and the presence of LRNC using Spearman correlation and multivariable logistic regression.

RESULTS

LRNC was identified in 11 participants (13.8%). After controlling for age, sex, hypertension, cigarette smoking, hypercholesterolemia, low high-density lipoprotein, diabetes, and body mass index, LRNC was associated with a lower ICA planarity [OR 95% CI: 13.3 (1.8-100.0) per SD, $p = 0.01$] and a lower ICA/CCA ratio [6.7 (1.1-33.3) per SD, $p = 0.03$]. LRNC was not associated with a lower bifurcation angle after multivariable adjustment [OR 95% CI: 2.2 (0.5-9.1) per SD, $p = 0.3$]. Total LRNC volume within the carotid artery correlated with ICA/CCA diameter ratio ($r = -0.32$, $p = 0.03$). Carotid bulb wall thickness correlated with ECA/CCA diameter ratio ($r = -0.49$, $p = 0.003$).

CONCLUSION

Objective geometric measurements of the carotid bifurcation by MRI are associated with carotid atherosclerosis and the presence of lipid rich necrotic core within carotid plaque. These findings support a geometric risk for carotid atherosclerosis.

CLINICAL RELEVANCE/APPLICATION

Variations in carotid bifurcation geometry by MRI are independently associated with carotid atherosclerosis, supporting a 'geometric risk' for atherosclerosis.

SSA16-04 • Atherosclerotic Plaque in the Left Carotid Artery Is More Vulnerable than at the Contralateral Side

Mariana Selwaness MD (Presenter) ; **Quirijn v Bouwhuijsen** ; **Albert Hofman** MD, PhD ; **Oscar H Franco** ; **Jolanda J Wentzel** PhD ; **Aad Van Der Lugt** MD, PhD

PURPOSE

Ischemic cerebrovascular events are most frequently reported in the left hemisphere compared to the right side. Whether this is related to an asymmetry in atherosclerotic plaque frequency and morphology in the carotid arteries is unknown. We investigated plaque distribution and composition in the left and right carotid artery in healthy individuals.

METHOD AND MATERIALS

1501 participants ($n = 45$ years) from The Rotterdam Study, a population-based cohort, with atherosclerotic plaque present on carotid ultrasound were selected. We used 1.5T Magnetic Resonance Imaging (MRI) with standard multisequence scanning protocol to assess plaque prevalence, thickness and predominant component: lipid core, intraplaque haemorrhage (IPH), calcification or fibrous tissue. Differences between left and right side were tested using Pearson chi-square test and Generalized Estimating Equations analyses adjusted for age, gender and carotid wall thickness.

RESULTS

Carotid MRI revealed 2775 atherosclerotic plaques, (bilateral 1274; right 76; left 151) corresponding with 5% higher prevalence of unilateral plaques left than right ($p < 0.05$).

CONCLUSION

We found an unequal distribution of atherosclerotic plaque size and composition in the carotid arteries. IPH and fibrous tissue were more frequently observed in the left carotid artery, whereas calcification was more often present in the right. Our findings suggest that the predilection of cerebrovascular disease to the left side may be explained by the vulnerable phenotype of plaques in the left carotid artery.

CLINICAL RELEVANCE/APPLICATION

We show for the first time that left and right plaque composition differ in carotid arteries. Understanding distribution patterns of atherosclerosis is important for stroke recognition and management.

SSA16-05 • Automated Interpretation of Carotid Plaque Composition Identifies High-risk Lesions: A Prospective MRI Study

Daniel S Hippe MS (Presenter) * ; **Xin Pu** ; **Hunter R Underhill** MD, PhD ; **Jie Sun** ; **William S Kerwin** PhD * ; **Wei Yu** MD ; **Yan Song** MD, PhD ; **Jianming Cai** MD ; **Xihai Zhao** ; **J. Kevin Demarco** MD * ; **Chun Yuan** PhD * ; **Thomas S Hatsukami** MD *

PURPOSE

Carotid MRI is an effective modality for quantifying atherosclerotic plaque composition and identifying lesions associated with stroke/TIA. However, complexity of manual image interpretation and limited prospective data has hindered translation of carotid MRI into clinical practice. In this study we developed an automated technique for stratifying lesion severity and subsequently conducted a prospective study to determine if the algorithm predicts lesion growth or development of vulnerable features.

METHOD AND MATERIALS

Participants (N=536) from 17 institutions and centers in the US and China were imaged with an established multi-contrast carotid MRI protocol. A histologically-validated segmentation algorithm was applied to the MR images to automatically measure lipid-rich necrotic core (LRNC) and calcification (CA). Associations between manually identified high-risk features (i.e. intraplaque hemorrhage, IPH; and fibrous cap rupture, FCR) and clinical risk factors, plaque morphology, and composition were investigated to develop an optimized, automated carotid atherosclerosis score (ACAS) for stratifying lesion severity. Subsequently, ACAS was evaluated prospectively using an independent cohort of 73 asymptomatic subjects that underwent serial carotid MRI over a 3 year period.

RESULTS

During systematic analysis of potential risk factors, the most effective metric to detect lesions with IPH or FCR was percent size of LRNC (AUC=0.89). This metric was used to define ACAS from low to high risk: 1) LRNC absent; 2) LRNC < 30%; 3) LRNC 30-50%; and 4) LRNC > 50%. Applied prospectively, ACAS was associated with new FCR (AUC=0.84, p0.1).

CONCLUSION

Automated plaque interpretation is an effective technique for stratifying lesion severity that predicts lesion growth and development of FCR ♦ a key risk factor associated with stroke/TIA. Automated plaque analysis is expected to simplify carotid MRI interpretation, enabling the translation to clinical practice for improved management of patients with carotid atherosclerotic disease regardless of stenotic severity.

CLINICAL RELEVANCE/APPLICATION

The automated plaque interpretation technique developed is predictive of carotid plaque growth and fibrous cap rupture so utilization may improve management of patients over carotid stenosis alone.

SSA16-06 • Analysis of Association between Carotid Artery Plaque Volume and Cerebral Microbleeds

Luca Saba MD (Presenter) ; **Michele Anzidei** MD ; **Lorenzo Mannelli** MD, PhD ; **Jasjit S Suri** ; **Michele Di Martino** ; **Mario Piga**

PURPOSE

Cerebral microbleeds (CMBs), have become increasingly recognised with the widespread use of MRI techniques that are sensitive to iron deposits. The purpose of this work was to explore the association between carotid plaque volume (total and the sub-components) and CMBs.

METHOD AND MATERIALS

72 consecutive (males 53; median age 64) patients were prospectively analyzed. Carotid arteries were studied by using a 16-detector row CT scanner whereas brain was explored with a 1.5 Tesla system. CMBs were studied using a T2*-weighted gradient-recalled echo (GRE) sequence. Microbleeds were classified as absent (grade 1), mild (grade 2; total number of microbleeds, 1♦2), moderate (grade 3; total number of micro-bleeds, 3♦10), and severe (grade 4; total number of microbleeds, >10). Component types of the carotid plaque were defined according the following HU ranges: lipid < 60 HU; fibrous tissue from 60-130 HU; calcification > 130 HU and plaque volumes of each component was calculated. Each carotid artery was analyzed by 2 observers. Chi square, multiple logistic regression analysis as well as ROC was calculated.

RESULTS

The prevalence of CMBs was 35.3%. A statistically significant difference was observed between symptomatic (40%) and asymptomatic (11%) patients (p value = 0.001; OR = 6.07). Linear regression analysis demonstrated an association between the number of CMB and the symptoms (p = 0.0018). A statistically significant correlation was observed between the increase of the volume of the fatty component and CMBs (rho = 0.89; p = 0.001).

CONCLUSION

Results of this study confirm the association between CMBs and symptoms and that there is an increased number of CMBs in symptomatic patients. Moreover we found that an increased volume of the fatty component is associated the presence and number of CMBs.

CLINICAL RELEVANCE/APPLICATION

The presence of fatty components in the carotid artery plaque are associated with an increased prevalence of cerebral micro-bleeds

SSA16-07 • Dual Energy Computed Tomography Quantification of Carotid Plaques Calcification: Comparison between Monochromatic and Polychromatic Energies with Pathology Correlation

Lorenzo Mannelli MD, PhD (Presenter) ; **Lawrence MacDonald** PhD ; **Marina Ferguson** MS ; **Dongxiang Xu** PhD ; **William P Shuman** MD * ; **Chun Yuan** PhD * ; **Lee M Mitsumori** MD, MS *

PURPOSE

To compare the size and number of carotid plaque calcifications identified on monochromatic spectral CT and polychromatic CT images with a pathological reference standard.

METHOD AND MATERIALS

Ex-vivo carotid endarterectomy specimens were imaged with spectral and conventional CT. Monochromatic CT images were reconstructed at 40, 60, 80, 100, 120, and 140 keV. Conventional polychromatic images were acquired using 80, 100, 120, and 140 kVp. Cross-sectional area of the plaque calcifications was measured. The histological calcium areas were measured on digitized images of Toluidine-Blue/Basic-Fuchsin stained plastic sections. The CT images and corresponding histology sections were matched. Pearson's ♦ correlation coefficient for a linear relationship was calculated between the results from pathology and CT, and between different CT techniques. We also calculated the mean percent error (bias) and root-mean-square error (RMSE) in CT calcification size, taking pathology measurements as the gold standard. The mean percent error was calculated as $(C_{\text{size}} \diamond Pathology_{\text{size}})/(Pathology_{\text{size}})$ averaged over the calcifications found by the CT technique of interest.

RESULTS

116 pathological sections were evaluated, the calcification area per section ranged between 0.20 mm² and 26.4 mm². Fig. 1 is a scatter plot of calcification sizes measured by pathology and CT for three CT image types (40 keV, 140 keV, and 120 kVp). Fig. 2 shows that when compared to pathology, the amount of plaque calcifications identified with spectral CT decreased with higher reconstructed energy level: at 80 keV 90% were found, at 100 keV only 77%; on polychromatic 120 kVp CT images 95% of the calcifications were found. Fig. 2 also shows the Pearson correlation coefficient. The RMSE and average percent error are shown in figure 3: there is an overestimation in calcification size by CT for lower monochromatic CT images, decreasing to an underestimation for higher keV monochromatic CT images and polychromatic CT images. Monochromatic 80 keV and 100 keV images show the lowest RMSE and %error.

CONCLUSION

The size and number of plaque calcifications detected by CT depends upon the energy level used for the image acquisition and reconstruction. Monochromatic 80keV images were the most comparable to histology.

CLINICAL RELEVANCE/APPLICATION

80 keV monochromatic images allow for a better evaluation of atherosclerotic calcifications; this may help characterizing the whole atherosclerotic plaque.

SSA16-08 • Radiological Assessment of Thoracic Outlet Syndrome: Four Years of Institutional Experience

Dean Donahue ; Omid Khalilzadeh MD, MPH ; Julien Dinkel MD ; Gaetano T Pastena MD ; Martin Torriani MD ; Rajiv Gupta PhD, MD (Presenter)

PURPOSE

Imaging studies play a significant role in assessment of thoracic outlet syndrome (TOS). In this study, we reviewed the spectrum of CT and MR imaging findings in patients with TOS in our institution, over a period of four years.

METHOD AND MATERIALS

Our study included a total of 349 consecutive TOS patients, referred to our hospital between December 2008 and December 2012. Patients with non-specific symptoms were excluded. All patients underwent a biphasic contrast-enhanced CT angiography of the thoracic outlet using a TOS-optimized protocol and an MR scan with a postural maneuver. A single radiologist (RG) assessed all the scans. The findings associated with TOS were classified under the categories of vascular (venous or arterial), neurologic (due to soft tissue, bone or anatomical space abnormalities causing mass effect on the brachial plexus) and a combination of the two, i.e, neurovascular (typically secondary to post-operative or traumatic insult).

RESULTS

Positive CT or MR findings were seen in 78.5% of patients. Overall, 6% of patients had vascular TOS (2% venous and 4% arterial), 7.4% had neurovascular, and 86% had neurogenic TOS. Bone abnormalities were the most common cause of neurogenic TOS. Narrowing of anatomic compartments (inter-scalene triangle and costoclavicular space) was seen in 43.7% of patients with neural TOS. C7 transverse process variations were the most common bone abnormality (67.9%). Fibrous bands were the most common soft tissue abnormalities associated with neurogenic TOS.

CONCLUSION

This study describes the range of CT and MR findings associated with TOS. Based on our experience, a combination of CT angiography and MR imaging (with a postural maneuver) effectively demonstrate TOS abnormalities.

CLINICAL RELEVANCE/APPLICATION

A combination of biphasic contrast-enhanced CT angiography and MR imaging (with a postural maneuver) effectively demonstrate TOS abnormalities.

SSA16-09 • Bilateral Inferior Petrosal Sinus Sampling Using Desmopressin: A Single Center Experience

Amy R Deipolyi MD, PhD (Presenter) ; Bailin Alexander BA ; Junsung Rho BSc ; Zubin Irani MD ; Stephan Wicky MD ; Rahmi Oklu MD, PhD

PURPOSE

Bilateral inferior petrosal sinus sampling (BIPSS) following corticotropin-releasing hormone (CRH) stimulation is the current gold standard technique in the diagnosis of Cushing disease. However, as a result of CRH shortage, desmopressin (DDAVP) has become the replacement of choice for BIPSS. We present a single tertiary care center experience using the modified BIPSS protocol.

METHOD AND MATERIALS

This IRB approved, HIPAA compliant study involved using the radiology department's electronic database to identify BIPSS procedures performed at our institution using DDAVP. Electronic medical records and imaging studies were reviewed. Clinical history, demographics, endocrine test results, complications of BIPSS and patient outcome was recorded. BIPSS data was analyzed for centralization (3:1, central to peripheral ACTH gradient) and lateralization (1.4:1 ACTH gradient).

RESULTS

We identified 17 BIPSS cases (14 female, mean age 37.9 years (range 13-64)) performed using DDAVP between 2012 and 2013. The 17 cases demonstrated conventional, bilateral IPS anatomy and were successfully cannulated bilaterally. 16 patients met the criteria for both centralization and lateralization. 14 of the 17 patients had undergone a transphenoidal tumor resection, 1 patient was lost to follow up and 2 had not yet been surgically treated. All 14 patients demonstrated ACTH secreting adenoma on pathology review and all 14 were concordant with lateralization predicted by BIPSS. There were no complications resulting from the use of DDAVP, specifically thromboembolic events.

CONCLUSION

DDAVP is a safe alternative to CRH producing satisfactory diagnostic results.

CLINICAL RELEVANCE/APPLICATION

BIPSS is the current gold standard technique in the diagnosis of Cushing disease. Given the shortage of CRH, desmopressin has been safe and demonstrates similar diagnostic results.

Eye and Orbit

Sunday, 02:00 PM - 03:30 PM • E451A



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RC106 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC106A • Eye and Optic Nerve

Mary E Cunnane MD (Presenter) *

LEARNING OBJECTIVES

1) Recognize commonly seen abnormalities of the globe, including effects of trauma, infection, and congenital malformation. 2) Should be familiar with the appearance of intraocular tumors, particularly retinoblastoma, and diseases that mimic retinoblastoma. 3) Should be able to identify the most common causes of optic neuropathy, and identify radiographic features which point to a specific diagnosis in patients with optic neuropathy.

RC106B • Orbital Tumors

H. C Davidson MD, MS (Presenter) *

LEARNING OBJECTIVES

1) Be familiar with the anatomical and spatial composition of the orbit and related organs. 2) Develop differential diagnoses of orbital lesions based on spatial, pathological, demographic, and imaging features. 3) Discuss the cross-sectional imaging strategy for evaluation of the orbit, and describe the CT and MR appearance of common and uncommon orbital lesions.

RC106C • Orbital Inflammation

Ashley H Aiken MD (Presenter) *

LEARNING OBJECTIVES

1) To recognize the CT and MR imaging features of orbital infection and inflammatory diseases. 2) To recognize orbital inflammatory disease based upon imaging appearance and clinical scenario in order to offer a limited differential diagnosis and guide biopsy in select cases. 3) To understand important complications associated with orbital infection and inflammation.

ABSTRACT

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

Monday, 08:30 AM - 10:00 AM • S103AB

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RO **OI** **NR** **HN**

MSRO21 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Co-Director

Fergus V Coakley, MD

Co-Director

Bruce G Haffty, MD

MSRO21A • Anatomy of the Lymph Nodes

Suresh K Mukherji MD (Presenter)

LEARNING OBJECTIVES

1) Review the normal anatomy of the lymph nodes of the neck. 2) Review the radiological anatomy and landmarks for identifying lymph node groups. 3) Review the primary eschelon drainage patterns of various head and neck subsites.

ABSTRACT

1. Review the normal anatomy of the lymph nodes of the neck
2. Review the radiological anatomy and landmarks for identifying lymph node groups
3. Review the primary eschelon drainage patterns of various head and neck subsites

MSRO21B • Current Concepts and Controversies in Contouring and Treatment of Lymph Nodes

Sung Kim MD (Presenter)

LEARNING OBJECTIVES

1) Learn and discuss what lymph node levels are appropriate to target depending on primary site. 2) Discuss the appropriate dose and margins for lymph node coverage.

MSRO21C • Anatomy and Staging of the Brachial Plexus

Suresh K Mukherji MD (Presenter)

LEARNING OBJECTIVES

1) Review the normal anatomy of the brachial plexus. 2) Review the pertinent radiologic landmarks that permits accurate contouring of the brachial plexus. 3) Review the common neoplastic processes of the brachial plexus.

ABSTRACT

This session will be a detailed review normal anatomy of the brachial plexus and focus on the landmarks that help permit accurate contouring of the plexus

MSRO21D • Current Concepts and Controversies in Contouring the Brachial Plexus

Sung Kim MD (Presenter)

LEARNING OBJECTIVES

1) Discuss a reproducible method for contouring brachial plexus.

Head and Neck Top Ten: Missed Diagnoses and Imaging Pearls (An Interactive Session)

Monday, 08:30 AM - 10:00 AM • E450A

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NR **HN**

RC206 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Deborah R Shatzkes, MD

Richard H Wiggins, MD

LEARNING OBJECTIVES

1) To identify imaging findings in some of the most commonly missed diagnoses in the Head and Neck, including those within the neck, temporal bone, paranasal sinuses, skull base and orbits. 2) To review the most salient radiologic and clinical features of these diagnoses, as well as the most important differential considerations. 3) To suggest scan review techniques that will help the radiologist consistently make these diagnoses.

ABSTRACT

The Head and Neck can be a challenging area for the radiologist, in that some findings are easily missed, and others are frequently misinterpreted. Some of the more common 'misses' in HandN radiology occur because findings are subtle and will not be obvious to the examiner unless they are the subject of a specific and systematic search. A classic example is fenestral otosclerosis. This relatively common diagnosis (found in up to 10% of autopsy specimens!) will invariably be missed unless the radiologist specifically interrogates its most common site of presentation, the fissula ante fenestram, along the anterior margin of the oval window. There, only a small lucent focus may be discovered, yet this will reflect the etiology of the patient's hearing loss, while the remainder of the scan is entirely normal. The temporal bone is the site of another commonly missed diagnosis, labyrinthitis. In this scenario, the patient presents with sensorineural hearing loss, and the radiologist is able to rule out the most common listed study indication, 'acoustic neuroma.' Yet, labyrinthitis is a statistically more common cause of hearing loss, though the findings of abnormal signal in the membranous labyrinth may be extremely subtle. When 'tunnel vision' is applied in the setting of hearing loss, and scan interrogation is limited to the IAC and CPA, the findings of labyrinthitis will invariably be missed. Familiarity with some of the diseases specific to the HandN will help reduce the likelihood of misinterpretation of findings. An example that has recently gained attention in the literature is HPV-related squamous cell carcinoma of the oropharynx. These cancers frequently metastasize to upper jugular lymph nodes, and these nodes are frequently cystic. As such, there has been a near epidemic of cystic metastatic lymph nodes mistakenly called second branchial cleft cysts. Beware this diagnosis in the adult patient!

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

Monday, 10:30 AM - 12:00 PM • S100AB

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MR NR HN

MSCM22 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Director

John R Leyendecker, MD

MSCM22A • Brain

Jonathan H Burdette MD (Presenter)

LEARNING OBJECTIVES

1) Understand the latest brain imaging techniques and how they can be used in routine clinical practice. 2) Generate appropriate differential diagnoses based on imaging findings and clinical presentation. 3) Recognize imaging features of various brain pathologic entities, such as neoplastic, infectious, inflammatory, and vascular diseases. 4) Help guide clinical colleagues along the path to the appropriate diagnosis.

ABSTRACT

Magnetic Resonance Imaging continues to be the workhorse technique in brain imaging. The brain imaging capabilities of MRI continue to make MRI a more sensitive and specific diagnostic tool compared with CT for most clinical entities. The past 15 years has ushered in the era of Physiologic MRI techniques, such as diffusion-weighted imaging, diffusion tensor imaging, gadolinium-based and arterial spin labeled perfusion imaging, spectroscopy, functional MRI (fMRI), and, most recently, connectivity/network-based imaging. This presentation will cover the MR imaging features of several brain pathologic entities, and some of the latest brain MR imaging techniques will be introduced.

MSCM22B • Head and Neck

Iлона M Schmalfuss MD (Presenter) *

LEARNING OBJECTIVES

1) Generate appropriate differential diagnoses based on imaging findings and patient's clinical presentation. 2) Demonstrate understanding of pertinent anatomy and imaging findings relevant to commonly overlooked disease processes in the head and neck area. 3) Recognize imaging features of different head and neck malignancies and apply this knowledge to cancer staging and treatment plan. 4) Practice interpretation of new imaging techniques.

ABSTRACT

Learning objectives: 1. Generate appropriate differential diagnoses based on imaging findings and patient's clinical presentation 2. Demonstrate understanding of pertinent anatomy and imaging findings relevant to commonly overlooked disease processes in the head and neck area 3. Recognize imaging features of different head and neck malignancies and apply this knowledge to cancer staging and treatment plan 4. Practice interpretation of new imaging techniques

MSCM22C • Peds Neuro

A. James Barkovich MD (Presenter) *

LEARNING OBJECTIVES

1) Determine the appropriate imaging study based upon the clinical history supplied. 2) Generate appropriate differential diagnoses of Pediatric Brain Imaging studies based upon the clinical presentation and the imaging findings. 3) Recognize imaging features of malformations, neurocutaneous disorders, metabolic disorders, and brain injuries that cause neurologic dysfunction in childhood. 4) Guide clinical colleagues in their pursuit of diagnosis.

ABSTRACT

Imaging of children with neurological dysfunction is difficult for most radiologists. The immature child's brain looks different from the adult brain because, especially in young children, development is not complete: sulcation has not completely finished, myelination is ongoing, the cerebellum is still immature. This presentation will explain features of normal development, discuss the best imaging strategies in immature and mature pediatric brains, and show examples of some of the most common and important disorders that are seen in children with perinatal and postnatal brain injury, developmental delay, epilepsy, and new neurological impairment. In addition to normal brain development as assessed by imaging, this talk will cover perinatal and postnatal brain injury, common malformations, and causes of epilepsy including neurocutaneous disorders. Some new concepts will be discussed that make these disorders easier to understand.

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

Monday, 10:30 AM - 12:00 PM • S103AB

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RO NR HN

MSRO22 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Co-Director

Fergus V Coakley, MD

Co-Director

Bruce G Haffty, MD

Moderator

Sung Kim, MD

Moderator

Simon S Lo, MD

MSRO22-01 • Invited Speaker:

John C Grecula MD (Presenter) *

MSRO22-02 • Induction Chemotherapy Plus Intensity Modulated Radiation Therapy for Locally-advanced Oropharyngeal Cancer: Prognostic Value of PTV

Carlo Furlan (Presenter)

ABSTRACT

Purpose: To assess the prognostic value of the PTV dimension in patients affected by locally advanced oropharyngeal carcinoma (OPC) treated with induction chemotherapy (CT) followed by radical IMRT.

Patients and methods: 38 consecutive stage III-IV OPC patients who underwent induction CT followed by SIB-IMRT were analyzed. CT consisted of TPF (docetaxel, platinum and 5-FU) delivered for 3 cycles before radiotherapy in all patients.

The maximum radiation dose, consisting of 66 Gy-70.95 Gy in 30-33 fractions, was prescribed to the PTV70, that included the initial

extent of disease (pre-CT GTV plus 0.5-0.8 mm margin). The node-negative neck received a total dose of 54-62.70 Gy in 30-33 fractions. Patients were divided into two groups according to the PTV70 dimensions: 97.5cc. Kaplan-Meier analysis was used to calculate disease free survival (DFS) and overall survival (OS). Log-rank test was to test potential risk factors including PTV70 volume. Results: The median follow-up was of 28 months (range, 6-141 months). The median age was of 59 years (range, 36-80 years), and 24 patients (63%) were male. Eight patients were stage III (21%), and 30 (79%) stage IV. All patients were staged with CT-scan and/or MR. Twenty-nine patients (76%) were staged with FDG-PET/CT. The median PTV70 dimension was of 95,7 ml (range, 45 ml-512 ml). Eighteen patients (47%) had a PTV70 < 97.5 ml (mean volume 78,2 ml), and 20 (53%) patients had a PTV70 > 97.5 ml (mean volume 341,6 ml). After induction CT, 11 patients had CR (29%), 24 PR (63%), and 2 SD (5%); one experienced locoregional progression of disease. The actuarial rates of DFS and OS were 71% and 88% at 3 years, respectively. At the univariate analysis PTV70 dimension does not correlate with DFS and OS (p = 0,77). Conclusions: Treatment with 3 cycles of induction TPF followed by SIB-IMRT is not influenced by PTV70 volume in terms of DFS and OS in locally-advanced OPC.

MSRO22-03 • Radioprotection of Murine Salivary Glands by Botulinum Toxin

Youssef Zeidan MD, PhD (Presenter) ; Nan Xiao PhD ; Hongbin Cao ; Christina Kong MD ; Davud Sirjani MD ; Quynh-Thu X Le MD

PURPOSE

Xerostomia is the most common chronic radiation toxicity affecting the quality of life of head and neck cancer (HNC) patients. Botulinum toxins (BTX) have been successfully used in treating sialorrhea in pediatric patients and radiation-induced cystitis, proctitis, fibrosis and facial pain. This study evaluates the effect of BTX on radiation-induced salivary gland damage.

METHOD AND MATERIALS

Submandibular glands (SMGs) of male C5BL6 mice (10-12 wks) were directly injected with saline or botulinum toxin via an open procedure. After 72 hrs, a focal submandibular field was irradiated on a kilovoltage machine to a total dose of 15 Gy. Pilocarpine-induced saliva flow was measured at 3, 7 and 28 days post irradiation. At different time points, submandibular glands were collected for weight, immunofluorescence and Western blotting analysis. Myeloperoxidase staining was used to study neutrophil infiltration. TUNEL staining was used to evaluate cell death. A cytokine array, consisting of 40 different mouse cytokines was used to evaluate cytokine profiles after radiation treatment.

RESULTS

Histologically, BOT pretreated glands showed relative preservation of acinar volume post irradiation and less periductal fibrosis compared to saline control. At 3 days post irradiation, saline-injected mice showed a 50% reduction in basal saliva flow. However, mice preinjected with botulinum toxin maintained 75% of initial saliva flow (p

CONCLUSION

Taken together, these data indicate that BTX intraglandular injection reduces radiation-induced salivary dysfunction through modulation of neutrophil infiltration and CXCL5 levels. Our findings have important implications for future targeting of xerostomia in HNC patients.

CLINICAL RELEVANCE/APPLICATION

This work uncovers a novel mechanism for radiation-induced salivary gland damage.

MSRO22-04 • Radiation Therapy in Tri-modality Treatment for Esthesioneuroblastoma

Jonathan Wallach (Presenter)

MSRO22-05 • Percutaneous Computed Tomography-guided Permanent I125 Implantation for Treating Recurrent Head and Neck Cancer

Suqing Tian (Presenter)

ABSTRACT

Abstract

Background: To investigate the therapeutic efficacy of computed tomography (CT)-guided permanent percutaneous implantation of iodine-125 (¹²⁵I) for treating recurrent head and neck cancers.

Methods: Thirteen patients with recurrent head and neck cancer (previously treated with a total cumulative dose exceeding 100 Gy) were included in this study. ¹²⁵I seeds were implanted into recurrent head and neck lesions by CT-guided needle puncture. Treatment responses were evaluated during follow-up by contrast-enhanced CT. Survival was analyzed using the Kaplan-Meier method.

Results: The tumor response rate was 84.0%. The overall median control time was 24.0 months. The local control rate was 57.8% and 34.5% at 1 and 2 years, respectively. The overall 1- and 2-year survival rates were 61.9% and 38.1%, respectively. No serious complications were observed postoperatively and during the follow-up period.

Conclusion: Ultrasound-guided brachytherapy using ¹²⁵I seed implantation is safe and effective for treating recurrent head and neck cancer.

MSRO22-06 • Development of a Standardized Method for Contouring the Larynx and Its Substructures

Mehee Choi MD (Presenter) ; Tamer Refaat Abdelrhman MD, PhD ; Ian Bacchus PhD ; Malisa S Lester MD ; Alfred W Rademaker PhD ; Bharat B Mittal MD *

PURPOSE

Limiting radiation dose to the larynx can diminish effects of laryngeal dysfunction. However, no clear guidelines exist for defining the larynx and its substructures consistently on cross-sectional imaging. This study presents computed tomography (CT)- and magnetic resonance imaging (MRI)-based guidelines for contouring laryngeal organs-at-risk (OARs).

METHOD AND MATERIALS

Using published anatomic information and radiologic data, standardized guidelines for delineating the larynx and its substructure organs at risk (OARs) on 3-mm axial CT images were devised. Based on the guidelines, the OARs were delineated on CT and MRI for five consecutive patients with non-laryngeal head and neck cancer. Volumetric comparisons between CT and MRI contours were performed to validate that the guidelines can be applied consistently to radiotherapy-planning CT scans as well as MRI scans in a reproducible manner. The guidelines were then used to delineate the OARs on radiotherapy-planning CT scans of 44 additional patients treated with chemoradiation for head and neck cancer. Further volumetric comparisons were made to establish the consistency of guideline-based contours.

RESULTS

The larynx and its substructures were successfully created on CT and MRI datasets for five patients, using the proposed guidelines. Differences in OAR volumes were not statistically different between CT and MRI. Comparisons of 44 additional CT-based contours with the five initial CT-based contours and MRI-based contours showed no significant differences in OAR volumes.

CONCLUSION

The contouring guidelines developed provide a precise, reproducible method for delineating the larynx and its substructures on treatment-planning CT scans. Similar guidelines could be used for MRI-based planning. Clinical implementation of the guidelines should reduce observer variability, leading to an improved understanding of the relationship between radiation dose-volume effects on laryngeal substructures and toxicity outcomes.

CLINICAL RELEVANCE/APPLICATION

This study presents guidelines for contouring the larynx and its substructures on axial CT and MR images for use in future investigations

MSRO22-07 • Single Fraction Spine Stereotactic Body Radiation Therapy for Treatment of Chordoma

Edward W Jung MD (Presenter)

ABSTRACT

Purpose/Objective(s):

Chordoma is a rare, slow growing locally aggressive bone tumor arising from embryologic notochord that affects 300 new patients each year in the United States. Only 10% to 20% of tumors arise in the cervical, thoracic, or lumbar spine. Because chordomas are radioresistant, involvement of the spine presents a therapeutic challenge due to the high doses of radiation needed for local control along with proximity to the spinal cord, a dose-limiting organ. There are currently no published reports in the literature exclusively looking at outcomes of spine Stereotactic Body Radiation Therapy (sSBRT) treatment of chordoma. The purpose of this study is to determine the efficacy and safety of treatment with single fraction sSBRT for chordoma of the spine.

Materials/Methods:

A retrospective review of our IRB approved registry from 2007 to 2012 identified 6 patients with chordoma of the spine who were treated with sSBRT for a total of 9 treatments. Five of six patients were treated with curative intent. Surgical resection was performed in 5 of 9 cases. All patients were treated on a Novalis Radiosurgery unit with coplanar beams. A thermoplastic head mask or a vacuum-form body immobilization device (BodyFix) was used depending on tumor location. Cone beam CT or ExacTrac™ image guidance systems were used for positioning and localization. The treatment volume was defined by the bony vertebral level of the lesion along with soft tissue extension appreciated on MRI scans (T1 and STIR sequences) as per RTOG 0631 guidelines. Post treatment MRI scans were assessed for local control, recurrence, and disease progression. Individual patient records were reviewed to assess for symptomatic relief and failure. Treatment toxicity was evaluated using the Common Terminology Criteria for Adverse Events v4.0.

Results:

Median age was 58 years (22 - 83). Median KPS was 70 (40 - 90). Median target volume was 19 cm³ (1 - 304). Median prescription dose was 16 Gy (11 - 16). Median conformality index was 1.35 (1.15 - 3.21). Median homogeneity was 1.12 (1.05 - 1.19). Median follow-up time was 10 months (0.5 - 34). Local control at 12 months was 88.8% with one local failure. All patients presented with spinal pain, and pain was improved in 50% of patients treated. One patient developed limited cord myelopathy that resolved with steroids. There were no other treatment toxicities from sSBRT.

Conclusion:

Spine SBRT can be safely and effectively delivered to treat chordoma of the spine with the potential to improve pain symptoms. Single fraction sSBRT compares favorably with other treatment platforms and techniques based on this early data. Longer follow-up with more patients is necessary to determine the exact role of sSBRT in the treatment of chordomas of the spine.

MSRO22-08 • Re-irradiation of the Head and Neck Using Highly Conformal Tomotherapy IMRT

Daniel A Jones MD (Presenter)

ABSTRACT

Purpose/Objective(s): There is no standard of care regarding re-irradiation of the head and neck. The difficulty of balancing the benefit of tumor control with that of increased normal tissue toxicity may be partially negated with proper patient selection and highly conformal radiation therapy. The purpose of this study was to analyze the outcomes of patients with a second primary and/or recurrent head and neck cancer treated with re-irradiation and to identify patients who are most likely to benefit.

Materials/Methods: We retrospectively reviewed 24 patients treated with re-irradiation to the head and neck, between March 2008 and July 2012. There were 17 patients with recurrent tumors, 5 with second primaries, and 2 with both second primaries and recurrences. Tumor factors included volume of recurrence (median 12.5 cm³, range 1.5-400,) and recurrence location (local only (12,) neck only (5,) local + neck (3,) and local + distant (3.) Patient factors included age, median 62 (27-77,) and performance status, (20 with ECOG 0-1, 4 with ECOG 2-3.) Three patients were unresectable and underwent biopsy only. Four underwent subtotal resection or debulking. Seventeen underwent gross total resection, thirteen with positive margins, and four with negative margins. All but two patients were treated with conventionally fractionated tomotherapy IMRT. Fourteen underwent concurrent chemoradiation, typically with platinum based regimens.

Results: Patients were followed for a median of 10 months, minimum of 8 months among survivors. Patients were treated with a median dose of 60 Gy (44-70.) Kaplan-Meier estimates for 1 year local control, recurrence free survival, and overall survival was 58% (95% CI 36-75,) 40% (95% CI 20-59,) and 68% (95% CI 44-83.) Kaplan-Meier estimates for 2 year local control, recurrence free survival, and overall survival was 41% (95% CI 17-64,) 20% (95% CI 6-41,) and 25% (95% CI 8-46.) Median survival was 15 months (95% CI 10-20.) There were 3 long term survivors, at 24, 24, and 32 months, all of which are disease free. Toxicity was significant with twelve patients permanently dependent on a feeding tube and two dying of carotid artery bleeds.

Conclusions: In our series, patients were mostly treated with highly conformal conventionally fractionated Tomotherapy IMRT. Outcomes are similar to those achieved in other published series. Local control at

one and two years was encouraging at 58% and 41%, and re-irradiation likely reduced morbidity associated with local progression. The heterogeneity and the small sample size limit generalizability of the study results to future patient management. Likely, treatment with highly conformal techniques such as with Tomotherapy IMRT, improve the ability to control disease and reduce toxicity.

MSRO22-09 • Metastatic Carcinoma of Unknown Primary to Cervical Lymph Nodes: Treatment Patterns, Outcomes, and Patterns of Failure

Varun K Chowdhry MD (Presenter) ; Michael Farris MD ; Seung S Hahn MD ; Jack M Hsu MD ; Michael A Lacombe MD

ABSTRACT

Purpose/Objective: Metastatic squamous carcinoma of unknown primary origin to the cervical lymph nodes poses a complicated diagnostic and therapeutic challenge. Due to rare nature of the disease, treatment is based on retrospective data.

Materials/Methods: Thirty-four patients with head and neck cancer of unknown primary were treated at Upstate Medical University between 2000-2012. The charts were retrospectively reviewed for treatment patterns, toxicity, outcomes, and patterns of failure. The volume and dose for each patient was at the discretion of the treating physician based on patient factors, pathology, location of disease, and clinical stage.

Results: The median age of patients in this series was 57.5 (range, 41-89). Sixteen patients (47%) had a neck-dissection prior to radiotherapy. Eleven patients (32.4%) were treated with either 2D or 3D planning and 23 patients (67.6%) were treated with Intensity Modulated Radiotherapy (IMRT). The median dose to gross disease 6600 cGy (range 3000-7200). The median dose to high risk mucosal sites was 5800 cGy (range, 0-6500 cGy), and median dose to uninvolved cervical chains was 6000 cGy.

Two patients were treated to the neck only (5.9%), 3 patients (5.9%) were treated to the oropharynx only, 9 patients were treated to oropharynx and nasopharynx (26.5%) using laryngeal sparing IMRT, and 15 patients were treated to the oropharynx, nasopharynx, hypopharynx and larynx. Dosimetric analysis of patients treated with a laryngeal sparing technique was performed and it estimated that the dose to the larynx and hypopharynx was approximately 4000 cGy.

Four patients (13%) developed distant metastatic disease. Four patients (13%) recurred loco-regionally in the neck, and 3 of these (9%) were neck only recurrences. One patient (2%) had a primary surfaced after definitive therapy, and the primary was found to be in the oral cavity. There was no statistically significant difference between sites treated and incidence distant disease (p=.203). Seven patients (20.5%) had a neck dissection after definitive radiotherapy or chemoradiotherapy, and one patient (14.2%) was found to have residual

disease at the time of neck dissection. Median survival calculated using Kaplan-Meier method 2509 days, 95% CI (2067,2950) days. Median follow-up was 22 months.

Conclusions: We report overall low rates of treatment failures, which were noted to be primarily in neck and distant. We noted only one primary site local failure in the oral cavity, a site not traditionally treated in patients with unknown primary head and neck cancer. We did not note increased local, loco-regional or distant failures in patients treated with laryngeal sparing IMRT, oropharynx only, or neck only. However, proper patient selection is critical in determining which patients can be treated with limited volumes.

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

Monday, 03:00 PM - 04:15 PM • S103AB

RO OI NR HN

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MSRO23 • AMA PRA Category 1 Credit™:1.25 • ARRT Category A+ Credit:1.5

Co-Director

Fergus V Coakley, MD

Co-Director

Bruce G Haffty, MD

Suresh K Mukherji, MD

Sung Kim, MD

Carol R Bradford, MD

Ezra Cohen, MD *

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.

Neuroradiology/Head and Neck (ENT Oncology)

Monday, 03:00 PM - 04:00 PM • N230

RO NR HN

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SSE18 • AMA PRA Category 1 Credit™:1 • ARRT Category A+ Credit:1

Moderator

Julia Fruehwald-Pallamar, MD

Moderator

Barton F Branstetter, MD

SSE18-01 • Initial Clinical Experience of Core Needle Biopsy with BRAF V600E Mutation Analysis in Thyroid Nodules

Eun Ju Ha ; **Jung Hwan Baek** ; **Hun Cho** MD (Presenter) ; **Jeong Hyun Lee** MD, PhD

PURPOSE

To evaluate the role of core-needle biopsy (CNB) with BRAF^{V600E} mutation combined analysis in thyroid nodules having non-diagnostic or atypia of undetermined significance (AUS) results on fine-needle aspiration (FNA).

METHOD AND MATERIALS

From January 2011 to March 2012, CNB +BRAF^{V600E} mutation combined analysis was performed on thyroid nodules with previously non-diagnostic (n=32) or AUS (n=97) results. Direct DNA sequencing technique was used for BRAF^{V600E} mutation analysis. The diagnostic value of CNB +BRAF^{V600E} mutation analysis was evaluated.

RESULTS

The sensitivity and positive predictive value of BRAF^{V600E} mutation in CNB specimens were 66.3% and 100%, respectively. Of 32 nodules with previously non-diagnostic results, CNB showed 81.3% (26/32) of conclusive results with 6 cases of AUS and no cases of non-diagnostic results. There was no additional value of CNB+BRAF^{V600E} mutation analysis. Of 97 nodules with previously AUS results, CNB showed 93.8% (91/97) of conclusive results with 5 cases of AUS and 1 case of non-diagnostic results. There was 3.1% (3/97) additional value of CNB+BRAF^{V600E} mutation analysis.

CONCLUSION

CNB of the thyroid nodule demonstrate high rates of conclusive diagnoses in patients for whom previous FNA results are non-diagnostic or AUS. The CNB +BRAF^{V600E} mutation analysis may be helpful for patients with previously AUS results.

CLINICAL RELEVANCE/APPLICATION

This is an initial report to demonstrate the feasibility and usefulness of CNB with BRAF^{V600E} mutation combined analysis in thyroid nodules.

SSE18-02 • Bimodal Histogram Analysis of Apparent Diffusion Coefficient Values for Detection of Occult Tonsil Cancer in Patients Presenting with Neck Metastasis from an Unknown Primary

Young Jun Choi MD (Presenter) ; **Jeong Hyun Lee** MD, PhD ; **Jung Hwan Baek**

PURPOSE

To explore the role of bimodal histogram analysis of apparent diffusion coefficient (ADC) values for detecting occult palatine tonsillar squamous cell carcinoma (PTSCC) in patients with neck metastasis from an unknown primary.

METHOD AND MATERIALS

This retrospective study was approved by the institutional review board, and informed consent was waived. We enrolled 19 patients with occult PTSCC presenting with neck metastasis from an unknown primary, 20 with overt PTSCC on physical examination, and 20 with normal palatine tonsils. DWI was performed with b values of 0 and 800 sec/mm². ADC values of the entire volume of palatine tonsil were measured by manual drawing of regions-of-interests. Bimodal histogram parameters of the ADC values were obtained using in-house and statistically tested for difference (Kruskal-Wallis test, Mann-Whitney U test). Receiver operating characteristic (ROC) analysis was employed to determine the best differentiating parameter between occult PTSCCs and normal tonsils. We also analyzed added values of histogram analysis of ADC values to conventional MRI and 18F-FDG PET/CT.

RESULTS

The bimodal histogram analysis showed statistically significant differences in mean, 50 \diamond and 90 \diamond ADC values between overt PTSCCs and occult PTSCCs/normal palatine tonsils. Between occult PTSCCs and normal tonsils, standard deviation ($[0.54\pm0.20]\times10^{-3}\text{mm}^2/\text{sec}$ vs $[0.41\pm0.09]\times10^{-3}\text{mm}^2/\text{sec}$), skewness ($[0.52\pm0.38]\times10^{-3}\text{mm}^2/\text{sec}$ vs $[0.30\pm0.25]\times10^{-3}\text{mm}^2/\text{sec}$), and 90 \diamond value of ADC ($[1.75\pm0.27]\times10^{-3}\text{mm}^2/\text{sec}$ vs $[1.52\pm0.25]\times10^{-3}\text{mm}^2/\text{sec}$) were significant higher (P

CONCLUSION

Adjunctive histogram analysis of ADC values detected five more occult PTSCCs (26.3%) than conventional MRI and 18F-FDG PET/CT, therefore, adjunctive histogram analysis can be helpful when conventional MRI and 18F-FDG PET/CT failed to detect occult PTSCCs.

CLINICAL RELEVANCE/APPLICATION

Adjunctive bimodal histogram analysis can be helpful when conventional MRI and 18F-FDG PET/CT failed to detect occult PTSCCs.

SSE18-03 • Role of ARFI in the Assessment of Thyroid Nodules

Bagyam Raghavan MBBS, DMRD (Presenter); **Sounak Paul** MBBS; **Sathyasree Viswanathan** MBBS; **Atif Wasim Haneef Mohamed**; **Jayaraj Govindaraj** MD; **Saravanan Shanmugasundaram** DMRD, MBBS

PURPOSE

The purpose of the study was aimed at improving diagnostic significance of thyroid sonography in predicting cytological type of thyroid nodules by additional use of ARFI.

METHOD AND MATERIALS

110 nodules were evaluated by B-mode imaging and color Doppler and ARFI. Shear wave elasticity measurements according to ARFI (Acoustic Radiation Force Impulse) imaging was performed for 110 nodules in 52 patients. Images obtained by Virtual Touch tissue imaging (VTI) were classified into three groups: Soft, Intermediate hardness, and Hard. Numerical values were also computed for the nodules Virtual touch tissue Quantification (VTQ). The results of B-mode imaging, color Doppler and ARFI were compared with the cyto-pathological diagnosis and analyzed statistically using Chi square test, and Logistic regression analysis to find out the correlation between the sonographic variables and final cytological end result. The significant VTQ values of each subgroup of hardness were evaluated by ANNOVA (Analysis of Variants). ♦SSPS for Windows, Version 17♦ was used for the statistical analysis.

RESULTS

Multi nodular goiter and Thyroiditis nodules can remain indeterminate after B-mode and Color. In our study we found that tissue hardness assessment obtained by ARFI helped in categorization of such nodules and reducing negative cytology rates. The concordance between B-mode, color and FNAC was 81% which after ARFI the concordance with FNAC increased to 89%.

In this study however we obtained a significant statistical correlation of intermediate hardness in predicting thyroiditis, odds ratio of 9.22 (95% confidence interval from 3.09 to 27.45) (p value Multi nodular goiter and Thyroiditis nodules can remain indeterminate after B-mode and Color).

CONCLUSION

In our study we found that tissue hardness assessment obtained by ARFI helped in categorization of such nodules and reducing negative cytology rates.

In this study however we obtained a significant statistical correlation of intermediate hardness in predicting thyroiditis, odds ratio of 9.22 (95% confidence interval from 3.09 to 27.45) (p value

CLINICAL RELEVANCE/APPLICATION

ARFI with Virtual Touch Tissue Imaging Analysis is a quick additional parameter in the diagnosis of thyroid nodules

SSE18-04 • Preliminary Evaluation of MR Diffusion Kurtosis Imaging at 3-Tesla for Head and Neck Squamous Cell Carcinoma: A New Monitoring Tool for Early Treatment Response

Yukie Shimizu (Presenter); **Noriyuki Fujima** MD; **Daisuke Yoshida**; **Tomohiro Sakashita**; **Akihiro Homma**; **Kohsuke Kudo** MD; **Hiroki Shirato** MD, PhD

PURPOSE

The purpose of this study is to investigate the usefulness of 3-T MR diffusion kurtosis imaging (DKI) for the assessment of patients with head and neck squamous cell carcinoma (HNSCC).

METHOD AND MATERIALS

Eighteen patients who were histopathologically diagnosed as HNSCC were included in this study. All patients were treated with super-selective arterial infusion of cisplatin with concomitant radiotherapy. TDKhey underwent magnetic resonance imaging (MRI) using DKI sequence before the treatment and at the early treatment period (at time point of 15-25 Gy in total 65 Gy radiotherapy). All MR scanning was performed by using a 3-T unit (Achieva TX; Philips Medical Systems, Best, The Netherlands) with a 16-channel neurovascular coil. DKI was obtained by using single-shot echo planar diffusion weighted imaging with 4 different b values of 0, 800, 1000, 2000s/mm². Three orthogonal motion probing gradient was used. The quantitativeDK value of the tumor in each of the 18 patients was calculated usingDKI datasets. The change ratio of DK value between pre-treatment and early treatment period was also calculated. After the treatment, thirteen patients were classified into complete remission (CR) group and the other five were into non-CR group judging from multi-modality assessment and clinical follow-up. Mean of value in pre-treatment, early treatment period, and its change ratio were compared between CR and non-CR groups using non-paired T-test.

RESULTS

The change ratio of DK value in CR group was significantly lower than non-CR group(0.78±0.13 vs 0.93±0.05, P

CONCLUSION

DKI can be useful as monitoring tool for early treatment response for the assessment of patients with HNSCC.

CLINICAL RELEVANCE/APPLICATION

DKI can be useful as monitoring tool for early treatment response for the patients with HNSCC by evaluating change ratio of DK value between pre-treatment and early treatment period.

SSE18-05 • Treatment of Metastatic Lymph Nodes in the Neck from Papillary Thyroid Carcinoma by Percutaneous US-guided Interstitial Laser Ablation: Three Years Experience

Giovanni Mauri MD (Presenter); **Luca Cova** MD; **Tania Tondolo**; **Tiziana Ierace** MD; **Enzo Di Mauro**; **Claudio M Pacella** MD; **S. Nahum Goldberg** MD*; **Luigi Solbiati** MD

PURPOSE

We report our three year experience with percutaneous US-guided interstitial laser ablation for metachronous cervical nodal metastases from papillary thyroid carcinoma.

METHOD AND MATERIALS

RESULTS

Laser ablation was technically feasible and well tolerated in all patients, with no either immediate or late complications.

In 5 cases a second PLA was performed to treat recurrent disease (3 pt) or new lymph node metastases (2 pt) At a mean follow up time of 19 months local control was achieved in 19/26(73%) patients, with 11 (42%) having serum Tg/TgAb normalized. Complete ablation (lack of enhancement at CEUS, no uptake at ¹⁸F-FDG PET) was achieved in 38/46 (83%) 4 patients developed distant disease progression.

CONCLUSION

Percutaneous US-guided interstitial laser ablation seems to be an effective, low cost and safe therapeutic tool for the treatment of metachronous nodal metastases from papillary thyroid carcinoma in the neck which would otherwise require often challenging further resections.

CLINICAL RELEVANCE/APPLICATION

Interstitial laser ablation seems to be safe and effective for the treatment of metachronous nodal metastases from papillary thyroid carcinoma in the neck.

SSE18-06 • Intravoxel Incoherent Motion MR Imaging: Emerging Applications for Nasopharyngeal Carcinoma at the Primary Site

Shui Xing Zhang MD (Presenter) ; **Qianjun Jia** MD ; **Zhong-Ping Zhang** ; **Chang Hong Liang** MD ; **Wen-Bo Chen** BArch ; **Qian-Hui Qiu**

PURPOSE

To compare pure molecular diffusion, D, perfusion-related diffusion, D* and perfusion fraction, f, determined from diffusion-weighted (DW) magnetic resonance (MR) imaging on the basis of the intravoxel incoherent motion (IVIM) theory in patients with nasopharyngeal carcinoma (NPC) at the primary site.

METHOD AND MATERIALS

This prospective study was approved by the appropriate ethics committee, and written informed consent was obtained from all patients. Between December 2011 and October 2012, 35 consecutive patients (22 men, 13 women; mean age, 49 years; age range 16-69 years) with suspected of having NPC were examined on a 3.0T MR scanner. DW imaging was performed by using a single-shot echo-planar sequence with 13 b-values (0, 10, 20, 30, 50, 80, 100, 150, 200, 300, 400, 600, 800 sec/mm²). MR imaging was compared with endoscopy and biopsy for the detection of NPC. Mean interval between MR imaging examination and subsequent nasopharyngeal biopsy was 3 days (range, 0-11 days). The initial study population comprised of 21 patients with newly diagnosed NPC (13 men, 8 women; mean age, 55 years) and 14 patients with adenoids enlarge (9 men, 5 women; mean age, 35 years) . The lesion D, D* and f were measured and compared in patients with primary NPC and benign hyperplasia.

RESULTS

CONCLUSION

IVIM DWI is a feasible technique for investigating primary NPC although limited in 11.4% patients due to susceptibility artifacts around the skull base. D is significantly decreased in primary NPC. The elevation of D* reflects increased blood vessel generation and parenchymal perfusion in primary NPC, indicating that D* can provide insight into the physiological activities related to the disease.

CLINICAL RELEVANCE/APPLICATION

Intravoxel incoherent motion (IVIM) can differentiate benign and malignant head and neck disease, and differentiating certain histological types of malignancy.

BOOST: Head and Neck Hands-on Contouring (In Cooperation with ASTRO)

Monday, 04:45 PM - 06:00 PM • S104B

RO OI NR HN

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MSRO29 • AMA PRA Category 1 Credit™:1.25 • ARRT Category A+ Credit:1.5

Co-Director

Fergus V Coakley, MD

Co-Director

Bruce G Haffty, MD

Suresh K Mukherji, MD

Sung Kim, MD

LEARNING OBJECTIVES

The intent of this course is to provide direct hands-on education regarding contouring of head and neck cancer. Participants will be given the opportunity to contour head and tumor of the nasopharynx and larynx. Their contours will be compared to contours drawn by experts in head and radiation oncology and radiology. The session will emphasize various techniques approaches that enhance the participants ability to accurately contour tumor and prevent geographic misses. The session will also discuss important anatomic landmarks and patterns of spread for cancers at these sites.

ABSTRACT

The inten of this course is to provide a hands-on contouring session for head adn neck cancer. This session will be presented by a radiologist and radiation oncologist.

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

Tuesday, 08:30 AM - 10:00 AM • S406A

NM CT NR HN

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MSCC31 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Director

John A Parker, MD, PhD

Rathan M Subramaniam, MD, PhD *

LEARNING OBJECTIVES

1) To understand what the surgeon, radiation oncologist and oncologist want from a head and neck PET/CT. 2) To understand the normal variant FDG uptake in Head and Neck. 3) To understand the neck spaces, tumor spread and value of PET/CT in staging. 4) To understand the value of PET/CT in post therapy assessment of head and neck oncology.

ABSTRACT

This lecture will cover the essential information that allows a surgeon, radiation oncologist and oncologist to care for head and neck cancer patients in a multidisciplinary settings. It will emphasise the PET/CT clinical paradigms, normal variants of FDG uptake, neck speaces and tumor spread, and value and pitfalls of PET/CT in therapy assessment and follow up of head and neck cancer patients.

Temporal Bone Imaging

Tuesday, 08:30 AM - 10:00 AM • E451A

NR HN

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RC306 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC306A • The Inner Ear: Normal and Abnormal

John I Lane MD (Presenter)

LEARNING OBJECTIVES

1) Review the imaging approaches, critical anatomy, diagnoses and differential diagnoses of diseases in the bony and membranous labyrinth. 2) Apply the CT and MR Imaging approaches to lesions suspected in this area as well as comprehend the finer details of the underlying imaging anatomy of the inner ear. 3) The differential diagnosis discussion will permit the participant to analyze the imaging features of unknown lesions in this area, construct a statistically driven differential diagnosis list and come to a conclusion about the most likely diagnoses possible.

ABSTRACT

RC306B • Cholesteatoma and Inflammation

Gul Moonis MD (Presenter)

LEARNING OBJECTIVES

1) Recognize the imaging features of external and middle ear inflammatory abnormalities with emphasis on cholesteatoma. 2) Review inner ear inflammatory lesions. 3) Discuss complications of temporal bone inflammation.

ABSTRACT

1) Recognize the imaging features of external and middle ear inflammatory abnormalities with emphasis on cholesteatoma 2) Review inner ear inflammatory lesions. 3) Discuss complications of temporal bone inflammation.

URL's

<http://www.bidmc.org/Research/Departments/Radiology/NeuroRSNA.aspx>

RC306C • Tumors of the Temporal Bone

H. Ric Harnsberger MD (Presenter) *

LEARNING OBJECTIVES

1) Review the range of temporal bone tumors by temporal bone anatomic subsite (EAC, middle ear, inner ear, facial nerve, internal auditory canal). 2) Develop a differential diagnosis for each subsite. 3) Become familiar with the typical imaging appearances of the more common tumors of the temporal bone. 4) The participant should end up with an understanding as to when it is possible to make a histopathologic diagnosis of a temporal bone tumor based on CT and MR appearances and location.

ABSTRACT

In this portion of the temporal bone session the focus will be temporal bone tumors. A subsite specific discussion will review the tumors in each major area of the temporal bone including the external auditory canal, middle ear, inner ear, and intratemporal facial nerve. A differential diagnosis will be presented in each area with both benign and malignant tumors included. Tumor-specific imaging findings will be emphasized. Multiple cases of each diagnosis will be presented to give the participant exposure to the range of imaging manifestations seen. This location-based temporal bone tumor review will cover the following tumors by location:

- External auditory canal: Exostoses, osteoma, and squamous cell carcinoma.
- Middle ear: Glomus tympanicum paraganglioma, glomus jugulare paraganglioma, facial nerve schwannoma, middle ear adenoma, middle ear meningioma, and rhabdomyosarcoma.
- Inner ear: Intralabyrinthine schwannoma, endolymphatic sac tumor, and inner ear meningioma.
- Intratemporal facial nerve: Facial nerve schwannoma, facial nerve hemangioma (venous malformation), and perineural malignancy from the parotid gland.

Skull Base and Nerves

Tuesday, 04:30 PM - 06:00 PM • N227



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RC406 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC406A • The Central Skull Base

Nancy J Fischbein MD (Presenter)

LEARNING OBJECTIVES

1) To review the anatomy of the Central Skull Base. 2) To present common and uncommon pathologies that affect the Central Skull Base. 3) To remind the audience of imaging pitfalls of the Central Skull Base. 4) To discuss the complementary roles of CT and MR in imaging the Central Skull Base.

ABSTRACT

Imaging of the skull base presents many challenges due to its anatomical complexity, numerous normal variants, and lack of familiarity to many radiologists. As the skull base is a region which is not amenable to physical exam, and as lesions of the skull base are generally difficult to biopsy and even more difficult to operate on, the radiologist plays a major role in directing patient management via accurate image interpretation. Knowledge of the skull base should not be limited to neuroradiologists and head and neck radiologists, however, as the central skull base in particular is routinely included in the field of view when cross-sectionally imaging the brain, cervical spine, or head and neck with CT or MRI, and hence its nuances should be familiar to general radiologists as well. We review the basic anatomy of the central skull base, including bony anatomy as well as the anatomy of adjacent soft tissue structures. We will also present imaging findings of common and uncommon pathologies of the central skull base, including primary tumors such as chordoma and chondrosarcoma, metastases and plasmacytoma, and non-neoplastic lesions of the central skull base. We will review some imaging pitfalls and *don't touch* lesions of the central skull base, and will emphasize the complementary roles of CT and MR in solving difficult cases.

RC406B • Cranial Nerves I-VI

Jenny K Hoang MBBS (Presenter) *

LEARNING OBJECTIVES

1) To review the anatomy and function of cranial nerves I-VI. 2) To have a systematic approach to evaluating imaging in patients present with suspected cranial nerve disease. 3) To recognize the signs of cranial nerve pathology and the most common differentials for disease in cranial nerves I-VI.

ABSTRACT

RC406C • Cranial Nerves VII-XII

Claudia F Kirsch MD (Presenter) *

LEARNING OBJECTIVES

1) To review anatomy and function of cranial nerves VII- XII. 2) To present a systematic approach to evaluating imaging in patients

present with cranial nerve VII- XII pathology. 3) To recognize the imaging findings of cranial nerve pathology in CN VII- XII, and the differential diagnosis associated with the radiographic findings.

ABSTRACT

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

Wednesday, 08:30 AM - 10:00 AM • S402AB

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PD **ER** **NR** **HN**

MSSR41 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

MSSR41A • General Principles

Ulrich Linsenmaier MD (Presenter)

LEARNING OBJECTIVES

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

ABSTRACT

MSSR41B • Challenges of Imaging Pediatric Abdominal Emergencies

Susan D John MD (Presenter)

LEARNING OBJECTIVES

1) Plan safe and effective imaging strategies to evaluate abdominal pain in infants and children. 2) Understand the common and unusual causes of abdominal pain in different pediatric age groups. 3) Recognize potentially confusing variations in the appearance of these conditions with imaging.

ABSTRACT

MSSR41C • Imaging in ENT Emergencies

Diego B Nunez MD, MPH (Presenter)

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

Oral Cavity, Pharynx, Larynx

Wednesday, 08:30 AM - 10:00 AM • E353C

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OI **NR** **HN**

RC506 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC506A • Nasopharynx

Suresh K Mukherji MD (Presenter)

LEARNING OBJECTIVES

1) Understand the normal anatomical landmarks and relations of the nasopharynx and in particular the relationship of the nasopharynx to the central skull base. 2) Recognize normal physiological variations and inflammatory processes of the nasopharynx that might be mistaken for more sinister pathology. 3) Understand the pathological behavior and important staging features of nasopharyngeal carcinoma and lymphoma, the two most common nasopharyngeal malignant processes.

ABSTRACT

The nasopharynx is the most superior portion of the pharynx, extending anteriorly to the posterior choanae and inferiorly to the level of the soft palate. The nasopharynx attaches to the undersurface of the clivus via the pharyngobasilar fascia of the superior constrictor muscle. This fascia is in continuity with the buccopharyngeal fascia surrounding the pharynx. The foramen of Morgagni is a hiatus between the base of skull and constrictor muscle, through which the Eustachian tube, tensor veli palatini and levator veli pass. It is thus a potential weak spot; in the head and neck, through which pathological processes may reach the skull base and spread intracranially. Other important imaging landmarks include the lateral nasopharyngeal recess or fossa of Rosenmiller and the midline nasopharyngeal tonsil, or adenoids. Nasopharyngeal carcinoma (NPC) is a distinct entity from pharyngeal squamous cell carcinoma (SCCa). NPC has a unique histological appearance, has different inciting factors to SCCa, and has unique familial, genetic, and geographic predispositions. Nasopharyngeal carcinoma also has a different pathological behavior to pharyngeal SCCa, with a tendency for clival invasion, intracranial spread, and early systemic metastasis. In keeping with this distinct pathological behavior, NPC has particular imaging manifestations and staging criteria that differ significantly from pharyngeal SCCa. In this session we will review the key anatomic landmarks and the key imaging features of the nasopharynx and of nasopharyngeal carcinoma, reviewing the 2010 TNM staging updates and changes to the WHO pathological classification. We will also review important differentials for masses in this region.

RC506B • Oral Cavity and Oropharynx

Kristine M Mosier DMD, PhD (Presenter) *

LEARNING OBJECTIVES

1) Review the anatomy of the oral cavity and oropharynx. 2) Review common neoplasms that may involve this region. 3) Review common infectious and inflammatory processes that may involve the oral cavity and oropharynx.

ABSTRACT

The intent of this presentation is to review the normal anatomy of the oral cavity and oropharynx. In addition, this presentation will review the common pathology including neoplasms, infections and developmental processes that you will encounter in your practice.

RC506C • Larynx-Hypopharynx

Hilda E Stambuk MD (Presenter)

LEARNING OBJECTIVES

1) Review the imaging anatomy of the larynx. 2) Understand the key landmarks for describing a tumor of the larynx. 3) Understand imaging strategies for following patients after treatment for larynx carcinoma.

Neuroradiology/Head and Neck (Head and Neck Tumors)

Wednesday, 10:30 AM - 12:00 PM • N229

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IR NR HN

SSK15 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Moderator

Yoshimi Anzai, MD

Moderator

Laurie A Loevner, MD

SSK15-01 • Using SRU Recommendations for Workup of Imaging-detected Incidental Thyroid Nodules: What Types of Cancers Would We Miss?

Manisha Bahl MD, MPH (Presenter) ; **Julie A Sosa** MD ; **Hasan A Hobbs** MD ; **Nathan Wnuk** MSc, BSc ; **Rendon C Nelson** MD * ; **Jenny K Hoang** MBBS *

PURPOSE

To apply the Society of Radiologists in Ultrasound (SRU) recommendations to incidental thyroid cancers detected on imaging and to describe cancers that do not meet the workup criteria.

METHOD AND MATERIALS

We performed a retrospective review of 1721 patients who underwent thyroidectomy or lobectomy from 2003 to 2012 to identify thyroid cancers that were detected incidentally on imaging. Imaging-detected incidental cancer was defined as cancer in asymptomatic patients presenting with incidental thyroid nodules (ITN) on imaging with no other risk factors. The SRU recommendations were applied to nodules with ultrasound for review. SRU positive nodules include solid nodules or nodules with coarse calcifications =15 mm, nodules with microcalcifications =10 mm, and solid-cystic nodules =20 mm. Tumor characteristics for SRU- and SRU+ groups were compared.

RESULTS

Of 1721 patients who underwent surgery, 578 (34%) patients had thyroid cancer and 86 (5%) patients had thyroid cancer first detected incidentally by imaging studies. Incidental cancers were first detected on ultrasound in 21 patients. Other cancers were seen incidentally on CT, MRI, PET, octreotide scan, echocardiogram, and radiographs. The SRU recommendations were applied to 72 patients, of which 21 had ultrasound-detected ITN and an additional 51 who had ultrasound workup of ITN detected on other imaging modalities. 15/72 (21%) patients did not meet SRU recommendations for workup and would not have undergone FNA if the recommendations had been used at the time of diagnostic ultrasound. The SRU- group represented 3% of all malignancies. SRU- cancers had a mean size of 1.1 cm (range 0.9-1.4 cm) compared to 2.4 cm (range 1.0-7.6 cm) for SRU+ cancers. Histology was papillary in 3/15 SRU- and 50/57 SRU+ cancers. 5/15 SRU- patients had nodal metastases (all micrometastases detected on central compartment neck dissection). 16/57 SRU+ patients had nodal metastases (11 confined to central compartment).

CONCLUSION

Imaging-detected incidental thyroid cancer is uncommon. 3% of malignancies would be missed using the SRU recommendations for workup of ITN. SRU- tumors were more likely to be papillary carcinoma and less likely to have nodal metastases.

CLINICAL RELEVANCE/APPLICATION

SRU recommendations could reduce the biopsy rate of imaging-detected ITN. Missed malignancies would be uncommon (3%) and more likely to be nonaggressive papillary carcinoma.

SSK15-02 • Thyroid Nodules: A Total Malignancy Score (TMS) for Ultrasound (US) - A Validation Pilot Study

Giovanni G Pompili MD (Presenter) ; **Silvia Tresoldi** MD ; **Alessandra Primolevo** ; **Stefania Rossi** ; **Gaetano Bulfamante** PhD ; **Gianpaolo Cornalba** MD

PURPOSE

The aim of our study was to validate a malignancy score of thyroid nodules (Total Malignancy Score ♦ TMS) based on their ultrasound features. Pilot study

METHOD AND MATERIALS

Based on a retrospective analysis of 102 patients with follicular pattern at US we recently suggested an US score for the characterization of thyroid nodules [a score from 0 (most likely benign) to 2 (most likely malignant) was assigned to each nodule feature ♦ number, margins, colour-flow, structure, echogenicity, halo, calcifications, dimensional increment ♦ leading to a total score (TMS) ranging from 0 to 11]. The malignancy score system is shown in Figure 1.

In the present study we prospectively apply that score to all the patients undergoing a thyroid nodule fine needle aspiration cytology (FNAC) at our Institution. The score results are then compared to the cytological diagnosis.

RESULTS

between September 2012 and April 2013 59 consecutive patients entered the study. Among patients with TMS 3 (20/59) 8 had non-negative cytological results. Patients with non-negative cytological results (n=9) were diagnosed with malignancy (TMS 4 n=3; TMS 6 n=1); follicular proliferation (n=2; both follicular adenomas at surgery; TMS 5 and 3 respectively) or high cellularity lesion (TMS 4 n=1; TMS 5 n=2).

CONCLUSION

The preliminary results of this pilot study confirms what previously suggested: the identification of a predictive US score would allow a more accurate estimation of risk. Nodules with a TMS>3 should undergo FNAC, nodules with a score

CLINICAL RELEVANCE/APPLICATION

Our US-TMS, when validated, will be useful in the management of patients with thyroid nodules avoiding useless FNAC when benign features are recognized, and suggesting cytology in potential malignancy

SSK15-03 • Can Ultrasound Features of Thyroid Nodules Predict Outcomes after a Non-diagnostic Fine Needle Aspiration?

Thomas J Anderson MD (Presenter) ; **Michael K Atalay** MD, PhD ; **David J Grand** MD ; **Michael D Beland** MD

PURPOSE

Ultrasound characteristics of thyroid nodules are notoriously poor predictors of malignancy. The purpose of this study was to identify reproducible ultrasound characteristics that could indicate benignity to avoid repeat biopsies when the initial FNA is non-diagnostic.

METHOD AND MATERIALS

We identified 5399 nodules that were biopsied under ultrasound guidance in our radiology department between 2004 and 2012. Of these, 454 were initially non-diagnostic and met inclusion criteria with adequate cytological, surgical, or ultrasound follow up. Three independent, board-certified radiologists who were blinded to outcomes scored the ultrasound features of each nodule. Nodule size,

composition, border, calcifications, comet tail, and central vascularity were recorded. Outcomes data were collected through review of the medical record.

RESULTS

Of the 454 initially non-diagnostic thyroid FNAs, 10 malignancies (2.2%; 3 follicular, 7 papillary) were diagnosed by subsequent FNA (3, 0.7%) or surgery (7, 1.5%). There were no cancers detected in nodules with a spongiform or cystic composition, with a comet tail, or with eggshell or indeterminate calcifications. The minimum diameter of any malignant nodule was 0.8cm, with an average of 2.2cm, compared to 0.3cm and 1.5cm in the benign group ($p=0.049$).

CONCLUSION

The incidence of malignancy after initial non-diagnostic FNA is very low (0.7%), particularly when the nodule is cystic, spongiform, or in the presence of a comet tail, or eggshell or indeterminate calcifications. In the setting of a non-diagnostic FNA with these features, clinical and ultrasound follow-up are more appropriate than repeat FNA, particularly in smaller nodules.

CLINICAL RELEVANCE/APPLICATION

Clinical and ultrasound follow-up may be more appropriate than repeat FNA in thyroid nodules with a non-diagnostic result and reassuring ultrasound characteristics.

SSK15-04 • Is Repeat FNA after a Non-diagnostic Thyroid Nodule FNA Necessary?

Thomas J Anderson MD (Presenter) ; Michael K Atalay MD, PhD ; David J Grand MD ; Michael D Beland MD

PURPOSE

Fine needle aspirates (FNA) of thyroid nodules have a diagnostic yield of 85-90%, but optimal management of non-diagnostic results is unknown. The aim of this study was to identify demographic features predictive of malignancy after an initially non-diagnostic FNA and the role of subsequent FNA.

METHOD AND MATERIALS

We identified 5399 nodules that were biopsied under ultrasound guidance in our radiology department between 2004 and 2012. Of these, 454 were initially non-diagnostic and met inclusion criteria with adequate cytological, surgical, or ultrasound follow up. Demographic and laboratory data were correlated with outcomes through review of the medical record.

RESULTS

Of the 454 initially non-diagnostic thyroid FNAs, 10 malignancies (2.2%; 3 follicular, 7 papillary) were diagnosed by subsequent FNA (3, 0.7%) or surgery (7, 1.5%). 373 (82.2%) were benign at subsequent FNA (279, 61.5%) or surgical pathology (94, 20.7%), and 71 (15.6%) were stable or decreased in size by serial ultrasound examinations (mean follow up: 2.7 years). In 77 males (17%), 4 (5.2%) cancers were detected; in 377 females (83%), 6 (1.6%) cancers were detected ($p=0.07$). The average age of this cohort was 55.7 years, while patients with malignancies averaged 62.3 ($p=0.02$). No malignancies were detected in patients less than 47 years of age. 27 (5.9%) patients were noted to have a papillary cancer elsewhere in the thyroid either at the time of surgery or by FNA of a separate nodule.

CONCLUSION

The likelihood of a malignant FNA after a non-diagnostic FNA is very low (0.7%), and therefore clinical and ultrasound follow up may be more appropriate than repeat FNA, particularly in female patients under the age of 45.

CLINICAL RELEVANCE/APPLICATION

Clinical and ultrasound follow up of non-diagnostic thyroid FNAs may be more appropriate than repeat FNA, particularly in younger female patients, due to the very low rate of malignancy.

SSK15-05 • Repeat Fine Needle Aspiration Biopsy for Nondiagnostic Thyroid Nodules with Short Interval Does Not Increase Atypical Cytologic Result

Ha Young Lee (Presenter) ; Jung Hwan Baek ; Hyunkyung Yoo MD ; Young Hye Kang MD ; Myung Kwan Lim MD

PURPOSE

To evaluate which factors affected atypia with undetermined significance (AUS) results of thyroid nodules with initial nondiagnostic (ND) result and to determine whether repeat fine needle aspiration biopsy (FNAB) with short interval increases AUS result.

METHOD AND MATERIALS

A retrospective review of 128 nodules from 126 patients with initial ND results was performed from January 2009 to December 2012. Demographic and clinical factors; age, sex, and time interval of FNAB, and ultrasonographic factors; size, location, consistency, suspicious malignant finding and thyroiditis were recorded. Time interval was subdivided into $< \text{or} = 5, 10, 15, \text{and } 20$ weeks after initial FNAB. Their effects on AUS result were analyzed using Fisher's exact test and Mann-Whitney U test.

RESULTS

None of the demographic, clinical, and ultrasonographic variables was significantly related with AUS result of repeat FNAB. Time interval of repeat FNAB was not related with AUS result ($p=0.63, 0.57, 0.23, 0.48$ for 5, 10, 15, 20 weeks, respectively).

CONCLUSION

Timing of repeat FNAB for the ND nodules did not influence the AUS result of repeat FNAB, and other clinical and US characters were not correlated with AUS result. Repeat FNAB for ND nodules could be performed without waiting for 3 months following to the need of patients and referring clinicians.

CLINICAL RELEVANCE/APPLICATION

1. To determine the recommended waiting period of 3 months is necessary or not.
2. To provide clinical evidence for management of thyroid nodules with initial nondiagnostic results.

SSK15-06 • Thyroglobulin Measurement in Fine Needle Aspirates from Neck Lesions after Total Thyroidectomy: Is It a Reliable Tool for Post-surgical Follow-up Regardless of TSH Stimulation?

Younghen Lee MD (Presenter) ; Hyung Suk Seo ; Nan Hee Kim ; Soon Young Kwon ; Gil Soo Son

PURPOSE

Thyroglobulin (Tg) measurement in needle washout fluid has been reported to increase diagnostic accuracy of fine needle aspiration for sonographically suspicious neck lesions encountered in postoperative follow-up. Although TSH stimulation is needed to improve the diagnostic accuracy of serum Tg for detection of recurrence, it is not clear whether stimulated or suppressed TSH status affect FNA-Tg.

METHOD AND MATERIALS

A total of 104 consecutive patients with papillary thyroid carcinoma initially treated by total thyroidectomy followed by remnant iodine ablation were retrospectively enrolled. They were sonographically evaluated for cervical recurrence by FNA-Tg and cytology during recent 5 years. Final diagnoses were confirmed by histopathologic results or follow-up examination at least 3 years. We evaluated the diagnostic performances of their FNA-Tg and cytology, serum Tg, anti-Tg antibodies, depending on the TSH stimulated or suppressed.

RESULTS

Of 104 lesions, 30 were confirmed as recurrences and 74 were non-recurrence. On TSH stimulated condition, both serum Tg and FNA-Tg levels in recurrent group were significantly higher in those of non-recurrent group (p

CONCLUSION

On TSH-suppressed condition, FNA-Tg measurement may be sufficient postoperative follow tool for cervical recurrence in patients with thyroid cancer.

CLINICAL RELEVANCE/APPLICATION

On TSH-suppressed condition, FNA-Tg measurement may be sufficient postoperative follow tool for cervical recurrence in patients with thyroid cancer.

SSK15-07 • Head and Neck Squamous Cell Carcinoma: Predicting Treatment Response to Induction Chemotherapy with Standard- and High-b-value Diffusion Weighted MR Imaging

Inseon Ryoo MD (Presenter) ; Ji-Hoon Kim MD ; Soo Chin Kim MD ; Tae Jin Yun MD ; Seung Hong Choi MD, PhD ; Chul-Ho Sohn MD ; Jisang Park MD ; Koung Mi Kang ; Eun Kyoung Lee MD

PURPOSE

Recent publications reported the contradictory results of pretreatment diffusion-weighted MR imaging (DWI) for the prediction of chemoradiotherapeutic response in primary head and neck squamous cell carcinomas (HNSCC). The purpose of this study was to evaluate the diagnostic performance of DWI with both standard ($b=1000$ s/mm²) and high ($b=2000$ s/mm²) b-values for predicting treatment response to induction chemotherapy in primary HNSCC.

METHOD AND MATERIALS

Twenty seven patients with primary HNSCC who underwent DWI with both $b=1000$ and 2000 s/mm² prior to treatment were included in this study, and corresponding apparent diffusion coefficient (ADC) maps were calculated. Regions of interest containing the tumor were drawn on every section of ADC map and summated to make volume based data of the entire tumor. Histogram parameters were correlated with treatment response using unpaired student t-test.

RESULTS

Among 27 patients, 14 showed good response (complete remission or partial response) and 13 showed poor response (stable disease or progressive disease) to induction chemotherapy. The mean ADC values of good responders (1252.7 ± 91.4 s/mm² at $b=1000$ and 625.36 ± 36.9 s/mm² at $b=2000$) were lower than those of poor responders (1294 ± 19.5 s/mm² at $b=1000$ and 746.5 ± 41.8 s/mm² at $b=2000$). But statistically significant difference was achieved at only high-b-value ADC map. ($p=0.039$) The 75th percentiles of cumulative ADC histogram of good responders (807.3 ± 54.9 s/mm²) also showed statistically significant lower values than those of poor responders (963.7 ± 48.7 s/mm²) at only high-b-value ADC map. ($p=0.04$)

CONCLUSION

Pretreatment DWI with high-b-value may facilitate and be better in predicting treatment response to induction chemotherapy than DWI with standard-b-value in primary HNSCCs.

CLINICAL RELEVANCE/APPLICATION

Based on our study results, high-b-value DWI has the potential to facilitate pretreatment prediction of the response to induction chemotherapy in primary head and neck squamous cell carcinomas.

SSK15-08 • Improved Zoomed EPI-DWI of the Head and Neck Using Two-dimensional Spatially-selective Radiofrequency Excitation Pulses

Philipp Riffel MD (Presenter) ; Stefan Haneder MD ; Josef Pfeuffer PhD * ; Stefan O Schoenberg MD, PhD * ; Henrik J Michaely MD *

PURPOSE

Diffusion-weighted MR imaging (DWI) in the head and neck is challenging especially because of susceptibility artifacts. Two-dimensional spatially-selective radiofrequency (RF) excitation pulses for single-shot echo-planar imaging (EPI) combined with reduced FOV i.e. zooming - in the phase-encoding direction lead to a decreased number of acquisition k-space lines and significantly shorten the length of the EPI echo train. This can potentially reduce susceptibility artifacts. The purpose of this study was to evaluate the feasibility of a zoomed DW EPI (z-EPI) sequence in the head and neck in a healthy volunteer population. The approach was compared to conventional single-shot EPI (c-EPI).

METHOD AND MATERIALS

The necks of 9 healthy volunteers were examined in this prospective IRB-approved study. All examinations were performed on a 3T whole-body MR system (MAGNETOM Skyra, Siemens Healthcare, Erlangen, Germany) equipped with a two-channel fully dynamic parallel transmit array, termed TimTX TrueShape. In all subjects, the experiment consisted of a conventional EPI sequence and two zoomed EPI sequences. Therefore the excitation of the standard DW EPI sequence was extended by the two-dimensional spatially-selective RF pulse using an echo-planar transmit trajectory. For quantitative assessment of distortion artifacts, DW images were merged with T2 TSE. Maximum missegregation of DW images with T2 TSE images was assessed in the cervical myelon. For qualitative assessment two readers ranked c-EPI and z-EPI sequences in terms of susceptibility artifacts, image blur and overall scan preference.

RESULTS

CONCLUSION

Zoomed DW EPI in the head and neck leads to substantial image quality improvements and has the potential to exhibit markedly reduced susceptibility artifacts and image distortion especially in regions close to major air cavities.

CLINICAL RELEVANCE/APPLICATION

Due to significantly reduced susceptibility artifacts zoomed DW EPI in the head and neck could have a potential value for identification of small malignant lymph nodes prior to neck dissection

SSK15-09 • Role of Sonoelastography in Differentiating Benign and Malignant Salivary Gland Tumors: A Systematic Review and Meta Analysis

Mahsa Ghajarzadeh MD, MPH (Presenter) ; Mehdi Mohammadifar ; Kamran Azarkhish MD ; Seyed Hassan Emami-Razavi

PURPOSE

to evaluate accuracy of sonoelastography in differentiating benign and malignant salivary gland tumors

METHOD AND MATERIALS

A highly sensitive search for sonoelastography and salivary glands tumors was performed in MEDLINE, Cochrane Library, ACP Journal Club, EMBASE, Health Technology assessment, and ISI web of knowledge for studies published prior to December 2012.

The criteria for eligibility were:

1. Studies evaluated diagnostic accuracy of sono-elastography in differentiating malignant and benign salivary glands tumors. 2. Using appropriate reference standard test such as Fine-Needle Aspiration (FNA), histological assessment of specimens obtained by surgery. 3. Diagnostic measures on sonoelastographic evaluation results such as sensitivity, specificity, positive and negative predictive values. Articles which evaluated role of sonoelastography in differentiating benign and malignant salivary glands tumors considered for more evaluation.

SPSS version 18 used for descriptive analysis and meta disc version 1.4 applied for meta analysis.

Forest plots for pooled estimates and summary of ROC plots for different cut-offs were produced.

RESULTS

The literature and manual search yielded 32 articles, of which, 6 were eligible to include.

A total of 348 individuals with total number of 356 salivary gland masses were evaluated (87 malignant and 296 benign). The summary sensitivity of sonoelastography for the differentiation of benign and malignant salivary glands was 0.63 (95% CI:0.52-0.873) The summary specificity was 0.59 (95% CI:0.53-.65). The summary positive and negative LR were 1.63 (95% CI:1.33-2.01) and 0.61 (95% CI:0.47-0.79). the summary diagnostic odds ratio (DOR) was 3.18 (95% CI:1.86-5.44) Area under the curve (AUC) was 0.68(SE=0.03)

CONCLUSION

Sono-elastograohy has high accuracy in differentiating benign and malignant salivary gland tumors.

CLINICAL RELEVANCE/APPLICATION

applying sonoelastography for differentiating benign and malignant salivary tumors.

Neck Imaging

Thursday, 08:30 AM - 10:00 AM • S402AB

NR HN

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RC606 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC606A • Cystic Lesions of the Neck

Wendy R Smoker MD (Presenter)

LEARNING OBJECTIVES

1) Identify branchial cleft cysts (Types II-IV) and their mimics. 2) Recognize common and uncommon locations of simple and complicated thyroglossal duct cysts. 3) Identify a variety of less common cystic neck lesions such as thymic cysts, obstructed laryngoceles, necrotic SCCa lymph nodes.

ABSTRACT

Second branchial cleft cysts and fistulae account for 92%-99% of branchial cleft anomalies. They are thought to be remnants of the cervical sinus of HIs with no internal or external communication. They are usually lined by stratified squamous epithelium of ectodermal origin and lie lateral to the post-styloid carotid sheath structures, posterior to the submandibular gland, and anterior to the sternocleidomastoid muscle. They are unilocular and do not enhance unless infected. Third and fourth branchial cleft anomalies are extremely rare. Thyroglossal duct cysts are the most common congenital cystic lesions. Suprahyoid cysts are typically midline which infrahyoid cysts (50%-65%) are frequently off-midline deep to, or embedded within, the infrahyoid strap muscles. They are found anywhere along the course of the thyroglossal duct from the foramen cecum to the thyroid gland. These cysts are usually unilocular and do not enhance. 'Complicated-appearing' cysts should be viewed with suspicion as thyroid carcinomas (typically papillary carcinoma) may occur within these cysts. A variety of relatively uncommon 'cystic' neck lesions are occasionally encountered including thymic cysts, thyroid cysts, complicated laryngoceles, completely necrotic lymph nodes, lymphatic malformations, etc. A number of these lesions will be presented and discussed as time permits.

RC606B • Neck Tumors

Deborah L Reede MD (Presenter)

LEARNING OBJECTIVES

1) Learn the CT and MR appearance of common non cystic neck masses in the infrahyoid neck. 2) Learn to develop a differential diagnosis for lesions based on location and imaging appearance. 3) Review the anatomy in the region of the thoracic Inlet and location of major nerves in the infrahyoid neck to improve the detection of tumor spread and prediction of potential nerve involvement.

ABSTRACT

Common non cystic neck masses are discussed with an emphasis on differential diagnosis bases on lesion location and imaging appearance. Anatomy in the region of the thoracic inlet and the location of major nerves in the infrahyoid neck are reviewed. Knowledge of this anatomy will enhance your ability to detect tumor spread beyond the confines of the neck and help identify lesions originating in or potentially involving major nerves. Information presented is important for surgical planning and may improve patient outcomes.

RC606C • Lymph Nodes

Peter M Som MD (Presenter)

LEARNING OBJECTIVES

1) The attendee will learn the function and anatomy of the cervical lymph nodes. 2) The attendee will be able to understand the differences between nodal staging and classification. 3) The attendee will know the criteria for assessing metastatic adenopathy.

ABSTRACT

The anatomy and function of the cervical nodes will be discussed and special attention will be given as to how cancer enters these nodes. The classification and staging of the cervical nodes will be discussed and the differences between them noted. How this information is then utilized in treatment planning will be highlighted. Criteria for the imaging assessment of the presence of nodal metastases will be discussed and examples will be given. Both morphologic and functional criteria will be presented.

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

Thursday, 01:30 PM - 03:00 PM • S100AB

PD NR HN

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MSCN53 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Director

Pina C Sanelli, MD

MSCN53A • Adult Head and Neck

Laurie A Loevner MD (Presenter)

LEARNING OBJECTIVES

1) Emphasize pertinent anatomy in the adult neck as it pertains to image interpretation through well selected cases. 2) Generate succinct, well thought out differential diagnoses for a spectrum of head and neck lesions. 3) Identify important imaging findings that allow the radiologist to be specific about establishing 'the' diagnosis. 4) Avoid the common adult radiologic diagnostic pitfalls.

ABSTRACT

This session will evaluate a spectrum of pathologies encountered in the adult head and neck. The session will emphasize critical analysis of image findings which allow the radiologist to generate a succinct, short differential diagnosis, and in many instances, the correct diagnosis. There will be emphasis on correct anatomic localization of pathology in the head and neck, patterns of radiologic pathology, as well as management decisions that may include additional imaging studies, or clinical interventional.

MSCN53B • Pediatric Head and Neck

Nafi Aygun MD (Presenter)

LEARNING OBJECTIVES

- 1) Provide a short differential diagnosis for neck tumors in children in varying ages.
- 2) Recognize various congenital anomalies in the neck.
- 3) Manage neck emergencies effectively.

ABSTRACT

A review of various developmental, infectious and neoplastic conditions in the neck and skull base in children will be provided with a case-based approach with emphasis on key imaging findings that help in differential diagnosis.

MSCN53C • Common Misdiagnoses

Hugh D Curtin MD (Presenter)

LEARNING OBJECTIVES

- 1) Identify the most common areas where abnormalities are overlooked and will be able to identify subtle abnormalities at those locations.
- 2) Identify areas to search for additional diagnoses that must not be overlooked once a primary diagnosis is established.

Salivary Glands

Thursday, 04:30 PM - 06:00 PM • N228

NR HN

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RC706 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

RC706A • Salivary Gland Imaging

Bronwyn E Hamilton MD (Presenter)

LEARNING OBJECTIVES

- 1) The participant will be able to recognize the normal anatomical landmarks that define the parotid, submandibular, and sublingual spaces.
- 2) The participant will recognize common inflammatory, infectious, and neoplastic diseases affecting the salivary glands.
- 3) The participant will understand the respective roles for CT and MRI in salivary gland imaging.

RC706B • Parapharyngeal Spaces

Hugh D Curtin MD (Presenter)

LEARNING OBJECTIVES

- 1) The participant should be able to separate lesions that occur in the prestyloid parapharyngeal space from those in the post or retrostyloid parapharyngeal (carotid) space and from those in the masticator space.
- 2) The participant will be able to identify the major landmarks for assessing masses in the parapharyngeal region, the carotid artery, the styloid process, the parapharyngeal fat, and the stylo-mandibular tunnel are the most important.
- 3) The participant will be able to identify and will understand the importance of the trigeminal fat pad in the masticator space.

ABSTRACT

The parapharyngeal region is separable into three major compartments. Substantial fascial layers organize these compartments and have a substantial effect on the imaging appearance of lesions occurring in each.

The compartments are the prestyloid parapharyngeal space, post or retrostyloid parapharyngeal space and the masticator space. The carotid space used in an alternative classification is very similar to the poststyloid parapharyngeal space but emphasizes a slightly different fascial layer. As both systems use the same imaging landmarks, either classification can be used in clinical imaging.

The most important landmark in designating the location of a lesion is the carotid artery. Other important landmarks are the styloid process, the posterior margin of the mandible, the medial pterygoid muscle and the fat in the parapharyngeal space.

Lesions in the prestyloid parapharyngeal space are almost always salivary gland in origin. They are anterior to the carotid artery and push the parapharyngeal fat antero-medially. Lesions in the poststyloid parapharyngeal compartment push the carotid artery anteriorly compressing the parapharyngeal fat antero-laterally. Masses in this space are usually nerve sheath tumors or paragangliomas (glomus vagale).

Lesions of the masticator space compress the parapharyngeal fat posteromedially and distort the fat planes between the pterygoid muscles. These lesions are not salivary tumors but may be of osseous, odontogenic, neural or mesenchymal origin. Temporomandibular joint pathology also occurs here.

The third division of the trigeminal nerve passes into the trigeminal fat pad located along the medial margin of the lateral pterygoid muscle just inferior to foramen ovale. Perineural spread can reach the trigeminal fat pad and foramen ovale by following the auriculotemporal nerve from the parotid gland or the other major branches of the third division of trigeminal.

RC706C • Perineural Spread

Lawrence E Ginsberg MD (Presenter)

LEARNING OBJECTIVES

- 1) Review the various cutaneous malignancies that may afflict the face and scalp, focusing on imaging appearance and staging evaluation.
- 2) Understand the clinical circumstances and imaging appearance and strategies related to perineural tumor spread in head and neck malignancies.
- 3) Understand the spectrum of upper aerodigestive tract malignancy attributable to minor salivary glands, including the anatomic distribution, imaging appearance including non-specificity, and patterns of spread, particularly by perineural mechanism.

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

Thursday, 04:30 PM - 06:00 PM • S505AB

NM CT NR HN

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RC711 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

LEARNING OBJECTIVES

- 1) Recognize the strengths of FDG PET/CT and dedicated CT imaging in head and neck cancer.
- 2) Recognize the false positives and false

negatives associated with FDG PET/CT and CT imaging. 3) Understand the importance of combining PET and dedicated CT imaging findings for a thorough interpretation.

ABSTRACT

Accurate staging and timely detection of recurrence are of prime importance for for improving outcome in head and neck cancer patients. FDG PET/CT imaging helps in staging and detecting persistent or recurrent disease, estimate its extent and monitor tumor response and occasionally detect synchronous second primary tumors. After radical surgery or radiation therapy for HNC, conventional imaging modalities can be highly inaccurate in differentiating tumor from non-neoplastic post-treatment changes as normal tissue planes are altered substantially. FDG-PET has higher sensitivity and specificity for detecting metastatic lesions in HNC than other conventional imaging modalities including CT. Although in some instances PET can be false negative without the existence of a morphologic imaging component . Combined PET/CT scanners overcome some of these limitations by fusing the morphologic data obtained by CT with the functional data of PET. In this session case examples will be presented to highlight the superior sensitivity and specificity of FDG PET/CT imaging. In addition, case examples of dedicated CT will be presented in those cases when FDG PET imaging can be misleading with false positive or negative results.

RC711A • Correlative CT and PET Imaging: Superiority of CT

Peter M Som MD (Presenter)

LEARNING OBJECTIVES

1) The attendee will learn from case examples how the morphologic information of CT and MR imaging are a critical part of a of PET study. 2) The attendee will learn by case examples the imaging findings on CT and MR that should make one question the pathologic significance of PET avidity.

ABSTRACT

Although PET avidity can identify head and neck cancers that may be poorly seen on morphologic imaging, there are times when the PET findings may be misleading. These include PET avidity in non-cancerous lesions, apparant PET avidity related to artifact, and the absence of PET avidity due to limited biomass in necrotic lesions. Case examples will be presented to illustrate these points.

RC711B • Correlative CT and PET Imaging: Superiority of PET

Lale Kostakoglu MD,MPH (Presenter)

LEARNING OBJECTIVES

1) Recognize the strengths of FDG PET/CT imaging over CT imaging in head and neck cancer. 2) Recognize the false positives and false negatives associated with FDG PET/CT imaging. 3) Understand the importance of combining PET and CT imaging findings for a thorough interpretation.

RC711C • Correlative PET and MRI Imaging: Superiority of MRI

John A Arrington MD (Presenter)

LEARNING OBJECTIVES

1) Understand and recognize the advantages and strengths of MRI as well as the complementary roles of MRI, CT, and FDG PET/CT in the diagnosis and treatment of head and neck cancer. 2) Attendee will learn through case studies the areas of superiority of MRI as well as evaluating and correlating MRI examinations with false positive and false negative PET examinations.

ABSTRACT

MRI, CT, and FDG PET/CT have strengths and weaknesses in the detection and staging head and neck carcinoma. While PET/CT is highly sensitive in the detection of primary head and neck carcinoma and metastatic nodal disease, there are limitations including avidity in muscle activation and inflammatory lesions as well as the detection of perineural tumor spread and metastatic necrotic nodal disease. MRI case studies will be presented highlighting the areas of superiority of MRI over FDG PET/CT.

Sinonasal Imaging

Friday, 08:30 AM - 10:00 AM • S406B



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RC806 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

LEARNING OBJECTIVES

RC806A • Anatomy and Developmental Problems

C. Douglas Phillips MD (Presenter) *

LEARNING OBJECTIVES

1) Understand the normal embryology of the sinonasal cavity. 2) Recognize the appearance of developmental lesions of the sinonasal cavity. 3) Understand the strengths and weaknesses of CT and MR in evaluation of common developmental abnormalities of the sinonasal region.

ABSTRACT

There is a wide spectrum of maldevelopmental lesions of the midface and sinonasal cavity. Understanding the normal embryology of the face and sinuses help clarify the pathology visualized, and allows them to be segmented and characterized. The complex interplay of the sinonasal cavity and anterior fossa during development of the fetus must be understood. Imaging of the sinuses and anterior fossa are required on discovery of these complex midfacial lesions to give the surgeon clear understanding of the repair required. This talk will discuss the range of anterior fossa and sinonasal maldevelopmental lesions from choanal stenosis to encephaloceles.

RC806B • Sinonasal Infections and Inflammation

Patricia A Hudgins MD (Presenter) *

LEARNING OBJECTIVES

1) Understand the pathophysiology of sinus inflammatory diseases and the rationale for FESS. 2) Learn and understand the surgical anatomy and anatomic variants of the sinonasal cavity, and be able to apply this knowledge such that an organized sinus dictation can be developed. 3) Know the CT and MR Imaging findings of sinonasal bacterial and fungal, both invasive and non-invasive infections.

ABSTRACT

The most important goal of sinus CT imaging in the patient with sinusitis or a history of repeat or prolonged sinus infections is to analyze each sinus outflow tract to determine whether there is an anatomic and surgically correctable cause for sinus cavity obstruction. While the description 'ostioameatal complex' has been popularized, the term oversimplifies CT analysis, and instead each sinus cavity should be individually assessed. This session will review the normal anatomy of each sinus outflow tract in coronal, axial and sagittal planes, and present the common correctable causes of ostial stenosis. Imaging findings of bacterial sinusitis will be presented, with a description of potential complications of severe infection. Invasive and non-invasive fungal sinonasal infection will be contrasted and compared, as the imaging findings are markedly different.

RC806C • Sinonasal Masses

Michelle A Michel MD (Presenter) *

LEARNING OBJECTIVES

1) Discuss the role of imaging in evaluating sinonasal neoplasms. 2) Describe the risk factors and histologic classification of sinonasal malignancies. 3) Demonstrate the imaging features of a variety of sinonasal neoplasms. 4) Review staging, treatment, and prognosis of sinonasal neoplasms.

ABSTRACT

Although sinonasal malignancies are rare and they account for less than 1% of cancer deaths in western countries, these tumors arise in a complex anatomic location and are histologically diverse. In addition to new histologic and clinical classifications, the last decade has brought new insights into the etiological risk factors, tumor biology, and therapeutic options of these lesions. Sinonasal malignancies have a relatively poor prognosis and many present at an advanced stage due to delay in diagnosis. Diagnosis may be delayed because the presenting symptoms often mimic those of chronic rhinosinusitis, they generally present with little pain, and there is space for tumor growth within the sinus lumen. Epithelial tumors account for the majority of sinonasal malignancies and squamous cell carcinoma is the most common. Additional epithelial neoplasms include adenocarcinoma and adenoid cystic carcinomas. Soft tissue tumors of the nasal cavity and paranasal sinuses are uncommon and include rhabdomyosarcoma, hemangiopericytoma, and other very rare forms. Malignancies of bone and cartilage include osteosarcoma, chondrosarcoma, malignant giant cell tumor, and Ewing sarcoma. Additional neoplasms such as esthesioneuroblastoma, mucosal melanoma, and lymphomas are uncommon, but may have characteristic features that help to distinguish them from other lesions. CT and MR are the modalities of choice for imaging neoplasms of the sinonasal cavities and their roles are often complementary. CT demonstrates bony remodeling or destruction, identifies intratumoral calcification, demonstrates the matrix of cartilaginous and osseous neoplasms, and delineates obstruction of sinus drainage pathways. MR imaging is superior for distinguishing tumor margins from obstructed secretions; for delineating extension of tumor into the infratemporal fossa, orbit, and intracranial cavities; for detecting perineural tumor spread; and for demonstrating the vascularity of neoplasms.

US for Thyroid Cancer: Diagnosis, Surveillance, and Treatment (How-to-Workshop)

Friday, 08:30 AM - 10:00 AM • E450B

US **OI** **NR** **HN**

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RC831 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Jill E Langer, MD *

Kathryn A Robinson, MD

Sheila Sheth, MD *

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.

Neuroradiology/Head and Neck (Advanced Head and Neck Imaging)

Friday, 10:30 AM - 12:00 PM • N226

MR **NR** **HN**

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SST09 • AMA PRA Category 1 Credit™:1.5 • ARRT Category A+ Credit:1.5

Moderator

Suresh K Mukherji, MD

SST09-01 • Vascular Communications between Donor and Recipient Tissues One Year after Successful Full Face Transplantation

Kanako K Kumamaru MD, PhD (Presenter) ; Geoffroy C Sisk ; Michael L Steigner MD * ; Elizabeth George MBBS ; Bohdan Pomahac MD ; Frank J Rybicki MD, PhD * ; Kurt Schultz RT * ; Dimitris Mitsouras PhD ; David S Enterline MD * ; Ericka M Bueno PhD

PURPOSE

To noninvasively study vascular changes that have implications on graft survival and rejection, future surgical planning, and our understanding of the underlying biology changes after full face transplantation.

METHOD AND MATERIALS

Three full face transplant patients (single anastomosis bilaterally of artery and vein) for whom clinical findings were previously reported (NEJM 2012; 366:715-22) were, for the first time, evaluated for vascular reorganization 1 year after successful transplantation using a previously described 320 x 0.5 mm detector row dynamic CT angiography protocol (AJNR 2012, Aug 9, PMID 22878008).

RESULTS

Consistent, extensive vascular re-organization was observed among the recipients. Diverted external carotid artery (ECA) or facial artery angiosomes were found to be perfused from newly opened, elaborate collateral circulation. Using the metric of arterial blood flow (BF) at the temporal region expressed as the percentage of the BF at the internal carotid artery, allograft tissue was slightly less perfused when the facial artery was the only donor artery when compared to an ECA-ECA anastomosis (4.4±0.4% vs 5.7±0.7%). However, allograft BF was higher than the recipient normal neck soft tissue. Blood flow to the recipient's tongue was maintained, despite the fact that the recipient lingual arteries were not always preserved. On the side where the lingual artery was ligated, blood flow was redistributed from a contralateral artery. Venous drainage was adequate for all patients, including patients for whom the recipient internal jugular vein was anastomosed in end-to-end fashion on one side.

CONCLUSION

Despite extensive surface contact between the donor and the recipient, disruption of recipient's blood supply depends on extensive

collateralization rather than new vessel ingrowth from the donor tissues. These findings guide both surgical planning and the assessment of potential complications for larger scale face transplant studies.

CLINICAL RELEVANCE/APPLICATION

A single anastomosis bilaterally of artery and vein is adequate for full face transplantation, evidenced by substantial arterial flow demonstrated on dynamic CT angiography.

SST09-02 • Value of Dynamic Volume Imaging with 320-detector Row CT in the Pre-transplantation Evaluation of Head and Facial Skin Flap: Initial Experience

Kaiyuan Xu (Presenter) ; **Xuelin Zhang** ; **Xing Chen** *

PURPOSE

To investigate the value of dynamic volume perfusion CT scanning in the pre-transplantation evaluation of blood supply of head and facial flaps with 320-Detector row computed tomography(CT).

METHOD AND MATERIALS

Whole-head dynamic volume perfusion CT scan was performed in 576 patients with a 320-Detector row CT system. All the patients enrolled had normal internal carotid arteries but due to other reasons referred to CT perfusion examination. Volume perfusion data were generated and then analyzed with the body perfusion software. BF(Blood Flow) value of each separate skin flap within the scan region was measured. The numbers of flap arteries and veins that can be found in dynamic CTA images are summarized.

RESULTS

We succeeded to measure BF value of each skin flaps in the head or face for all the patients. BF value of the forehead flap, the eyelid flap, the nasal dorsum flap, the buccal flap, the parietal flap, occipital flap, cervical flap was (127 ± 7.7)ml/min, (268.0 ± 31.1)ml/min, (229.0 ± 50.9)ml/min, (67.8 ± 9.5)ml/min, (140.3 ± 5.5)ml/min, (163.8 ± 15.5)ml/min, (123.5 ± 12.5)ml/min, respectively. There are significant difference between the flaps in different region, among which BF value of the buccal flap was the lowest. Arteries and vein of flaps was observed through different phases. Display rate of arteries and vein that can be found on dynamic CTA image was 100% for all flaps.

CONCLUSION

Whole-head dynamic volume CT perfusion using 320-detecor row MDCT is able to offer effective reference for assessing blood supply and vessel anatomy of different skin flaps for the patient who is going to undergo skin flap autotransplantation. Fusion of perfusion map and CT anatomical images were helpful to the analysis and orientation of flaps.

CLINICAL RELEVANCE/APPLICATION

Whole-head perfusion can be used as a method of preoperative assessment of the skin flap perfusion and avoid operation complications effectively, which has the potential to improve diagnostic utility.

SST09-03 • MRI Displays Affection of the Deep Temporal Artery and the Temporal Muscle in Patients with Giant Cell Arteritis

Simon Veldhoen MD (Presenter) ; **Thorsten Klink** MD ; **Julia Geiger** MD ; **Peter Vaith** ; **Cornelia Glaser** ; **Thomas Ness** ; **Dirk Duwendag** ; **Marcus Both** MD ; **Thorsten A Bley** MD

PURPOSE

Giant cell arteritis (GCA) is a vasculitis of large and medium-sized arteries. Dedicated MRI protocols have been developed to detect vasculitic changes of the superficial cranial arteries noninvasively. This study assesses the involvement of the deep temporal artery and the temporal muscle in MRI of patients with active GCA.

METHOD AND MATERIALS

99 patients who received MRI and subsequent temporal artery biopsy (TAB) were included. TAB was positive in 61 and negative in 38 patients. TAB negative patients served as reference group. Contrast enhanced T1-weighted spin-echo images were acquired utilizing 1.5T and 3T MRI scanners at three academic medical centres. Mural contrast enhancement and wall thickening of the deep temporal artery and contrast enhancement of the temporal muscle were defined as their inflammatory involvement and assessed by two radiologists with experience in vasculitis imaging. Correlation analyses between individual MRI results and jaw claudication were performed to test for a concordance of clinical symptoms and MRI findings.

RESULTS

Patients with active GCA showed inflammatory affection of the deep temporal artery in 34.4% (n=21) and 49.2% (n=30). Bilateral involvement was found in 80% (n=19) and 90.5% (n=24). Temporal muscle involvement was observed in 19.7% (n=12) and 21.3% (n=13), respectively, and occurred bilaterally in all cases. Relative risk for jaw claudication was increased to 2.1 [1.5; 3.1] for GCA patients. Its presence correlated with inflammatory MRI findings in the deep temporal artery (r=0.38; p=0.01) as well as in the temporal muscle (r=0.31; p

CONCLUSION

MRI is able to assess vasculitic changes in the deep temporal artery and in the temporal muscle. Both structures were affected simultaneously in a remarkable number of GCA patients. A substantial correlation of clinical symptoms and MRI results was observed.

CLINICAL RELEVANCE/APPLICATION

MRI is able to display the involvement of the deep temporal artery and the temporal muscle in patients with active GCA.

SST09-04 • Evaluation of Head and Neck Arteriovenous Malformations with 4D Contrast-enhanced MR Angiography at 3T

Yasuhiko Iryo (Presenter) ; **Toshinori Hirai** MD ; **Mika Kitajima** MD ; **Yoshinori Shigematsu** ; **Minako Azuma** ; **Yasuyuki Yamashita** MD *

PURPOSE

Four-dimensional contrast-enhanced MR angiography (4D CE-MRA) at 3T may replace digital subtraction angiography (DSA) for certain diagnostic purposes in patients with arteriovenous malformations (AVMs) in the head and neck region. The purpose of this study was to compare the agreement between DSA and 4D CE-MRA findings for the evaluation of head and neck AVMs.

METHOD AND MATERIALS

Six patients with facial AVMs (4 men, 2 women; aged 15 - 83 years, mean 39.2 years) underwent 4D CE-MRA at 3T and DSA. The AVMs were located tongue, lip, scalp, orbit, nose and cheek in one each. 4D CE-MRA combined randomly segmented central k-space ordering, keyhole imaging, sensitivity encoding, and half-Fourier imaging; it yielded total acceleration factor was 88. We obtained 30 dynamic scans every 1.9 sec at an acquired spatial resolution of 0.9×0.9×1.5 mm; the matrix was 256×256. Two independent observers reviewed 4D CE-MRA images with regard to the nidus size, main arterial feeders and venous drainage. The venous drainage was recorded as being extracranial, intracranial, or extra- and intracranial veins. Interobserver and intermodality agreement was assessed by ? statistics.

RESULTS

On 4D CE-MRA, the interobserver agreement was excellent for main arterial feeders (? = 1.0) and good for the nidus size and venous drainage (? = 0.63 and 0.67, respectively). Intermodality agreement was excellent for main arterial feeders and venous drainage (? = 0.92 and 1.0, respectively) and good for the nidus size (? = 0.63).

CONCLUSION

The agreement between 4D CE-MRA and DSA findings was good to excellent with respect to the nidus size, main arterial feeders and venous drainage in head and neck AVMs.

CLINICAL RELEVANCE/APPLICATION

4D CE-MRA is a reliable tool for assessing head and neck AVMs, although it is not able to replace DSA for the detailed evaluation.

SST09-05 • Visualization of the Intraparotid Facial Nerve with 3T MRI

Hiroyuki Fujii MD (Presenter) ; Akifumi Fujita MD ; Yukio Kimura MD ; Edward K Sung MD ; Osamu Sakai MD, PhD * ; Hideharu Sugimoto MD

PURPOSE

It is important to know the spatial relationship of the intraparotid facial nerve to a parotid tumor since the location of the tumor influences the duration and difficulty of the surgery. Recently, several study have proposed MRI techniques to visualize the intraparotid facial nerve by 3-dimensional reversed fast imaging with steady-state precession with diffusion weighted imaging (3D-PSIF-DWI) and three-dimensional double-echo steady-state with water excitation (3D-DESSWE). The purpose of this study is to evaluate the visualization of the intraparotid facial nerve with both sequences using 3T MRI, and compare the utility of this application in clinical practice.

METHOD AND MATERIALS

We evaluated 72 parotid glands of 36 consecutive patients during routine clinical MR examination. We performed both 3D-PSIF-DWI and 3D-DESSWE sequences using our 3T MR scanner (MAGNETOM Skyra, Siemens). Two observers initially assessed the images independently, but later resolved inconsistencies by collaborative review and consensus agreement. The certainty of identifying the intraparotid facial nerve was evaluated and divided into four categories; (1) Excellent: branch of the facial nerve identified; (2) Good: distal facial nerve trunk identified; (3) Fair: proximal facial nerve trunk identified; and (4) Poor: intraparotid facial nerve not identified.

RESULTS

Both 3D-PSIF-DWI and 3D-DESSWE were successfully obtained in all 36 patients (72 parotid glands). The intraparotid facial nerve was identified in 62 parotid glands (86.1%; Excellent:17, Good:25, Fair:20) with 3D-PSIF-DWI sequence and in 71 parotid glands (98.6%; Excellent:40, Good:15, Fair:16) with 3D-DESSWE sequence.

CONCLUSION

Using 3T MRI, both 3D-PSIF-DWI and 3D-DESSWE sequences can adequately demonstrate the course of the intraparotid facial nerve. 3D-DESSWE demonstrated better than 3D-PSIF-DWI in visualization intraparotid facial nerve.

CLINICAL RELEVANCE/APPLICATION

Knowledge about the course of the intraparotid facial nerve in relation to a parotid tumor is important for preoperative planning, and can optimize the surgical approach to prevent facial nerve damage.

SST09-06 • High Resolution Diffusion-weighted MR Imaging in the Head and Neck: A New Approach

Thorsten Klink MD (Presenter) ; Daniel Chong ; Dechen W Tshering-Vogel ; Nedelina Slavova ; Berthold Kiefer PhD * ; Harriet C Thoeny MD

PURPOSE

To evaluate whether diffusion-weighted MR images acquired with readout-segmented echo planar imaging (RESOLVE) are superior to single-shot echo planar imaging (ssEPI) in the head and neck region.

METHOD AND MATERIALS

After ethics committee approval and written informed consent, 10 volunteers were prospectively included in our MRI study of the head and neck region. The 3T MR study protocol included axial T2w-TSE, ssEPI, and RESOLVE acquisitions. Image analysis was performed by two independent observers. DWI was qualitatively evaluated by visual assessment using a 10-point score, and quantitatively by measuring SNR and ADC values of various predefined structures. Image distortion was assessed qualitatively and quantitatively by measuring the diameter of anatomical structures on RESOLVE and ssEPI images in comparison to T2w images. The RESOLVE sequence was additionally tested in four patients. Differences were considered statistically significant, when $p=0.05$ applying the non-parametric Mann-Whitney-U test.

RESULTS

Quality of RESOLVE images was significantly higher in comparison to ssEPI (Quality scores, RESOLVE 7.51 ± 0.18 and ssEPI 4.50 ± 0.32 ; $p < 0.05$).

CONCLUSION

DWI of the head and neck acquired with the RESOLVE sequence had superior image quality at comparable SNR and ADC levels in ten healthy volunteers, and were of diagnostic quality in four patients. Significant less image distortion is the key advantage of RESOLVE over ssEPI and may therefore improve image interpretation of DWI in this challenging region.

CLINICAL RELEVANCE/APPLICATION

RESOLVE produced superior image quality and less distortion; this new approach for DWI in the artifact- and distortion-susceptible head and neck region may improve image interpretation.

SST09-07 • Objective Evaluation of Salivary Gland Function Using Diffusion-weighted MR Imaging: Follow-up of Radiation-induced Xerostomia

Yun-Yan Zhang (Presenter) ; Dan Ou ; Yajia Gu MD ; Xia-Yun He ; Weijun Peng MD ; Jian Mao BA ; Lei Yue

PURPOSE

To investigate the value of diffusion-weighted (DW)-MRI as a noninvasive tool to assess salivary gland function for follow-up of patients with radiation-induced xerostomia.

METHOD AND MATERIALS

A HIPAA-compliant waiver of authorization was granted by the institutional review board. Twenty-three consecutive patients with nasopharyngeal carcinoma were examined with a 3T unit pre-radiotherapy (RT), and 1 week and 1 year post-RT. Clinical xerostomia was also assessed according to the Radiation Therapy Oncology Group/European Organization for Research and Treatment of Cancer morbidity scoring system. A DWI sequence was performed once on the salivary glands at rest, then continually repeated on the parotid glands immediately after oral ascorbic acid stimulation over a mean period of 21minutes. Apparent diffusion coefficient (ADC) maps for salivary glands before and after stimulation were calculated. The maximum ADC of the parotid glands (pADCmax) and the time to pADCmax (pTmax) during stimulation were also obtained. Findings before and after RT were compared.

RESULTS

CONCLUSION

The ADC value is a sensitive indicator for salivary gland dysfunction, and it changes earlier than clinical xerostomia. DW-MRI is potentially useful for noninvasively evaluating the severity of radiation-induced xerostomia.

CLINICAL RELEVANCE/APPLICATION

DW-MRI could noninvasively evaluate the functional changes of salivary glands before and after RT and the ADC value may be a early prediction for the severity of radiation-induced xerostomia.

SST09-08 • Evaluation of Enhanced Modernize Collaborative Management of Neck Lumps

Kit H Chow MBBCh, FRCR (Presenter) ; Rathinavelu Balamurugan MBBS ; Unnikrishnan Anoop MBBS, FRCR ; Saravana Ammamuthu MBBS ; Jyothi Rao

PURPOSE

Chesterfield Royal Hospital (CRH) implemented an enhanced modernized collaborative one-stop system in 2008, which included the use of specialist neck Ultrasound (US) and US-guided biopsy. We evaluated this innovative model of diagnostic management of neck lumps.

METHOD AND MATERIALS

1. Prospective Survey of Patient's Satisfaction (n=100) 2. Prospective 3 months study of impact of US and US guided biopsy on patients referred to CRH rapid access H&N lump clinic 3. Retrospective study of 60 patients with H&N Lymphoma in CRH presented over a 4 years period. This provides an evaluation of effectiveness of core biopsy provided by this radiology service.

RESULTS

CONCLUSION

The result shows this of model managing neck lumps is faster, cheaper, clinically less invasive and represents a successful formula for patients, radiologists, referring clinicians and commissioners of services.

CLINICAL RELEVANCE/APPLICATION

Radiologists should develop an ambition to work beyond their traditional boundary and use their skills to extend their role by running neck lump clinics, which, offer H&N US and US guided biopsy.

SST09-09 • Preliminary Prospective Study on Contrast-enhanced Ultrasound (CEUS) in the Quantitative Assessment of Uveal Melanoma (UM) Response to Gamma Knife Radiosurgery (GKR): Do Changes in Tumor Vascularization Precede Diameter Reduction?

Caterina Colantoni (Presenter) ; **Massimo Venturini** MD ; **Giulio Modorati** ; **Maura Di Nicola** ; **Giulia Agostini** ; **Alessandro Del Maschio** MD

PURPOSE

Tumor thickness is worldwide accepted as the most useful parameter to evaluate UM response to GKR, which on average occurs at 12 months. According to the modified response evaluation criteria in solid tumors (mRECIST), in case of hypervascular lesions, changes in vascularization precede diameter reduction after treatment. Our aim was to prospectively analyze CEUS as a tool to quantitatively assess the response of UM to GKR, investigating if changes in quantitative parameters expressing tumor vascularization precede diameter reduction.

METHOD AND MATERIALS

Our study had institutional review board approval, and written consent was obtained. From 2012 to 2013, 10 patients (mean age, 66 years) affected by UM were enrolled and submitted to a complete ophthalmological evaluation before and after GKR. US and CEUS (ATL-Philips, IU-22, 5-9 MHz linear probe; Sonovue, Bracco) were performed by the same experienced radiologist at baseline (b-GKR), 3 (3-GKR), and 6 (6-GKR) months after GKR. UM transverse diameter (TD), thickness (Th), and different quantitative parameters (area under the curve in the wash-in phase; wash-in perfusion index (WiPI); peak enhancement (PE); mean transit time; wash-in rate (WiR); rise time (RT); time to peak) were calculated by the same operator using a dedicated and off-line imaging software (Sonotumor, Bracco). Comparisons between each parameter were made using the Wilcoxon analysis.

RESULTS

At US the mean tumor diameters (TDxTh, mm) were: b-GKR=10.7x8.3, 3-GKR=8.8x7.4, 6-GKR=9.4x6.6, with statistical significance at 6 months (P=.031).

At CEUS the quantitative parameters were: PE (arbitrary units, a.u): b-GKR=2*10⁷, 3-GKR=3*10⁷, 6-GKR=8*10⁵ (P=.018); WiR: b-GKR=4*10⁶, 3-GKR=5*10⁶, 6-GKR=8*10⁴ (P=.028); WiPI (cm³/sec): b-GKR=6*10⁷, 3-GKR=1*10⁸, 6-GKR=2*10⁶ (P=.028). At 6-GKR tumor mean diameters decreased in 8/10 patients, while UM enhancement in 10/10.

CONCLUSION

CEUS is a feasible and reproducible method for the quantitative assessment of UM vascularization; it showed a reduction in UM enhancement at 6 months after GKR, earlier than tumor diameter changes, even though further studies with a larger population and a longer follow-up are needed.

CLINICAL RELEVANCE/APPLICATION

CEUS could be a useful additional tool to conventional US or the first choice technique to monitor UM response to GKR, in order to better predict the long-term survival of patients.

Disclosure Index

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