ECR2019 the bigger picture

BOOK OF ABSTRACTS

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B-1444 09:50

TRANS-FUSIMO: preliminary in-vivo animal results of MR-guided focused ultrasound of liver under respiratory motion

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Purpose: Treating liver tumors using Focused Ultrasound (FUS) is a great challenge. Prior to human applications, an in-vivo animal trial using the TRANS-FUSIMO treatment system (TTS) is ongoing in order to evaluate the safety and the technical efficacy and efficiency of generating predefined necrotic lesions.
Methods and Materials: The trial includes a crossbred porcine model of thirty large white swine (all females; 55-85Kg) that will be treated using the TTS under general anaesthesia with intubation. All treatments haven been performed under ventilator-controlled breathing and using an improved non-clinical prototype FUS transducer integrated with a 1,5T MRI unit; a set of interventional flexible coils were used. Before the treatment, a 3D LAVA sequence was scanned; 3D FIESTA sequences were then used for planning. During each sonication, real-time multi reference thermal monitoring was achieved using a 3mm istotropic EPI-GRE slice (8Hz). At the end of the treatment session we injected 2ml/Kg of gadobenate dimeglumine and a 3D LAVA sequence was than scanned to identified any necrotic lesion.
Results: The results from the first successfully treated animals will be presented. Liver lesioning was possible during both breath-hold and ventilator-controlled breathing due to the TTS motion compensation algorithm which allows the HIFU electronic steering to be controlled according to the MRI images. During all pre-clinical sessions, the TTS was used, including real-time multi reference thermal monitoring.
Conclusion: Although the TRANS-FUSIMO animal trial is still ongoing and subject to further optimizations the TRANS-FUSIMO treatment system is capable of perform liver lesions compensating respiratory motion.

08:30 - 10:00 **Room M 2**

Head and Neck

SS 1708

Miscellaneous and orbits

Moderators:
N.N.
N.N.

B-1445 08:30

Comparison of single shot echo planar imaging and turbo spin echo diffusion weighted imaging of the orbit in patients with uveal melanoma

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Purpose: Although orbital diffusion weighted imaging (DWI) has become an essential part of orbital magnetic resonance imaging, susceptibility to magnetic inhomogenities of echoplanar imaging (EPI) DWI has inherent obstacles. This study was conducted to compare single shot (SSh) turbo spin echo (TSE) DWI with SShEPI-DWI in patients with uveal melanoma.
Methods and Materials: Both T1, T2 WI and DWI of 32 patients with uveal melanoma were assessed qualitatively including geometric distortion, lesion discrimination and overall quality by two radiologists based on a 4-point scale. Distortion ratio (DR), signal-to-noise (SNR) and contrast-to-noise ratios (CNR) and apparent diffusion coefficient (ADC) measurements for each DWI were noted. General linear model for repeated measurements and Friedman test was applied for comparison. Pearson correlation test was performed to reveal the relationship between T1, T2 and DWI signal intensities.
Results: Geometric distortion was higher in EPI-DWI, overall quality was better in TSE-DWI for both reviewers. One reviewer scored EPI-DWI slightly better for lesion discrimination, the other found no significant difference. DR was higher in EPI-DWI; SNR and CNR were better in TSE-DWI ($p<0,05$). Pearson correlation demonstrated negative correlation between T1 and both T2, EPI-DWI and TSE-DWI signal intensities ($p<0,05$ for all). ADC values were also higher in TSE-DWI.
Conclusion: TSE-DWI, less sensitive to magnetic field inhomogenities and susceptibility artefacts, may be a good alternative to EPI-DWI for orbital imaging. Negative correlation between T1 versus both T2 and DWI signal intensities is a confounding factor, suggesting that the amount of intrinsic melanin may affect the DWI signal.

B-1446 08:38

MRI in the assessment of orbital invasion: diagnostic accuracy and impact on surgical planning

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Purpose: To assess MRI performance in detecting infiltration of periorbit, extrinsic muscles, apex, nasolacrimal duct (NLD) in patients with nasoethmoidal or maxillary sinus malignancies.
Methods and Materials: Retrospective analysis of 103 MRI (SET2, SET1, VIBE, high resolution matrix, slice thickness ≤3mm) in patients with maxillary (71/103) or nasoethmoidal (32/103) cancer. Periorbital invasion was considered when the tumour was abutting the medial/inferior orbital wall using periorbital focal interruption or irregular tumour-to-extraconal fat interface as criteria. Extrinsic muscle invasion was assessed only in tumours infiltrating intra/extraconal fat, using focal replacement/enhancement of muscular fibers as criteria. Criteria for apex invasion were invasion of optic canal or superior orbital fissure. Criteria for NLD were interruption of bony wall or mucosal layer. Imaging findings were compared to retrospectively revised surgical specimens (exenteratio orbitae 50/103, sparing surgey 53/103).
Results: In the assessment of periorbital invasion MRI obtained sensitivity 57%, specificity 71%, PPV 74%; pathological evidence of neoplastic necrosis is related to significant increase of MRI accuracy. For extrinsic muscles infiltration MRI obtained specificity 86% and NPV 78%, with sensitivity 58% and PPV 70%. Overall accuracy was 76%, significantly higher in the absence of perineural spread. On apex MRI obtained 100% specificity and PPV, sensitivity 56% and NPV 78%. For NLD sensitivity was 89% and NPV 88%, specificity (41%) and PPV (44%) were lower.
Conclusion: Diagnostic performance on periorbital infiltration is limited by microscopic breaches undetectable with MRI, that however generally are treated conservatively. Muscular and apex invasion (decision boundaries for enucleation) is more accurately identified.

B-1447 08:46

The intrinsic iodine content of the thyroid is correlated to the HU value of the thyroid on true non-contrast scans

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Purpose: Virtual non-contrast (VNC) scans from Dual energy CT are thought to reflect True non-contrast (TNC) images and could therefore be used as a substitute to lower radiation dose. The difference in thyroid imaging however exceeds the normally accepted 15 HU, this is thought to be due to the intrinsic iodine content of the thyroid. We investigated the correlation between Thyroid Stimulating Hormone (TSH) and the density measurements on TNC and VNC.
Methods and Materials: In the period from November 2016 until June 2018 we included forty-seven patients who underwent a DECT scan of the head neck region. The correlation of TSH values and density measurements on TNC and VNC, as well as the ΔHU between VNC and TNC were calculated.
Results: TSH of patients: mean 2.3, range (0.14-7.1). 35 Patients were euthyroid, 1 hypo- and 4 hyperthyroid. 7 Patients did not have a TSH test prior to the CT scan. Density thyroid VNC: mean 52.2, range (27.8-77.5); Density thyroid TNC: mean 104.0, range (48.0-151.4); deltaHU mean 51.8, range (6.7-110.5). The correlation between TSH and the HU value on TNC scan is 0.32 ($p=0.050$) and for VNC reconstructions -0.08 ($p=0.64$).
Conclusion: No correlation between TSH and VNC is found as expected, because the intrinsic iodine is subtracted from the images. The increased organification of iodine due to higher TSH levels is reflected in the density measurements of the TNC. Therefore Δ HU measurements reflect the intrinsic iodine content of the thyroid.
Author Disclosures:
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B-1448 08:54

Additional diagnostic value of dynamic MRI sequences in patients with temporomandibular joint dysfunction compared to static imaging

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Purpose: To evaluate the added value of a dynamic magnetic resonance imaging (MRI) sequence for the assessment of the temporomandibular joint (TMJ) compared to standard static MRI sequences in patients with TMJ dysfunction (TMD).
Methods and Materials: In this retrospective study 71 patients with TMD underwent MRI exam. We acquired 5 static T1- and T2-weighted sequences in parasagittal and paracoronal views and one dynamic sequence (trueFISP) in parasagittal view for each TMJ. We evaluated morphology and function of intra-articular structures and rated dynamic images as (1) “more informative”, “equal informative”, and (3) “less informative” compared to static images.