

SCIENTIFIC SESSIONS — TUESDAY 17 OCTOBER, 12:00–13:00

Session 1

Detecting nodal metastases in primary head and neck cancer with diffusion-weighted MRI: initial experience

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Aim: To evaluate diffusion-weighted magnetic resonance imaging (DW-MRI) for detection of regional nodal metastases in primary head and neck squamous cell carcinoma (HNSCC).

Materials and methods: Ten patients with HNSCC underwent an MRI prior to surgery. The scan protocol consisted of plain transverse T1- and T2-weighted turbo spin echo (TSE) sequences and gadolinium-enhanced transverse, coronal and sagittal T1-weighted TSE sequences. Additionally, a transverse echo-planar DW-MRI sequence, using six b-values between 0 and 1000 s/mm², was performed. Apparent diffusion coefficient (ADC) maps were calculated for the entire b-value range (ADC_{avg}) and for the high b-values separately ($b \geq 500$ s/mm², ADC_{high}). ADC values were compared with histopathology of the neck dissection specimens. After determining an optimal threshold for ADC_{avg} and ADC_{high}, sensitivity and specificity was calculated. Finally DW-MRI was compared with TSE-MRI for detection of nodal metastases.

Results: MRI showed 55 lymph nodes; 41 were benign and 14 malignant on histopathology. The mean ADC_{avg} value for benign lymph nodes was 0.00122 ± 0.00029 mm²/s and 0.00090 ± 0.00014 mm²/s for malignant nodes ($p < 0.0001$), resulting in a sensitivity of 73% and specificity of 83%. The mean ADC_{high} value for benign lymph nodes was 0.00099 ± 0.00026 mm²/s and 0.00062 ± 0.00013 mm²/s for malignant nodes ($p < 0.0001$), resulting in a sensitivity of 93% and specificity of 83%. TSE-MRI yielded a sensitivity of 57% and specificity of 90%. DW-MRI allowed for additional detection of contralateral adenopathies in three patients and excluded metastasis in a single enlarged lymph node in two different patients.

Conclusion: In HNSCC, DW-MRI allows better differentiation of benign and malignant lymph nodes than conventional TSE sequences.

Retropharyngeal nodes in squamous cell carcinoma of oropharynx: incidence, localization, and impact on prognosis

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Aim: To investigate the incidence, localization and prognostic influence of retropharyngeal (RP) nodal involvement in patients with squamous cell carcinoma of the oropharynx.

Methods: The CT studies of 208 patients presenting with oropharyngeal carcinoma were retrospectively analysed. The location of nodal neck disease was registered according to recent consensus guidelines for target volume delineation, and special attention was given to the RP nodes. The influence on recurrence (local and regional), distant metastasis, and survival was investigated.

Results: RP adenopathies were present in 16% (34/208) of all patients and in 23% (31/134) of patients with nodal disease in other neck sites. A solitary ipsilateral RP node was present in 3 (9%) of 34 patients with RP nodes; 2 of these 3 patients had a primary posterior pharyngeal wall tumour. No patients presented with a solitary contralateral RP node. At 5 years, patients with RP adenopathy had significantly more regional recurrences (45% vs. 10%, $p = 0.004$). Involvement of RP lymph nodes significantly (RR 4.29 [95% CI 3.33–5.25], $p = 0.01$) and independently predicted regional recurrence in multivariate analysis. Disease-specific survival was significantly lower in the RP node positive group (38% vs. 58%, $p = 0.03$).

Conclusions: Given the high incidence of RP nodal involvement in oropharyngeal cancer and the negative impact on prognosis, RP nodes should be included in the target volume, especially in node-positive necks. In node-negative necks, inclusion of RP nodes into the target volume is advised in posterior pharyngeal wall tumours.

The aggressive ameloblastoma: correlative MR/CT imaging and histopathological findings in 20 cases

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Aim: Acanthomatous change (AC) has been described as a sign of greater malignancy. However, it is generally accepted that histomorphological variations have no bearing on biologic behaviour or prognosis and that there is no correlation between histologic subtype and radiologic/imaging findings.

Materials and methods: In a review of 20 cases of aggressive ameloblastoma over a 12-year period (1991–2002), AC was often stated in histological reports, without any special clinical significance or pathological quantification, radiological correlation or proven clinical implication. In this study, AC was classified as focal or diffuse (from 1+ to 4+) and correlated with the radiological appearance and clinical behaviour.

Results: AC occurred in the follicular and plexiform subtypes. Fourteen cases were recurrences. It was conclusively shown that progressive AC was associated with an aggressive radiological appearance and biologic behaviour, including a case of ameloblastic carcinoma.

Conclusion: AC correlates with aggressive behaviour. Pathologists and clinicians should be alerted to the significance of AC in biopsy and resected histological specimens. These cases should be carefully assessed by MRI for diagnosis and follow up.

Systematic review and meta-analysis: sentinel node identification and classification after neoadjuvant breast cancer therapy

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Aim: To investigate sentinel lymph node mapping in patients with early stage breast carcinoma.

Methods: A systematic search of world literature of sentinel node mapping in patients with early stage breast carcinoma following chemotherapy was undertaken. Using the keywords 'sentinel node biopsy', 'early stage breast cancer', 'axillary lymph node dissection' and 'lymphatic mapping', potentially eligible studies were identified.

Results: Between 2000 and 2005, 24 trials were reported that met eligibility criteria. Of the 1247 patients studied, 1047 patients (84%) had successfully mapped lymph nodes. The proportion of patients who had successful lymph node mapping ranged from 63% to 100%, with 55% of studies reporting a rate of <90%. Lymph node involvement was found in 510 patients (48.7%) and ranged from 10.9% to 89.6% across studies. The sensitivity of sentinel node mapping ranged from 67% to 100% and the negative predictive value ranged from 57% to 100%. The pooled estimate of sensitivity for the 24 studies was 91% and the pooled estimates for the negative predictive value 91%. The false negative rate ranged from 0% to 11.1%. Significant inverse relationships were found between the false negative rate and the proportion of patients who had successfully mapped sentinel lymph nodes.

Conclusions: Sentinel lymph node mapping is increasingly used to reduce the risks associated with axillary lymph node dissection in patients with low stage breast carcinoma following chemotherapy or endocrine therapy. This systematic review demonstrates a wide variation in test performance. However, sentinel lymph node mapping is a reliable tool for planning treatment after neoadjuvant therapy.

Correlation of dynamic optical breast imaging curve and microvessel density count: our initial experience

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Aim: To investigate the behaviour of the dynamic optical breast imaging (DOBI) curve in relation to the microvessel density (MVD) count of surgical specimens from breast biopsies.

Methods: Forty-six patients underwent DOBI evaluation for mammographic findings suggesting biopsy. The DOBI evaluation was performed the day before or on the day of the scheduled biopsy. The MVD count was performed from the site of the specimen where the pathology was located. The characteristics of the DOBI curve were correlated to the MVD count and to the pathology results of the biopsy.

Results: All malignant lesions had a high MVD count and a DOBI curve with a downslope direction, rather straight and without any initiation delays. The benign cases with a high MVD count had a downslope DOBI curve but not always straight and with some initiation delays. The rest of the cases had a low MVD count and most of them an elevated DOBI curve.

Conclusion: Our preliminary results indicate a relationship between malignant breast lesions with a characteristic DOBI curve and high MVD count.

MRI findings of breast lymphoma: comparison with ductal invasive carcinoma

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Aim: To assess magnetic resonance (MR) imaging features of breast lymphoma (BL) and to compare MR characteristics of BL and ductal infiltrating carcinoma (DIC).

Methods: MR features of 7 patients with 7 breast lymphoma lesions (BL) and 7 patients with 9 DIC lesions were retrospectively evaluated by two radiologists, according to a multifactorial evaluation protocol (8-point scale) for lesion morphology (form, margins, and enhancing pattern) and dynamics (initial wash-in peak and post-initial washout). Signal intensity values of pre-contrast, initial and post-initial enhancement were recorded in order to calculate percentage changes of these values for BL and DIC lesions. Diameter of lesions was also recorded. The Wilcoxon two-sample test was used to evaluate the differences between BL and DIC MR features. The same statistical test was used to assess the inter-observer variability.

Results: BL showed a significantly higher median diameter (median 38 mm, range 25–50 mm) than DIC (median 20 mm, range 15–23 mm) ($p < 0.05$). Percentage changes of post-initial enhancement were significantly higher for DIC (median –12.4%, range –15.4%–7.4%) than for BL (median –3.7%, range –8.1%–1.1%) ($p < 0.05$). Overall evaluation score and percentage changes of initial enhancement did not show a significant difference between the two groups ($p > 0.05$). There was no significant inter-observer variability for all the assessed data ($p > 0.05$).

Conclusion: MR evaluation of BL and DIC lesions did not show significant difference in initial enhancement percentage change and overall evaluation score. There was significant difference between the two groups in diameter and percentage change of post-initial enhancement.

Session 2

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Abnormal liver parenchyma on MRI with SPIO in patients with colorectal metastases: related to chemotherapy?

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Aim: To determine the presence, severity and distribution of morphological changes consistent with 'fibrosis' and fatty infiltration on MRI with SPIO in patients with colorectal metastases, and their relationship to chemotherapy.

Methods: One-hundred and seventeen patients with colorectal metastases, 89 undergoing chemotherapy and 28 untreated, underwent unenhanced in-phase and opposed-phase T1-weighted gradient refocused echo (GRE) imaging, and T2-weighted fast spin echo (FSE) and GRE sequences before and after 8 $\mu\text{mol/kg}$ ferucarbotran. The images were reviewed by two experienced observers to determine the presence, severity and distribution of morphological changes consistent with 'fibrosis' and fatty infiltration. Percentage signal intensity loss (PSIL) and tumour-to-liver contrast (CNR) were measured on superparamagnetic iron oxide (SPIO)-enhanced liver images.

Results: In the post-chemotherapy patients the mean PSIL, mean CNR were 51.9, 6.7 on FSE and 70.7, 29.6 on GRE sequences, respectively. In untreated patients the mean PSIL, mean CNR were 54.9, 8.3 on FSE and 74.1, 32.4 on GRE. Twenty-five patients (19 treated, 6 untreated) had 'fibrosis' (4 severe, 21 moderate), which was extensive in 11 and localised in 14. Compared with the non-fibrotic group ($n = 92$), the 25 patients with 'fibrosis' had significantly lower PSIL (47.5 v 54.1 [$p < 0.01$] on FSE; 64.6 v 73.5 [$p < 0.01$] on GRE). There was no significant difference in CNR on either sequence. Twenty-seven patients had moderate or severe fatty change (22 treated, 5 untreated). PSIL and CNR were not significantly different in these 27 compared with the non-fatty group ($n = 90$).

Conclusion: 'Fibrosis' and fatty change occur in a significant minority of livers with colorectal metastases, whether treated or not. 'Fibrosis' reduces PSIL on post-SPIO imaging but CNR is not significantly affected.

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CT perfusion (CTp) for monitoring therapy of hepatocellular carcinoma (HCC) with thalidomide as single agent

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Aim: To monitor by CTp perfusion, changes in hepatocellular carcinoma (HCC) following therapy with thalidomide. To correlate tumour perfusion with alpha-fetoprotein (AFP) and circulating endothelial cells (CEC). To investigate whether baseline tumour perfusion may predict therapy outcome.

Methods: Thirteen consecutive patients with advanced HCC, treated with orally administered thalidomide (200 mg/day), underwent baseline CTp and follow-up CTps, every 8 weeks. On May 2006 nine patients reached follow-up >6 months. Perfusion parameters (blood flow (BF), blood volume (BV), mean transit time (MTT), permeability surface (PS)) of the tumours were calculated using dedicated software (CT Perfusion 3, GE) and statistically correlated with AFP and CEC.

Results: Twelve patients were assessable for response (one excluded for toxicity); none had partial or complete remission; 6 had stable disease (SD) at 6 months and 3 had progressive disease (PD). All patients with PD showed increased BF (average 30.57%) at the time of PD; all patients with SD had stable or reduced BF (average -13.3%) at 6 months. Significant correlation between BF and AFP changes was found ($R = 0.71$). Baseline BF and BV of HCC were significantly higher ($p < 0.05$) than those of background liver and significantly correlated with baseline AFP ($R = 0.91$ and 0.74 , respectively). Correlation with CEC will be exposed at the meeting. Significantly lower baseline BV ($p = 0.03$) was found in patients with SD.

Conclusions: BF increased in patients with PD and was stable or decreased in patients with SD, with significant correlation with AFP. Our preliminary data showed significantly lower baseline BV in patients with SD at 6 months.

Computed tomography findings in two groups of pseudomyxoma peritonei: DPAM and PMCA

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Aim: Pseudomyxoma peritonei (PP) is a rare condition characterised by mucinous ascites and mucinous implants involving the peritoneal surfaces. The pathology of PP has been defined into three groups: disseminated peritoneal adenomucinosis (DPAM), peritoneal mucinous carcinomatosis (PMCA) and the hybrid type. The aim of the retrospective study was to describe the computed tomography (CT) findings of 51 patients referred to our institution for surgical cytoreduction.

Methods: Two observers independently reviewed the CT images performed between 1996 and 2004.

Results: There were 38 patients with PMCA (18 women, 20 men, mean age 59 years) and 13 with DPAM (8 women, 5 men, mean age 55 years). No hybrid type of PP was encountered. Pleural effusion or pleural rind, omental cake and paraaortic lymph nodes were seen only in cases of PMCA. Liver and spleen scalloping as well as hernias were also common in PMCA. Calcifications were seen in 36% of DPAM and 26% of PMCA examinations.

Conclusions: Pseudomyxoma peritonei is difficult to diagnose clinically. However, knowledge of typical CT findings can help the radiologist to suggest a diagnosis of PP.

Colorectal metastases: detection with high-resolution ferucarbotran-enhanced T1- and T2-weighted MR imaging

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Aim: To compare prospectively the accuracy of ferucarbotran-enhanced high-resolution dynamic T1-weighted imaging and delayed T2-weighted gradient refocused echo (GRE) imaging for detecting small metastases.

Methods: We studied 25 patients referred for liver resection with colorectal metastases. All were imaged with dynamic T1-weighted fat-suppressed 3D GRE (VIBE) and delayed T2-weighted GRE sequences after bolus injection of ferucarbotran. Images were independently evaluated by two blinded observers who identified and localised lesions using a four-point confidence scale. Only lesions smaller than 2 cm were included in the analysis. The results were correlated with surgery, intra-operative ultrasound and histopathology. AFROC analysis was used to determine the accuracy of each technique.

Results: One-hundred and forty-seven metastases, smaller than 2 cm (107 < 1 cm) were present. For all metastases the accuracy values were 0.94 and 0.92 for T1-weighted and 0.93 and 0.91 for T2-weighted, respectively, for each of two observers. Accuracy values for lesions of 1 cm or less were 0.93 and 0.89 for T1-weighted and 0.91 and 0.88 for T2-weighted. Nine sub-centimetre lesions were not detected by either observer on any technique. Overall 11/147 (7.5%) lesions were detected only on T1-weighted (mean of two observers) compared with 7/147 (4.7%) detected only on T2-weighted (all less than 1 cm).

Conclusion: Accuracy for ferucarbotran-enhanced T1- and T2-weighted imaging was similar. With combined T1- and T2-weighted imaging we detected substantially more lesions than either sequence alone.

Diagnostic efficacy of gadoxetate-enhanced MRI in comparison to tri-phasic MDCT of focal liver lesions

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Aim: To compare the performance of tri-phasic multidetector computed tomography (MDCT) and gadoxetate (formerly known as Gd-EOB-DTPA, Primovist[®], Schering, Germany)-enhanced magnetic resonance (MR) imaging in detection and characterization of focal liver lesions.

Methods: The study population consisted of 34 patients, who underwent triphasic MDCT and Gd-EOB-DTPA enhanced 1.5-T MRI (time interval, max 14 days), including dynamic and late phase gadoxetate-T1-weighted scans at 20 and 40 min. Two radiologists evaluated the images in consensus reading with respect to lesion size, number, location and characterisation. Gold standard was defined by histopathologic correlation, intra-operative ultrasound or imaging follow up. The McNemar test was used for statistical analysis.

Results: Of a total of 126 lesions CT detected 78% and MRI 93% ($p = 0.003$), respectively. The correct characterisation of lesions was accomplished in 64% with CT and in 89% with MRI ($p < 0.001$). Detection was possible in 7/21 with CT, in 14/21 metastases < 1 cm with MRI, correct characterisation in 3/21 with CT and in 14/21 metastases < 1 cm with MRI.

Conclusions: Gadoxetate-enhanced MR imaging markedly improves detection and characterisation of focal liver lesions compared to triphasic MDCT. Especially metastases smaller than 1 cm are detected and characterised significantly better with gadoxetate-enhanced MRI.

Efficacy of multidetector CT in the preoperative staging of oesophageal cancer in comparison to endoscopic ultrasonography

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Aim: To evaluate the preoperative TNM-staging of oesophageal carcinomas with contrast enhanced 16-or 64-row multidetector computed tomography (MDCT) and to compare the findings with results by endoscopic ultrasound (EUS), using the histopathological findings as gold standard.

Methods: Eighty-six patients with oesophageal carcinoma (proven by endoscopic biopsy) were preoperatively examined with MDCT in a prone position. After distending the oesophagus (gas granules) and stomach (1.5 L of water) the chest and neck were subjected to MDCT scanning with 16×0.75 mm or 64×0.63 mm, the abdomen with 16×1.5 or 64×1 mm, using an individualised contrast injection protocol based on a bolus tracking technique. EUS was performed using a fibre-optic endoscope with a 5–10 MHz electronic array with a 360 degree scanning angle. Our MDCT staging criteria were drawn from a careful review of the literature and from personal experience and we used the TNM classification of the American Joint Committee on Cancer.

Results: Both modalities detected all tumours with a sensitivity of 100%. T staging by MDCT and EUS reached accuracies of 79% and 89%. The diagnosis of local node involvement by MDCT was correct in 85%, in EUS in 72%. The evaluation of distant node involvement and other metastases reached an accuracy of 92% with MDCT and only 65% with EUS.

Conclusion: Non-invasive MDCT is an important tool in the preoperative staging of oesophageal carcinoma and is complementary to EUS.