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Scientific Sessions and Clinical Trials in Radiology (B)

Scientific session numbers are prefixed by SS.
Presentation numbers are prefixed by the letter B.
Sessions and abstracts are listed by days.

The Clinical Trials in Radiology sessions are listed at the end of section B. (page 460)

carotid arteries and examination duration of Ultrafast and conventional color-duplex Doppler.
Methods and Materials: Ultrafast Doppler and conventional duplex Doppler examinations of common (CCA), internal (ICA), external carotid arteries (ECA) and renal (RA) and intrarenal interlobar arteries were performed by a single experienced examiner in 30 patients (mean age 52 ± 17 years, range 28-74, 10 male, 20 female). Peak systolic velocity (PSV) was measured in each patient and values were correlated between two methods using Pearson's correlation coefficient.
Results: The values of PSV in all arteries were in the range between 30 and 170 cm/s. The mean PSV ± s.d. in conventional Doppler in all patents was 67.2 ± 26.7 cm/s, while in Ultrafast Doppler it was 64.5± 27.1 cm/s. There were no statistically significant differences between groups (t-test: p=0.703). The Pearson's correlation coefficient in all patients was 0.989. Ultrafast Doppler examination duration was significantly shorter for all arteries compared to conventional Doppler.
Conclusion: Measurements of PSV of carotid, renal and interenal arteries are equally accurate with Ultrafast and conventional color duplex Doppler, while examination duration is significantly shorter using Ultrafast Doppler.

B-0475 10:46

Perfusion quantification of vascular malformations using contrast-enhanced ultrasound (CEUS) with time intensity curve analysis (TIC) before and after percutaneous treatment

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Purpose: Quantification of perfusion differences of peripheral vascular malformations with CEUS and TIC, before and after percutaneous treatment, for planning and control of interventional procedures.
Methods and Materials: CEUS war performed after injection of 1-2.4 ml of sulfur hexafluoride microbubbles using a 6-9 MHz linear probe. Regions of interest (10x 30 mm) were defined in the centre, and at the margins of the malformation as well as in the healthy tissue. TIC with Time to Peak (TTP), and Area und the Curve (AUC) were calculated using special software.
Results: Retrospective analysis of 197 patients (136 female; 61 male; 3-86 years) with 135 venous, 39 arterio-venous, and 23 combined peripheral vascular malformations before and after percutaneous treatment. There were significant CEUS perfusion differences for AUC in the centre of all malformation compared to the margins as well as the surrounding healthy tissue (437.5 rU vs. 356.3 rU vs. 218.8 rU; $p < 0.001$) before percutaneous treatment. After the intervention AUC in the centre was also significantly different ($p < 0.0001$) from the healthy tissue (372.2 rU vs. 161.1 rU). After the first percutaneous intervention there was an obvious decrease in AUC in the centre (387.5 rU) but not at the margins (316.6 rU).
Conclusion: By recording capillary perfusion CEUS and TIC analysis offer a possibility of monitoring therapy-induced changes of vascular malformations and help planning interventional procedures by displaying feeder vessels.

B-0476 10:54

As low as reasonabily achievable: lowest dose CT angiography in patients with endoleak after endovascular aneurysm repair

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Purpose: CT Angiography (CTA) represents the gold standard in evaluating endoleak (EL) after Endovascular Aneurysm Repair (EVAR); it has though a significative dosimetric impact, especially in patients undergoing several consecutive follow-up investigations. The purpose of the study was to prove feasibility and efficacy of a low-dose CT examination protocol with a 256 row MSCT scanner in evaluating EL after EVAR.
Methods and Materials: a CT examination protocol was implemented on a 256 row MSCT scanner, with split-bolus contrast administration and a single low dose acquisition (80kv-600 mAs). From February 2014 to June 2015 this protocol has been tested in 25 selected patients with known EL from previous traditional multiphasic full-dose CTA investigations.
Results: a 100% concordancy has ben found in EL detection between the traditional CTA and the aforementioned low-dose CT protocol; a significative statistical difference was not demostrated (p=0.0082) in enhancement conspicuity of the EL, despite a substantially similar intravenous iodine load. No significative difference was seen in image quality on subjective evaluation from two different radiologists, and a significant difference was only seen in image quality on sub-millimeter slices as expressed by standard deviation in densitometry measurements. Dose reduction in comparison with full-dose CTA was on average 74%.
Conclusion: this protocol can be advocated for the routinarely examination of patients with EL afer EVAR. More ample studies are to be needed to evaluate the usefulness of this protocol in surveillance of patients with no known EL after EVAR.

B-0477 11:02

Ultra-low dose and volume contrast medium (CM) for aorta CTA: using IMR for substantial dose and volume CM reduction in a prospective clinical study

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Purpose: To investigate the image quality of IMR in reduced dose and ultra-low CM volume for aorta CTA.
Methods and Materials: 62 patients underwent aorta CTA were divided into 2 groups:Group A (n=31)was scanned using 120kvp with CM of70 ml and 5 ml/s injection rate. Other patients scanned using 80kvp and 100 mAs/slice with CM of 0.4 ml/kg and injection rate calculated as volume/(delay time + exposure time) were the study group.Paired image sets were created using 3 types ofreconstruction: FBP (group B), iDose4 (group C)and IMR (group D). Objective evaluation [CT values, image noise and CNR of aorta]and subjective rating score among the four groups were obtained and compared by One-way ANOVA and Kruskal-Wallis H test.
Results: The image noise in group A was lower than group B and C, and higher than group D, but showed no differences from group D ($p > 0.05$). There were no significant differences in aorta CT attenuation among the 4 groups ($p > 0.05$). The CNR of group D was better than other groups in all evaluated structures ($p < 0.05$). The images of group B and C were unacceptable for subjective image quality. The visual scores were significantly higher in group D and A. The amount of CM in group A was 70 ml, while (24.7±3.6)ml in study group. The radiation dose was significantly different between the study groups and control group[(2.58±0.94),(9.7±3.1)mGy,respectively]
Conclusion: IMR in aortic CTA with only 40%CM and 74.2%dose reduction was feasible and considerably improved both objective and subjective image quality parameters compared with conventional protocol.

B-0478 11:10

Multi-spectral MPI for real time 3D tracking of endovascular devices

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Purpose: Proof of concept of multi-spectral discrimination of solid magnetic particle imaging (MPI) markings on a guidewire and PTA-catheter and a liquid (blood pool) MPI tracer for in-vitro MPI guided stenosis treatment.
Methods and Materials: A standard guide wire and a balloon catheter were labeled with a thin layer of a solid MPI agent (magnetic lacquer) at the tip and on both sides of the balloon, respectively. Stenosis treatment was performed on a vessel phantom with an induced stenosis filled with solute superparamagnetic iron oxide particles (MM4), by inflating the balloon with saline to a pressure of 20 bar. During treatment MPI (Philips, Amsterdam / Bruker, Billerica) data were recorded at a rate of 46 frames/sec in a field of view of 37.3 x 37.3 x 18.6 mm³. For MPI guidance multi-spectral 3D images were reconstructed at a rate of 2 frames/sec in real time.
Results: It was possible to discriminate the marked interventional instruments within the blood pool MPI tracer filled vessel phantom using the multi-spectral magnetic particle images. The positioning of the interventional instruments and the inflation of the balloon could be guided and monitored in real time solely on the basis of MPI data.
Conclusion: Colored-MPI allows for 3D real time guidance of endovascular devices and MPI based in-vitro stenosis treatment. Multi-spectral MPI might emerge as a powerful tool for radiation free 3D intervention.

B-0479 11:18

Investigation into MR angiography as a possible replacement for rotational angiography or CT angiography for cerebrovascular computational fluid dynamics

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Purpose: We conducted a flow experiment using a cerebrovascular phantom to investigate whether magnetic resonance angiography (MRA) could be used instead of three-dimensional rotational angiography (RA) and computed tomography angiography (CTA) for computational fluid dynamics (CFD) geometric images.
Methods and Materials: We performed MRA and 3D cine phase contrast (PC) MR imaging for a silicone cerebrovascular phantom of an internal carotid artery-posterior communicating artery aneurysm (IC-PC An) using blood mimicking fluid flowing at the systolic volume flow rate (VFR) controlled with Coriolis flowmeters and a pump. We also obtained phantom microCT, RA and CTA data without flowing fluid. CFD (microCT-based CFD) analysis with geometric images obtained from microCT and with measured VFRs by the flowmeters in the flow experiment set as a boundary condition was used as a standard. We compared CFD (RA-, CTA-, MRA-based CFD) analysis using