7-2007

Neuroradiology

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NEURORADIOLOGY

COMMENTARY

Three articles from recent issues of the American Journal of Neuroradiology - all highlighting the various and innovative uses to which Multi-detector CT (MDCT) is being put to - are included.

The paper by Linn et al demonstrates that Computed Tomographic (CT) venography, long considered inferior to Magnetic Resonance (MR) venography, may be as sensitive and specific as its rival. Although this is a small study comprising 19 patients, 10 of whom had cerebral venous thrombosis, it shows that it is possible to diagnose and characterize patients with venous strokes in a single investigation.

Plaque characterization is another area which has largely been dominated by ultrasound and MR imaging. Although the study by Saba et al takes a somewhat simplistic view, using MDCT angiography (MDCTA) to detect plaque ulceration only, it again demonstrates what is possible. With the resolution on CT improving to less than 0.4 mm in any imaging plane, it is possible to look at very small plaques and detect not only ulceration but also relative lipid and fibrous content based on attenuation values.

Vasospasm following subarachnoid haemorrhage is a major cause of the morbidity associated with this condition. Although it can be detected by transcranial Doppler ultrasound and conventional angiography, the first modality is operator-dependent and the second unnecessarily invasive. MDCTA allows direct visualization of the affected vessel segments without the need to catheterize cerebral vessels directly. Combining this visualization with a CT perfusion study further enables prognostication and intervention where appropriate.

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DIAGNOSTIC VALUE OF MULTIDETECTOR-ROW CT ANGIOGRAPHY IN THE EVALUATION OF THROMBOSIS OF THE CEREBRAL VENOUS SINUSES

BACKGROUND AND PURPOSE: The diagnosis of cerebral venous and sinus thrombosis (CVST) as a rare but important cause of stroke is challenging. We aimed to investigate the diagnostic value of multidetector-row CT angiography (MDCTA) as a fast and cost-effective imaging tool in diagnosing CVST. MATERIALS AND METHODS: Nineteen patients who presented with clinical symptoms of a possible CVST were included. All patients had received both MDCTA and MR imaging with venous MR-angiography. Three blinded readers were asked to identify the cerebral sinuses and veins in MDCTA and to evaluate the presence of CVST in MDCTA. Consensus reading with interpretation of the MR imaging served to establish the definite diagnosis. RESULTS: The consensus reading revealed CVST in 10 of the 19 patients. With MDCTA, the venous sinuses could be identified in 99.2% and the cerebral veins in 87.6% of cases. The sensitivity and specificity of MDCTA for the diagnosis of CVST were 100%. CONCLUSION: Our study demonstrates that MDCTA provides excellent sensitivity and specificity for the diagnosis of CVST. Further studies are needed to evaluate the diagnostic potential of MDCTA in specific subsets of the general entity of CVST such as cortical venous thrombosis, thrombosis of the cavernous sinus, and thrombosis of the internal cerebral veins.

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EFFICACY AND SENSITIVITY OF AXIAL SCANS AND DIFFERENT RECONSTRUCTION METHODS IN THE STUDY OF THE ULCERATED CAROTID PLAQUE USING MULTIDETECTOR-ROW CT ANGIOGRAPHY: COMPARISON WITH SURGICAL RESULTS

BACKGROUND AND PURPOSE: Carotid plaque ulceration is an important risk factor for stroke, and its diagnosis may be very important to plan a correct therapeutic approach. We hypothesized that axial scans and various reconstruction methods could have different specificity and sensitivity in the study of plaque ulceration. The object of this study was to evaluate their role and diagnostic efficacy in patients with carotid plaque complicated by ulceration through the comparison with surgical results. MATERIALS AND METHODS: From January 2004 to November 2005, 109 patients who underwent a carotid endarterectomy were analyzed using CT angiography for a total of 218 carotid arteries. We assessed every carotid for the presence of ulcerations. For each patient axial image, maximum intensity projection (MIP), multiplanar reconstruction (MPR), shaded surface display (SSD), and volume rendering (VR) reconstructions were obtained. RESULTS: Multidetector row CT angiography (MDCT) found 32 ulcerations; surgical confirmation underlined an overall 93.9% sensitivity (95% confidence interval [CI] 0.858-1.021), and a 98.7% specificity (95% CI, 0.961-1.012). Axial scans and volume rendering images demonstrated the highest sensitivity (90.9% and 87.9%, respectively); SSD, on the contrary, showed the lowest sensitivity: 39.4% (95% CI sensitivity, 0.227-0.561). CONCLUSION: Axial scans plus VR reconstruction techniques offer superior depiction of carotid plaque ulceration compared with MIP, MPR, and SSD.

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CT ANGIOGRAPHY AND PERFUSION CT IN CEREBRAL VASOSPASM AFTER SUBARACHNOID HEMORRHAGE

BACKGROUND AND PURPOSE: We investigated the association of multisection CT angiography (MSCTA) and perfusion CT (PCT) for the characterization of vasospasm secondary to aneurysmal subarachnoid hemorrhage. MATERIALS AND METHODS: Among 27 patients with symptomatic cerebrovascular vasospasm investigated by digital subtraction angiography (DSA), 18 underwent both cerebral PCT and MSCTA. For the remaining 9, only PCT or MSCTA could be performed. MSCTA was compared with DSA for the detection and characterization of vasospasm on 286 intracranial arterial segments. PCT maps were visually reviewed for mean transit time, relative cerebral blood flow, and relative cerebral blood volume abnormalities and were qualitatively compared with the corresponding regional vasospasm detected by DSA. RESULTS: Vasospasm was grouped into 2 categories: mild-moderate and severe. The depiction of vasospasm by MSCTA showed the best sensitivity, specificity, and accuracy at the level of the A2 and M2 arterial segments (100% for each), in contrast to the carotid siphon (45%, 100%, and 85% respectively). The characterization of vasospasm severity by MSCTA showed a sensitivity, specificity, and accuracy of 86.8%, 96.8%, and 95.2%, respectively, for mild-moderate vasospasm, and 76.5%, 99.5%, and 97.5%, respectively, for severe vasospasm. The PCT abnormalities were related to severe vasospasm in 9 patients and to mild-to-moderate vasospasm in 2. The sensitivity, specificity, and accuracy of PCT in detecting vasospasm were 90%, 100%, and 92.3%, respectively, for severe vasospasm, and 20%, 100%, and 38.5%, respectively, for mild-moderate vasospasm. CONCLUSION: MSCTA/PCT can assess the location and severity of cerebrovascular vasospasm and its related perfusion abnormalities. It can identify severe vasospasm with risk of delayed ischemia and can thus guide the invasive treatment.