Prospective comparison of magnetic resonance sialography and digital subtraction sialography

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Introduction:
Conventional x-ray sialography, which preferably is carried out as digital subtraction sialography (DSS) to eliminate superposition from bony structures, has been the standard imaging procedure for the evaluation of the ductal sytem of parotid and submandibular glands. MR-hydrography is visualization of liquids within tubular structures on heavily T2-weighted images. The feasibility to visualize the ductal system of the salivary glands was demonstrated by Fischbach et al [1] and Murakami et al [2]. The main advantage of this technique is the non-invasive, rapid acquisition of images which demonstrate the entire ductal system. The aim of the present prospective study was to compare magnetic resonance sialography (MRS) and DSS in patients with suspected sialolithiasis or sialadenitis.

Material:
Patients underwent a MR sialography in a 1.0 T Magnetom Expert™ (Siemens, Erlangen, Germany) with a quadrature head coil. Images were produced with a manufacturer-provided single-shot TSE sequence (TR/TE/FA: 2800 ms/1100 ms/150°; Acquisition time: 7 sec). In the case of pathologic findings, an additional TSE sequence (TR/TE/FA: 4095 ms/138 ms/180°) with 29 echoes and 15 images with a slice thickness of 3 mm with a 5 cm surface coil was acquired in 21 seconds.
Immediately after MRS all patients underwent DSS in our angiography suite. The patient is placed in a supine position on the angio table with the head in a head rest. The orifice of Stensen's or Wharton's duct is cannulated with a dilatator (0.016 inch for Wharton's duct; 0.035 for Stensen's duct). Digital subtraction images were obtained during injection of 0.5 to 2 cc of non-ionic iodinated contrast media (Iopamidol, 300mg J/ml, Solutrast®).
26 patients (Eleven women, 15 men; mean age: 51 ± 16,3 [14–72] years) were referred from the Department of Otorhinolaryngology for visualization of the main parotid duct (n = 21) or the submandibular duct (n = 10). In five patients the parotid ducts of both sides were investigated. Tentative diagnosis was sialadenitis in 26 glands and sialolithiasis in five glands.

Figure 1: 67 years old patient. MR sialography of a patient with a sialolithiasis of right submandibular gland (arrow pointing on the sialith). The normal left submandibular duct is not visible and therefore unsymptomatic. Cannulation of the duct was impossible in DSS.

Results:
Visualization of the ductal system was succesful in all glands by MRS and 25 out of 31 (81%) by DSS. In the remaning 6 cases cannulation of the duct was impossible in DSS. The overall sensitivity was 100% (MRS) in comparison to 81% (DSS). Specificity was 97% for MRS and 77% for DSS. In case of sialadenitis MRS gave the correct diagnosis in 96% and DSS in 84%. MRS diagnosed sialolithiasis in 100% of all cases correct, were as DSS only in 60%.

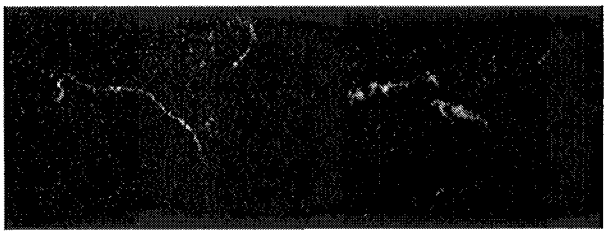

Figure 2: 71 years old patient. Parotid gland of the unsymptomatic right side (small, subtle, ductal structures) in comparison to the left side with pathologic alterations due to chronic sialadenitis (ductal excavations; no normal ductal structures visible).

Conclusion:
DSS as one of the standard techniques for the detection of sialolithiasis and confirmation of post-inflammatory changes in chronic sialadenitis has the drawbacks of minimal-invasive procedures, including radiation exposure, the need to cannulate the ductal orifice and the injection of iodinated contrast agents. Duct cannulation requires an experienced operator.
With the technique of MRS (heavily T2-weighted images depicting only static or nearly static fluids in the image volume) a 2D projection image of the ductal structures similar to the conventional DSS image is obtained in a single thick slice. Signal from vascular fast flowing fluids or soft tissue has already decayed, and is therefore not visualized. First experiences with this technique have been reported by Lomas et al. [7] and Fischbach et al. [4]. All images were postprocessed using a maximum intensity projection (MIP).
Our study sought to demonstrate the potential of MRS in comparison with the technique of DSS for the imaging of sialolithiasis or sialadenitis. The major advantages of the MRS technique are the absence of ionizing radiation and the non-invasiveness of the method. Furthermore, there is no need for application of contrast media. It is also possible to image ductal structures proximal to a complete occlusion. Images can be obtained in a standardized protocol without the need for an experienced examiner. Finally, acute infection is not a contraindication for MRS.
Our study demonstrated the potential to replace the standard technique of DSS with MRS for the investigation of sialolithiasis and sialadenitis.

References:
[1] Fischbach et al., JCAT 1997; 21:826-830
[2] Murakami et al., Am J Neuroradiology 1998; 19:959-961