Use of MR sialography and T2W fat-suppressed MR in parotitis

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Background

Imaging can be helpful when investigating salivary gland pain and swelling. Typically in such cases, an ultrasound (US) or conventional sialogram would be requested in seeking obstructed or dilated ducts, a ductal calculus or an abscess within the gland. Occasionally a computed tomography (CT) scan is requested. Magnetic resonance imaging (MRI) is usually reserved for investigating clinically palpable masses in the glands.

In acute non-obstructive parotitis, the differential diagnosis includes acute non-suppurative parotitis (as found in mumps), early Sjögren's syndrome, or suppurative parotitis as seen following duct obstruction. Sometimes there is strong insistence on retrograde contrast sialography; however, this may exacerbate the pre-existing inflammatory process.[1] The imaging of a young patient expands on these observations.

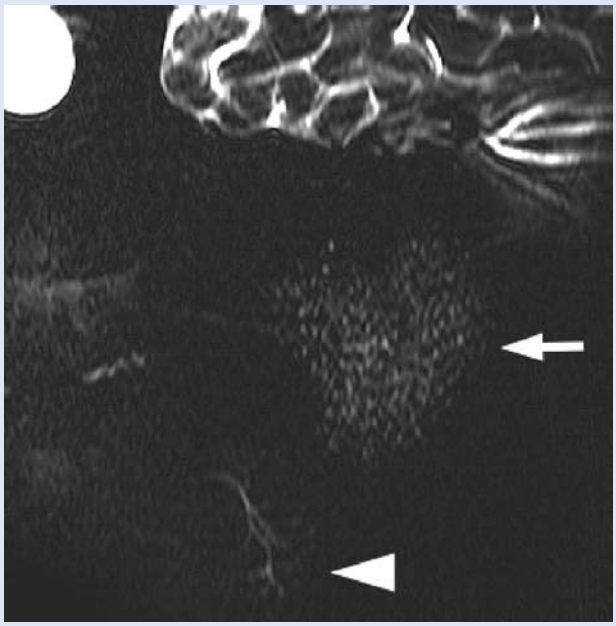

Fig. 1. MR sialogram (TR 8 000 msec, TE 1 000 msec, FOV 150 mm, SPIR fat suppression, slice thickness 40 mm, scan time 8 sec on 3T scanner). Numerous microcysts in parotid gland (arrow) without associated duct dilatation. These changes were identical in the other parotid gland. A few small microcysts were also noted in the submandibular gland (arrowhead), with the ducts also visible.

Findings and diagnosis

A young girl presented with only a non-specific history of recurrent painful swelling of both parotid glands over the preceding few months. An US scan showed numerous small, discrete hypoechoic foci throughout both parotid glands. An MRI was recommended and performed using standard sequences including thin-slice axial and coronal T1 and T2 (fat-suppressed) sequences. In view of the pathological changes seen on US, fat-suppressed T1 series were also obtained, as were pre- and post-contrast axial and coronal series. An MR sialogram was acquired through each parotid gland in an oblique sagittal orientation, which proved to be the most useful diagnostic sequence (Fig. 1). The images from these sequences showed both parotid glands to be diffusely swollen with numerous microcysts within the gland parenchyma. This was felt to be typical of Sjögrens disease, Stage I or II (depending on the size of the cysts).

Discussion

Sjögrens syndrome is an auto-immune disease affecting the lacrimal and all salivary glands, but predominantly the parotid glands. Initial periductal lymphocyte aggregates extend into, and finally destroy, salivary acinar parenchyma, which leads to small cystic spaces beginning peripherally in the gland.[1] As acinar destruction progresses, salivary production decreases and ascending infections develop, eventually leading to sialectasis developing in the gland, enlargement of the microcysts and fatty replacement of the destroyed acinar within the salivary gland parenchyma. Xerostomia (dryness of the mouth) is the most common oral symptom.[1]

Literature over the last 2 decades has described the use of MR imaging to diagnose and stage the severity of Sjögrens syndrome involving the parotid glands.[1,2] MR sialography can now be used to replace conventional sialography in diagnosing and staging parotid gland involvement in this condition.[1,2] MR sialography approaches 95% sensitivity and specificity.[1,2]

Although not histologically proven, the clinical diagnosis of Sjögrens syndrome in this case is considered almost certain. The case highlights two important MRI techniques: MR sialography and T2W fat-suppression sequence.

MR sialography

MR sialography is an excellent example of the technique of MR hydrography, using extremely long TR and TE times to highlight fluid and suppress other surrounding tissue signals. Hydrography is more commonly applied in other areas of the body, such as creating MR myelograms in the cervical and lumbar spine, MR cholangiopancreatograms of the biliary system, and MR renograms of the urinary tract.

Most modern MR scanners often have pre-programmed 'myelogram' sequences in the list of cervical spine protocols. These can be modified

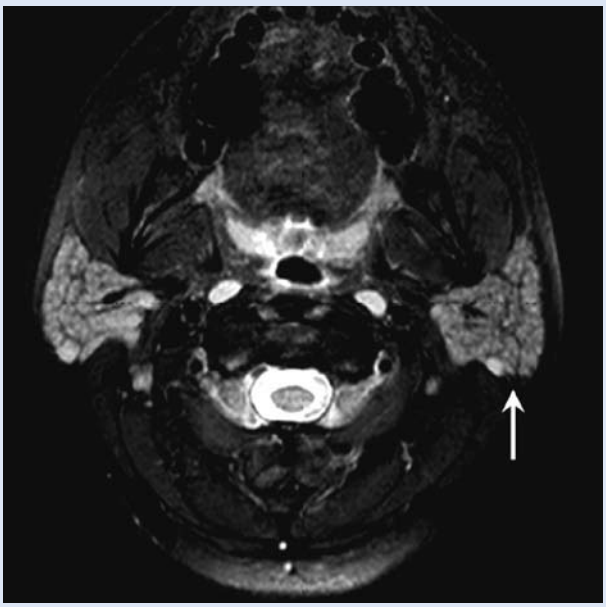

Fig. 2. Axial T2W fat-suppressed image (TE 60 ms, TR 3 000 ms) acquired with standard 4 mm-thick T2 fat-suppressed protocols for deep face and salivary gland. Microcysts are not differentiated from the glandular tissues.

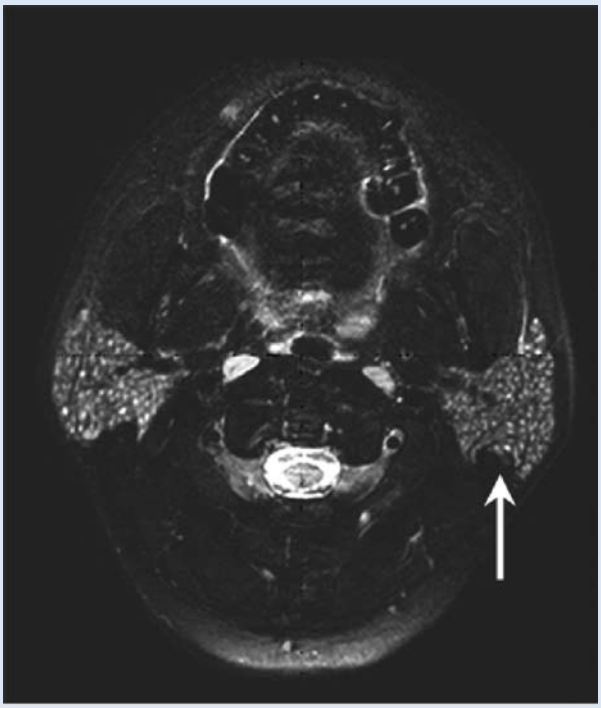

Fig. 3. Axial T2W fat-suppressed image with TE 110 ms, TR 5 200 ms. Note improved visibility of microcysts (arrow).

to create a 'sialogram' sequence by performing single sagittal oblique slices over each gland. These should be planned on the axial series and angled obliquely along the AP axis of the individual glands. This scan sequence is typically a 30 - 40 mm-thick single shot, turbo spin echo, with long TR (8 000 msec) and long TE (1 000 msec) and spectral presaturation inversion recovery (SPIR) fat suppression. Each slice takes approximately 8 seconds to acquire (depending on the strength of the magnet). A standard head coil is usually adequate; however, a receiver surface coil can also be used, placed directly over the parotid gland to increase the signal-to-noise ratio and hence the quality of the scan, if necessary. The scan sequence effectively suppresses signal from any tissues without water content, while fluid-filled structures stand out as bright objects against an almost black background.

The sequence will therefore clearly show any cysts or dilated ducts (sialectasis) within the relevant glands, and provides a non-invasive alternative to retrograde contrast sialography. As with MRCPs and MR myelograms, MR sialograms should enjoy clinical support as a good alternative to conventional sialography when investigating inflammatory conditions of the parotid glands.

T2W fat-suppression sequence

This useful sequence is used extensively in musculoskeletal, abdominal and head and neck imaging. Typically for MSK imaging, the T2W fat-suppressed sequence should have the TE reduced from the usual 100 - 120 msec down to approximately 60 msec; this significantly reduces the time required to obtain the images, increases signal-to-noise ratio and permits good visualisation and separation of pathology from surrounding tissues.

Unfortunately, in the case of parotid glands, cystic structures may not stand out clearly from the normal parenchyma, which itself is fluid-rich (Fig. 2). A more T2-weighted series is required to highlight the cystic changes in the gland (Fig. 3).

As for other fluid-filled structures in the body, MR hydrography is useful in imaging the salivary glands. It is a valuable complement to conventional MR imaging, and avoids the need to inject contrast material. From the author's personal experience, MR sialography can reasonably be considered the radiological investigation of choice for suspected Sjögrens syndrome and acute acalculous parotiditis.

As opposed to the usual practice of reducing TE to improve the signal in T2W fat-suppressed series, standard or even prolonged TEs (100 - 150 msec) are required to better demonstrate fluid-filled structures in high-fluid-content backgrounds such as the salivary glands.

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2. Ohbayashi N, Yamada I, Yoshino N, Sasaki T. Sjogren syndrome: comparison of assessments with MRI sialography and conventional sialography. Radiology 1998;209:683-688.
3. Harnsberger HR, Wiggins III RH, Hudgins PA, Davidson HC. Diagnostic Imaging: Head and Neck. Philadelphia, USA: Amirsys, Part III, section 7:12-15.