British Sjögren's Syndrome Association

Originally published in the Winter 2009, Volume 24, Issue 4 of Sjögren's Today magazine

Radiographic Diagnosis of Sjögren's Syndrome

By John Rout, Consultant Dental Radiologist, Birmingham Dental Hospital

Primary Sjögren's Syndrome is a troublesome, chronic autoimmune condition accociated with dryness of the mouth and eyes. Secondary Sjörgen's Syndrome is as outlined above but with the presence of a connective tissue disorder, typically rheumatoid arthritis but also several other conditions including primary biliary cirrhosis, progressive systemic sclerosis, Raynaud's phenomenon and thyroiditis. Mouth dryness with or without salivary gland enlargement is a relatively common complaint having a number of causes and thus arriving at a correct diagnosis is important.

Diagnosis

The diagnosis of Sjörgen'sSyndrome is based on the presence of dryness affecting the mouth and eyes, supported by a number of investigative tests, which may include:

- Immunology for auto antibodies
- Schirmer test which determines the amount of moisture in the eyes
- Salivary flow estimation by collecting saliva over a timed period
- Lip minor salivary gland biopsy
- Sialography – see below

In some instances, the diagnosis is not always straight forward so the Joint European and American consensus group1 have laid down six criteria which are outlined in table 1.

I	Ocular symptoms	Complaint of recurrent and persistent dry and/or gritty eyes > 3 months or use tear substitutes >3x daily
II	Oral symptoms	Complaint of recurrent and persistent xerostomia >3 months, swollen glands or need water to swallow food
III	Ocular signs	Positive Schirmer's eye test or other ocular dye score (≥4 according to van Bijsterveld's scoring system)
IV	Histopathology	Focal lymphocytic sialadenitis in a minor salivary gland biopsy
V	Salivary gland involvement	- Unstimulated whole salivary flow (≤1.5 ml in 15 minutes) - Parotid sialography - diffuse sialectasis (punctate, cavitary or destructive pattern) without evidence of obstruction in the major ducts - Salivary scintigraphy showing delayed uptake, reduced concentration, and/or delayed excretion of tracer
VI	Autoantibodies	Presence in the serum of ENA autoantibodies to Ro(SSA) or La(SSB) antigens, or both

Table 1

The fifth of the six criteria from table 1 relates to clinical tests of the salivary glands, which are:

- Unstimulated whole flow less than 1.5 ml in 15 minutes
- Parotid sialography demonstrating diffuse sialectasis without duct obstruction
- Salivary gland scintigraphy showing delayed uptake, reduced concentration and/or delayed excretion of tracer.

The criteria were produced before ultrasound had become established as an investigation for disorders of the soft tissues of the head and neck and so do not appear in the table. The main recommended radiographic investigation is parotid sialography.

Sialography

Sialography is the introduction of a contrast agent or 'dye' along the duct system of the parotid or submandibular salivary glands. The procedure does not normally require a local anaesthetic as it is relatively painless. It should not be performed in the presence of acute infection of the salivary gland or for someone who is hypersensitive to iodine.

Parotid sialography has been one of the mainstay investigations because in established disease it produces a characteristic radiographic appearance, as shown in figure 1. Focal collections of contrast medium are seen uniformly scattered throughout the gland, an appearance referred to as sialectasis. When small these are described as punctuate and when larger as globular or cavitary suggesting a greater amount of glandular damage. Sialectasis is not confined just to Sjögren's Syndrome as it

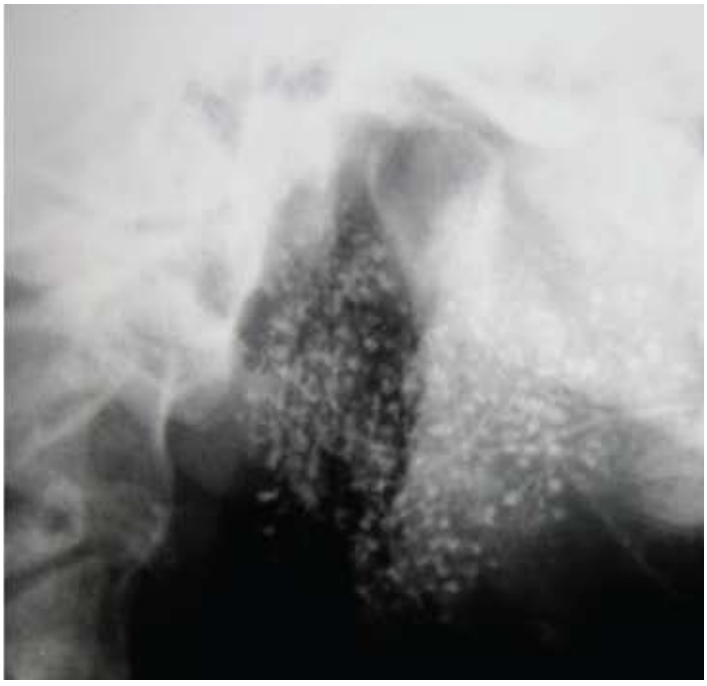

Figure 1. Parotid sialogram showing numerous small round collections of dye - punctate sialectasia.

Continued next page

occurs in other inflammatory conditions, but when present in a someone with dry eyes and mouth dryness is a useful indicator that Sjögren's Syndrome may well be present.[2]

Unfortunately sialography is invasive by virtue of injecting the contrast agent in to the duct system and could possibly injure an already damaged duct or gland. In addition, it uses ionising radiation, which potentially is harmful. However, in some instances the effect of washing out the duct system can have a beneficial effect in those with mucus plugs or salivary stasis.

Scintigraphy

Scintigraphy is a functional test which also involves the use of ionising radiation, (gamma rays which are similar to X-rays). It relies on the uptake of the radioactive substance, technetium pertecnetate, by functioning salivary gland tissue, the radiation is emitted from the gland and recorded using a device called a gamma camera. The half life of technetium pertecnetate is about 6 hours.

A normal gland shows a steady build up of the isotope within the gland whilst one that has lost its ability to produce saliva shows little or no uptake. Scan readings are started as soon as the isotope is injected intravenously.

The investigation can be used to assess the amount of remaining normal salivary gland tissue and it can be used to ascertain whether prescribing salivary stimulating drugs such as pilocarpine may be beneficial.

Ultrasound

Ultrasound (sonography) has been used for diagnosis and assessing the soft tissues in medicine for many years with pregnancy being a notable example. It has an excellent safety record and there are no known harmful effects at the energy levels used for diagnostic purposes. With the development of high resolution transducers and improved computer processing power it has found wider application particularly for investigating conditions affecting the head and neck.

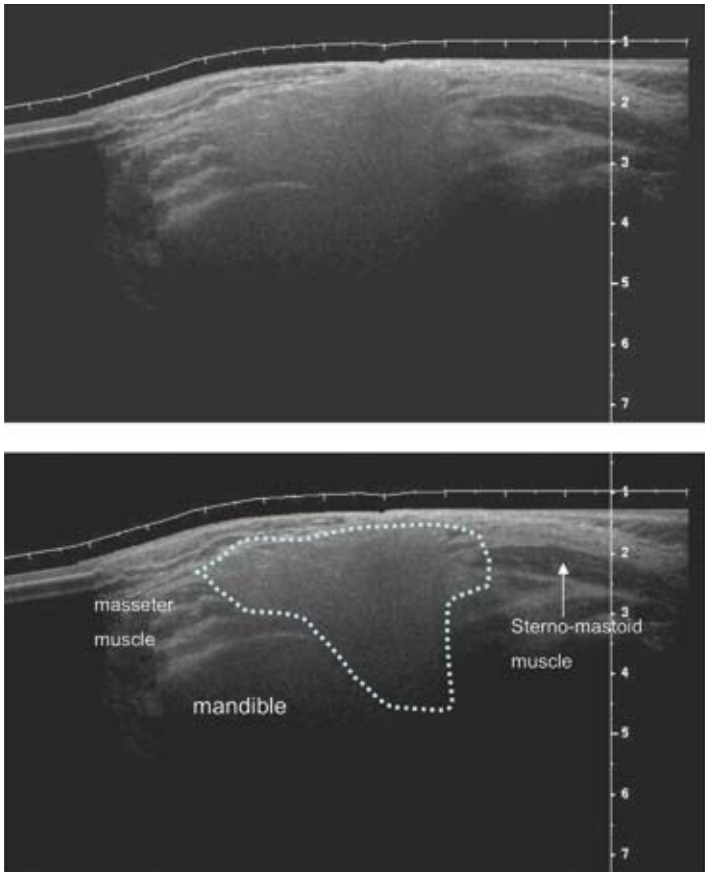

Figure 2. Ultrasound image showing normal appearance of paotid gland outlined by dotted line.

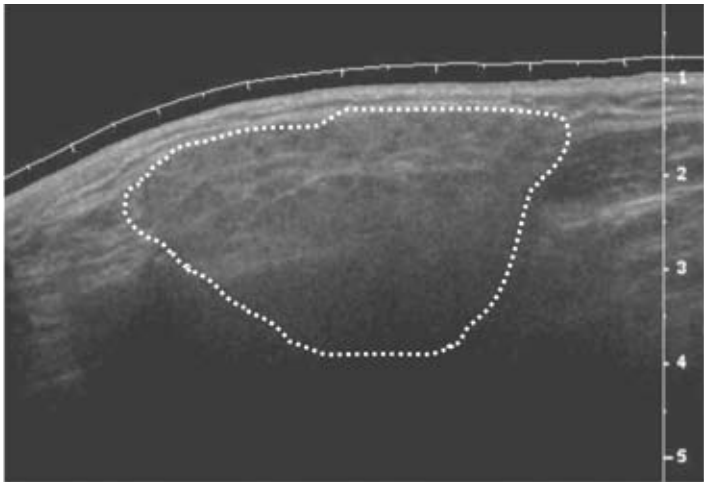

Figure 3. Parotid gland showing several small hypoechoic foci measuring 2 - 4mm in diameter scattered through out the gland, dotted line.

High frequently sound waves are produced by a transducer that contains a piezoelectric crystal which oscillates rapidly when a voltage is applied across it. The sound frequency produced of 5 -15mHz is well above that of audible sound which for humans is of the order of 10 – 20 kHz. These sound waves pass through the tissues and are reflected back as echoes at tissue interfaces. The reflected sound waves are received by the same transducer and converted to an electrical signal and displayed as a real time image on the television monitor. The higher the frequency, the less the depth of penetration of the sound waves but the greater the definition of the image. High definition is required to image the salivary glands and other structures such as lymph nodes. Bone is a barrier to sound and structures in the shadow of bone are not imaged. The deep part of the parotid gland is not always recorded being obscured by part of the lower jaw. However, the majority of the parotid gland is seen as is all of the submandibular salivary gland.

Figure 4. A more severely affected gland with numerous foci measuring 4 - 6mm.

Continued next page

Ultrasound has a number of advantages, these being that it does not use ionising radiation, is relatively cheap, has good patient compliance, is non invasive and at energies used in diagnosis has no known harmful biological effects. The main disadvantage is that interpretation of the images is difficult.

A normal salivary gland appears well defined and has a uniform homogenous, light grey speckled appearance throughout, as shown in figure 2. In Sjögren's Syndrome the affected glands become less well defined, appear slightly darker (hypoechoic) than a normal gland, loose their uniform (homogenous) structure to show numerous, dark circular areas, figure 3. The number and size of these dark areas appears to match the severity of the condition. Typically the foci vary in size but are usually round or ovoid, about 2 – 5 mm is diameter and are non vascular. Foci larger than this, shown in figures 4 and 5, suggest more extensive damage and require careful follow up or monitoring. Occasionally a suspicious area may be identified and if necessary can be biopsied using a fine needle directed under ultrasound guidance.

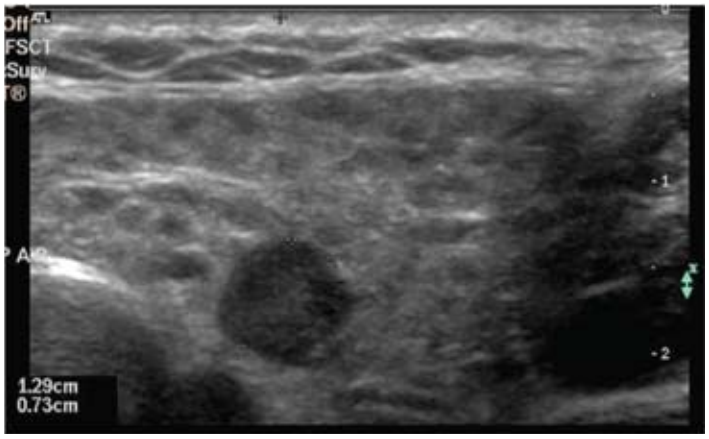

Figure 5. Ultrasound of parotid gland showing numerous small hypo-echoic foci and one large focus indicating possible lymphomatous change.

Hocevar et al[4], have developed a scoring system based on the size of the foci, the number of foci, how many of the major salivary glands are involved and degree of vascularity. This can be used to assess the degree of severity of the condition.
A recent study by Brown, as yet unpublished, showed good correlation between the presence of a positive ENA (ie anti-Ro and /or anti-La antibodies in the blood) and the presence of hypoechoic foci, the positive predictive value being in the region of 90%. In the same study those patients with an absence of abnormal objective findings for Sjögren's Syndrome showed that in over 90% of the patients there were normal ultrasound features. This study suggests that if the salivary glands appear normal on ultrasound then Sjögren's Syndrome is unlikely to be present.

In summary there are several radiographic investigations that can be used in the diagnosis of Sjögren's Syndrome, of which ultrasound is increasingly becoming the imaging method of choice.

References

1. Vitali C et al. European Study Group on Classification Criteria for Sjögren's Syndrome.Classification criteria for Sjögren's Syndrome: a revised version of the European criteria proposed by the American-European Consensus Group.
Ann Rheum Dis. 2002 Jun;61(6):554-8.

2. Kalk WW, et al. Parotid sialography for diagnosing Sjögren syndrome. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002 Jul;94(1):131-7.

3. Johannsson L, et al. Effective dose from radiopharmaceuticals. Eur J Nucl Med. 1992;19: 933-938

4. Hocevar A et al. Eur J Radiol. 2007 Sep;63(3):379-83

This article was taken from a lecture at the BSSA Medical Meeting, Birmingham, 2008.