Role of conventional sialography in the diagnosis of benign salivary diseases

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Learning objectives

With this poster, the authors intended to analyze the experience of the Radiology department of Oporto Hospital Centre, during a period of three and half years, in the performance of conventional sialography.

We also present a review of the pathologic findings and a presentation of the performed technique.
Background

Sialography is one of the oldest imaging procedures and was first mentioned by Carpy in 1902. In 1925, Barsony and Uslenghi separately described sialography as a diagnostic tool.

The radiographic sialography allows the demonstration of the ducts, ductules and parenchyma of the salivary glands by introducing a fat-soluble radiopaque contrast in their excretory ducts.

With this method we only access the major salivary glands such as parotid and submandibular. The sublingual gland, despite being a major gland, has a difficult cannulation and therefore this technique is not routinely performed.

Sialography remains the "standard" imaging technique for the study of extra and intraglandular ductal system. Its high spatial resolution allows a detailed view of the glandular duct and excretory tree with parenchymal ductal branching up to 4th order, enabling the identification of subtle pathological changes in the level of these structures.

Main indications

- Recurrent and transient acute glandular swelling (obstruction by a stone or tumor);
- Gradual and progressive glandular swelling (mass, chronic inflammation)
- Dry mouth
- Palpable mass (adenopathy, tumor …)
- Salivary fistulas, traumatic or postsurgical
- Surgical planning

Main contraindications

- Known allergies to contrast media
- Severe infection of a gland
Procedure description

Before starting the procedure: any removable dental work, jewelry, and other artifact causing opaque items must be removed; an overhead lamp is used to provide adequate light.

1. Gather the necessary tools and materials such as metallic dilator, plastic cannula, contrast media (Lipiodol®), gauze, syringes and a lemon;
2. Preliminary X-rays are obtained; Fig. 1 on page 7
3. The duct is cannulated, not punctured, and contrast is introduced with fluoroscopic guidance; Fig. 2 on page 7
4. Radiographs are obtained during the filling of the tree salivating (main duct, several ductules and glandular parenchyma); Fig. 3 on page 8
5. After the radiographs, the patient then sucks on a lemon wedge to evacuate the contrast and the emptying the gland is documented. Fig. 4 on page 9

The main pathologic findings discovered in 34 patients who underwent sialography in our hospital centre:

Sialolithiasis

Sialolithiasis is a disease of adulthood and the second most common disease of the salivary glands after mumps. The gland may be diffusely or focally enlarged with a sialolith in the proximal duct.

This disease predominates in the submandibular gland since the majority of stones occur here. Sialoliths occur more frequently in the submandibular gland (80%) because of the alkaline, thicker and viscous saliva produced in this gland. Other factors that predispose to stasis are the uphill course of the Wharton duct, a wider lumen and tighter orifice.

Calculi may be solitary or multiple (25%) and may occur within intraglandular ductal tributaries or within the main ducts. They form as a result of stasis or infection, and once formed predispose to further infection and stone formation.
Patients with duct calculi usually present with duct pain and swelling of the gland that is related to meals.

One of its major complications is chronic sialadenitis (which we address below).

Imaging may help define the location of isolated nonpalpable or multiple sialoliths and so play an important role in determining treatment. Fig. 5 on page 15

**Chronic sialadenitis**

Chronic sialadenitis is clinically characterized by intermittent swelling of the gland, often painful, that may or may not be associated with food. This disease is mainly caused by infection secondary to sialolithiasis. With recurrent infection the gland atrophies and is replaced by fibrotic tissue.

There are many causes of chronic sialoadenitis such as sialolithiasis, which is the major cause, trauma, auto-immune diseases, infections and foreign body.

Chronic sialadenitis is characterized by irregularity of the ductal system and strictures with upstream dilatation. Fig. 6 on page 12 and Fig. 7 on page 11

**Sjögren syndrome**

Sjögren syndrome is a chronic autoimmune disease predominantly affecting women over 40 years of age. It is characterized by intense lymphocytic and plasma cell infiltration and destruction of salivary and lacrimal glands. Major clinical symptoms include a dry mouth and eyes. Parotid or submandibular enlargement occurs in 80% of patients. Initially there is inflammation involving the peripheral ductal system which results in intraglandular duct dilation and destruction of gland tissue predisposing to recurrent infection.

Syalogram is an important technique in the classification of this disease (*Classification of Rubin and Holt*). In stage 1 we find only peripheral punctate sialectasis (<1mm), in stage 2 - globular sialectasis (1-2mm), in stage 3 - cavitory sialectasis (>2mm) and finally, in the stage 4 - complete destruction of the gland parenchyma. Dilatation of Stenson's duct is not a feature in Sjögren's syndrome but in obstructive or inflammatory conditions whose features are the opposite of the peripheral changes in the syndrome. Fig. 8 on page 10
**Sialosis**

Sialosis refers to a recurrent non inflammatory bilateral and painless enlargement of the salivary glands that may be caused by systemic disorders such as diabetes mellitus, alcoholism, hypothyroidism, malnutrition or even some medications (antibiotics, diuretics and psycotropics). Fig. 9 on page 14

**Trauma**

Due to the location, the parotid gland is more likely to be injured than submandibular gland.

The salivary ducts may be injured by sharp or blunt facial trauma, less commonly, may be due to surgery. Injury to the gland itself may result in an external fistula but this usually heals within a few days, however injury in the main parotid duct or one of its major branches, is likely to result in the formation of a persistent subcutaneous or external salivary fistula which may require some form of radical treatment to cure.

Moderate to severe facial swelling or clear drainage shortly after injury in the region of the gland or its duct should alert the clinician to this potential problem. Fig. 10 on page 13
Fig. 1: Radiograph of the right submandibular gland.

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Fig. 2: Cannulation of the left parotid duct, located next to the 2nd superior molar.

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Fig. 3: Filling phase of the right submandibular gland.

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Fig. 4: Emptying phase of the right submandibular gland

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Fig. 8: Sjögren's syndrome - globular sialectasis in various secondary and tertiary ducts and main duct achievement of the left parotid gland, unusual appearance of this pathology.

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Fig. 7: Severe chronic sialadenitis - depletion of ductal tree of the left submandibular gland.

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**Fig. 6:** Chronic sialadenitis - Wharton’s duct stricture and upstream dilation associated, typical of this pathology.

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Fig. 10: Trauma - abrupt stop of Stensen’s duct opacification of the left parotid gland secondary to blunt trauma.

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Fig. 9: Sialosis - swelling of the left parotid gland due to chronic alcoholism.

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Fig. 5: Sialolithiasis - repletion defect located in the Wharton’s duct and associated upstream dilatation in a patient with pain and facial swelling.

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Conclusion

Despite being an invasive technique and the exposure to radiation, syalography is an accessible and economic technique. It still holds a significant importance for the diagnosis and treatment planning of pathologies that often affect the salivary glands including chronic sialoadenitis and sialolithiasis, without recourse to supplementary means of diagnosis with higher resolution.

Complications of the procedure are uncommon especially if the right technical steps are followed.
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