

Sialoendoscopy and Sialography: Strategies for Assessment and Treatment of Salivary Gland Obstructions

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Obstruction of salivary glands is a rather common problem in which patients usually suffer from swelling and tenderness of the involved salivary gland and altered salivary flow from the duct orifice. Surgical procedures have been carried out in the past to treat such problems; however, they were indicated only for obstructions in the anterior portion of the salivary gland duct (anterior to the first molar in the Wharton's duct and anterior to the Masseter muscle in the Stensen's duct).

In the early 1990s, endoscopic procedures were introduced for the diagnosis and treatment of inflammatory pathologies and salivary gland obstructions. After early reports on the use of this technique by Katz,^{1,2} and further developments by Nahlieli et al^{3,4} and Marchal et al,⁵⁻⁷ endoscopy of salivary glands (sialoendoscopy) has become one of the more important tools used in the assessment of salivary gland status.

Sialoendoscopy enables surgeons to see different aspects of the glands by showing the intraductal and intraglandular microanatomy, which up until its introduction had been known only through radiographic exams and without a clear and close view of these inner structures. New aspects of this anatomy, such as the sphincter-like structures and their location in the submandibular and parotid ducts, were confirmed.^{3,7,8} The introduction of sialoendoscopy has also undoubtedly changed the philosophy of the surgical treatment of inflammatory and obstructive pathologies of salivary glands because this minimally invasive technique permits the removal of sialolithiasis from deeper portions of the ducts and within the

gland and opening of obstructions, kinks, and duct strictures through endoscopic-guided visualization.

Yet, it is also interesting to observe how the introduction of sialoendoscopy, a new technique, made possible the revival and return to use of sialography, an older technique. Sialography was used in the past mainly for diagnostic purposes in patients suffering from chronic sialoadenitis and in the case of suspected systemic diseases such as Sjögren's Syndrome. Although this technique can identify and show the location of sialolithiasis and other causes of salivary gland obstruction, surgical conservative techniques available at the time could offer treatment only in cases in which the obstruction or the sialolith were located close to the opening of the duct. Most patients suffering from recurrent sialoadenitis with sialolithiasis in the deeper portion of the duct or in intraglandular locations were candidates for sialoadenectomy, with all the known surgical risks involved. Today, sialography plays an important role as an aid in the treatment of patients suffering from obstructive sialoadenitis and candidates for endoscopic treatment of salivary gland. The sialogram presents a "map" of the pathologic structures and orients the surgeon in his or her search for the obstruction during endoscopic visualization of the salivary gland. In addition, the use of less sharp and delicate catheters and the use of magnifying lens to visualize the duct turned sialography into a quick and almost pain-free procedure.

The purpose of this study is 2-fold: to present sialography and sialoendoscopy as important tools for diagnosis and treatment of patients suffering from salivary gland obstructions, and to stress the importance of performing endoscopic procedures, a minimally invasive technique, on symptomatic patients, before carrying out more extensive surgery.

Clinical Examination

Clinical examination remains an important tool available to the clinician when examining patients suffering from possible obstruction of the salivary gland. Swelling and tenderness of the involved gland and decreased salivary flow are normally observed.

If the clinical examination indicates suspicion of obstructive salivary gland pathology, panoramic

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and occlusal x-rays are ordered for submandibular gland assessment and computed tomography (CT) scan (thin slices) for the parotid gland (Fig 1). Patients suffering from aggressive sialoadenitis, possibly resulting from obstruction of the gland, are hospitalized and treated with intravenous antibiotics. During hospitalization, a CT scan is usually ordered for screening of facial swelling. After the acute phase, sialography of the affected gland is routinely carried out and exploratory sialoendoscopy is scheduled.

Sialography Technique

Although it is a simple procedure, on reviewing the literature no consensus was found regarding the need for sialography in patients who are candidates for endoscopic procedures. Marchal et al⁵ reported carrying out sialoendoscopy on all patients suffering from salivary gland obstruction without the need for sialography. Katz^{1,2} and Nahlieli et al^{3,4} indicated the use of sialography for screening of salivary gland status before sialoendoscopy.

Today, sialography is considered a simple procedure and if carried out properly, no local anesthesia is required in most cases. The procedure is carried out on all patients in an ambulatory setting. Sialography is not attempted on patients presenting an acute stage of salivary gland obstruction or when the salivary gland duct orifice is blocked due to the presence of a sialolith or stricture.

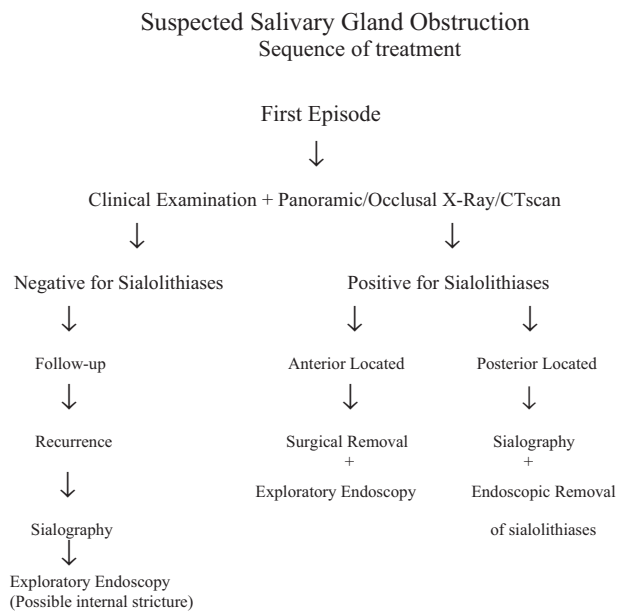


FIGURE 1. Salivary gland obstruction, sequence of treatment.

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FIGURE 2. Lacrimal probe inserted into Stensen's duct.

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The procedure is the same for both the submandibular and parotid glands, with the difference being that the anatomic localization of the Stensen's duct in the parotid gland requires surgical dexterity and patience to prevent perforation of the duct. During sialography, the duct of the selected gland is identified and gradually dilated using a set of lacrimal probes (Fig 2). Dilatation is carried out until a catheter can be introduced into the duct. A small adult intravenous catheter (22 GA) is usually introduced easily into the duct after dilatation (Fig 3) and no suture is required. Approximately 1.5 to 2 cc of contrast material are slowly injected into the gland until some resistance is felt. At this point patients usually report a feeling of pressure in the

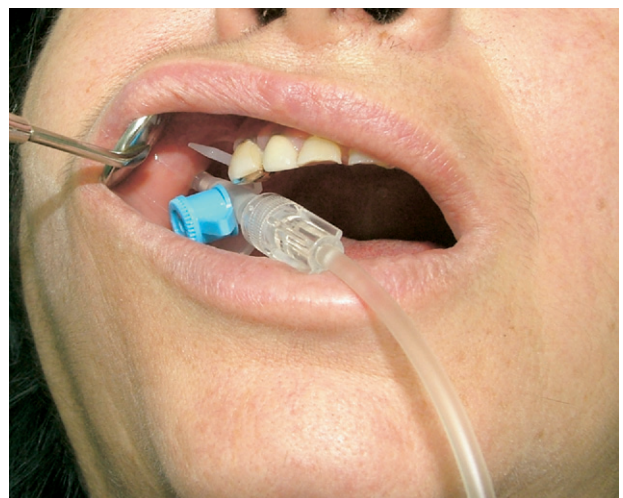


FIGURE 3. Intravenous catheter placed for sialography of parotid gland.

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gland area. Glandular lavage can also be carried out with marcaine (usually 0.5 cc) before injecting the dye. This produces anesthesia of inner structures, reducing the sensation of pressure during the sialogram. Panoramic radiograph is the indicated x-ray for sialography of the submandibular and parotid glands. Fluoroscopy also gives immediate and very good images of the studied gland. Sialography shows the anatomic structure of the duct and gland, disclosing the presence of obstructions, duct narrowing, or duct dilatations. The sialogram also shows the presence of sialoliths, their dimensions, number, and location (Fig 4). All these aspects of the sialographic examination provide important information that permits the surgeon to carry out endoscopic treatment of the selected gland properly, knowing what to expect, where to look, and where to find the different pathologies.

Sialoendoscopy

Sialoendoscopy completes the salivary gland assessment and is carried out for both diagnostic and treatment purposes. Using a small camera and specially designed instruments, it is possible to reach deeper portions of the duct and even the inner portions of the gland, remove sialoliths and open duct stenoses or correct duct kinks, in most cases sparing patients the need for surgical removal of the salivary gland and its possible complications. Sialoendoscopy can be carried out under local anesthesia alone; however, we believe that combining local anesthesia with intravenous sedation enables the surgeon to perform better and is more comfortable for the patient. General anesthesia is used in more difficult and potentially longer cases. Attention has also been given to the endoscope insertion method. When the duct orifice is easily identifiable, then dilatation using several probes might be sufficient to permit insertion and maneuvering of the endoscope.⁷ Papillotomy of the duct opening is also advocated by others.^{3,8} This maneuver facilitates the insertion of the endoscope and the surgical unit, and does not seem to cause postoperative infection due to retrograde infection. After dilatation or surgical opening of the duct, the diagnostic unit, composed of a cannula and a 1-mm endoscope (Karl-Storz Co, GmbH, Tuttlingen, Germany), is inserted for inspection and visualization of the inner portion of the duct and the gland. This gives an initial idea of the anatomy of the gland and the location and type of the pathologies present. Next, the surgical unit, composed of a 2.3-mm cannula with a 1.3-mm working channel, is introduced into the salivary duct. The endoscope is inserted through one of the cannula openings. Custom-de-

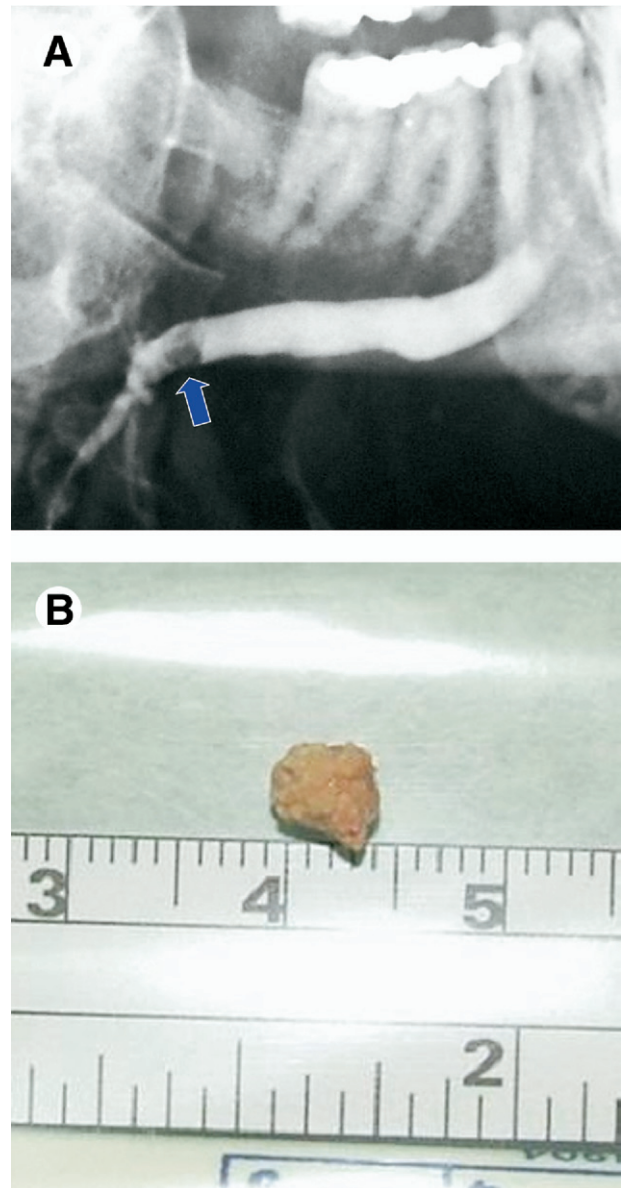


FIGURE 4. A, Sialography of submandibular gland demonstrating presence of sialolith in posterior portion of duct (cropped panoramic film). B, Sialolith removed using sialoendoscopy.

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signed instruments are inserted through the working channel to free, remove, or crush sialoliths, or open duct strictures. Sialoendoscopy is carried out under constant irrigation of saline, which enables better visualization of structures and washes out debris and parts of sialoliths displaced or crushed during the procedure. At the end of the procedure, a stent of 2 to 3 cm in length is left inside the salivary duct for 7 to 10 days, sutured to the adjacent structures. The stent permits healing of the duct after its surgical opening and frees salivary flow. After sialoendoscopy, patients are ad-

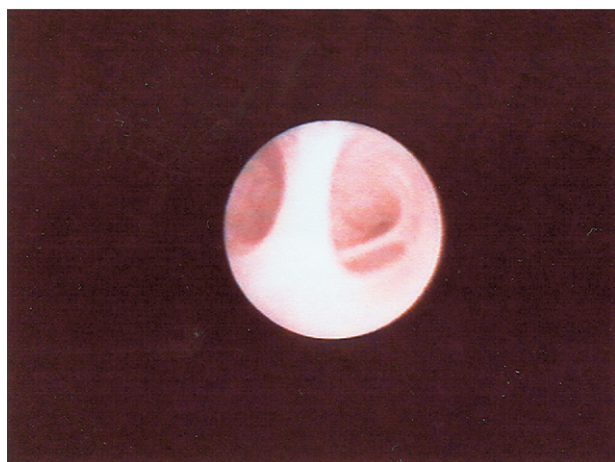


FIGURE 5. Endoscopic view of secondary channels in submandibular gland.

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vised to maintain a soft diet for several days. A preparation of amoxicillin and clavulanic acid is prescribed for a week, at a dosage of 875 mg twice daily.

After the first laparoscopic procedures carried out in the mid 1980s by gynecologists⁹ and general surgeons,^{10,11} endoscopic procedures were introduced and carried out in various surgical specialties

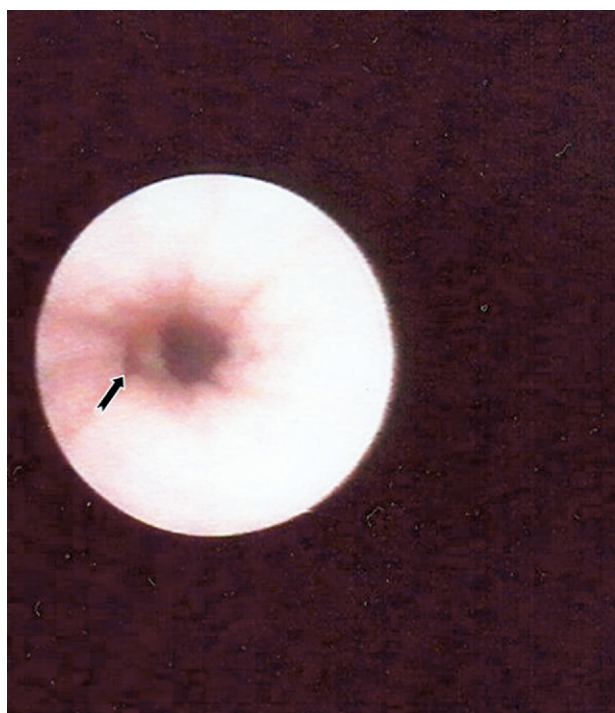


FIGURE 6. Endoscopic view of sphincter-like system in Wharton's duct. Note opening of sublingual gland (arrow).

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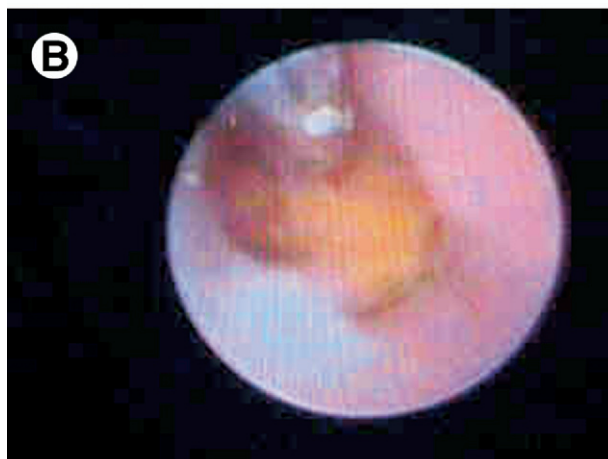
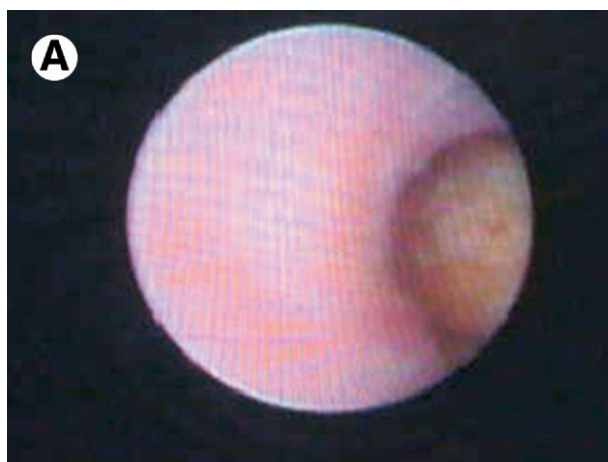


FIGURE 7. A, Endoscopic view of sialolith in Wharton's duct. B, Endoscopic view of sialolith about to be removed by grasper.

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such as gynecology, general surgery, orthopedics, urology, cardiothoracic surgery, and even in cosmetic procedures. These new procedures reduce the need for open surgery, shorten surgical and hospitalization times in most cases, and more importantly require a significantly shorter recovery period for patients. This is also true after the introduction of endoscopic procedures for the diagnosis and treatment of obstructive salivary gland pathologies. Up until the introduction of sialoendoscopy, symptomatic patients with obstructions of salivary glands located in the posterior region of the duct or with intraglandular obstructions were candidates for surgical removal of the entire salivary gland, which meant extended surgery time, surgical risks, and the need for several days of recovery. Besides showing important anatomic aspects, such as the secondary channels (Fig 5), the sphincter-like mechanism, and the opening of the sublingual gland in the Wharton's duct (Fig 6), the endoscopic

procedure introduced an alternative treatment for these patients; since sialolithiasis located in posterior regions of the duct (Fig 7) and even intraglandular ones are now within reach using the endoscopic approach.

Although most of the obstructions of the salivary gland are caused by sialolithiasis, or plugs, it seems that obstructions occur also due to strictures in the internal portions of the duct. These phenomena seem to occur more in the parotid gland than in the submandibular gland. Sialoendoscopy has also permitted observation of the intraductal and intraglandular appearance under inflammatory conditions, as in recurrent parotitis and bilateral salivary gland enlargements.¹² Nahlieli et al¹³ suggested the use of sialoendoscopy for the opening of intraductal strictures and steroid lavage in patients suffering from chronic recurrent parotitis. Baurmash¹⁴ described the need of surgical widening of the duct opening in patients suffering from recurrent parotitis as part of their treatment protocol. Today, combining sialoendoscopy with sialography is the state-of-the-art approach for diagnosis and treatment of salivary gland obstructions. Symptomatic patients enjoy the benefits of this minimally invasive procedure used to alleviate their condition. Nevertheless, surgical removal of the affected gland remains an option of treatment when endoscopic procedures fail.

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