Advanced Sialoendoscopy Techniques, Rare Findings, and Complications

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KEYWORDS

- Sialoendoscopy • Sialolithiasis
- Extracorporeal shock wave lithotripsy • Salivary
- Complications

Obstructive sialadenitis, with or without sialolithiasis, represents the most common inflammatory disorder of the major salivary glands.[1] Sialolithiasis is one of the major causes of sialadenitis. Calculi in the salivary glands can be found in 1.2% of the general population.[2] Other common salivary gland pathologies (besides tumors) are sialadenitis, strictures, and kinks. The diagnosis and treatment of this problem has been traditionally hampered by limitations of the standard imaging techniques. Satisfactory management depends on the surgeon's ability to reach a precise anatomic diagnosis and, in the case of sialoliths, to most accurately locate the obstruction.

Traditionally, sialoliths in the submandibular or parotid ducts and glands were divided into two groups[3,4]: stones that can be removed by the intraoral sialolithotomy approach, located usually in the anterior part of the duct; and stones that cannot be removed by the intraoral approach necessitating extirpation of the entire gland (sialadenectomy). Another pathology that required gland removal was concurrent or recurrent sialadenitis.

WHY MINIMALLY INVASIVE PROCEDURES FOR THE TREATMENT OF SIALOLITHIASIS?

The morbidity following traditional surgery for parotid and submandibular sialadenectomy includes a number of complications. Neurologic damage following superficial parotidectomy is of primary concern, because between 16% and 38% cases suffer

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temporary nerve weakness and 9% suffer permanent damage.[5,6] During submandibular gland removal there is a 7% risk of permanent marginal mandibular nerve damage and a 3% risk of damage to the lingual nerve.[7] Frey syndrome, facial scarring, greater auricular nerve numbness, sialocoeles, and salivary fistula also contribute to the morbidity of the traditional procedure.[8]

During the past decade, rapid developments in medical technology, such as optical miniaturization, lithotripsy equipment, microinstruments, and the influence from other surgical specialties, pushed development of new methods of analogous noninvasive and minimally invasive treatment.[9] Although it is possible to successfully treat salivary stones with traditional techniques, the use of the new methods was applied to advanced ductal cases. Because of the innovations, a surgeon became able to solve more complicated cases without major surgery and to perform the cases with less morbidity assuming the return of the gland to function.

The endoscopic system armamentarium requires an endoscope with at least 6000 pixels, a focal depth of 2 to 15 mm, and at least a 70° wide field of view. The diameter of one endoscope system (Modular Salivascope; PolyDiagnost, Pfaffenhofen, Germany) is 0.5 mm and uses four different disposable sleeves: 0.9, 1.1, 1.6, and 2 mm (**Fig. 1**A–C). The 0.9-mm sleeve has an irrigation channel and port for the telescope and is designed only for diagnostic purposes. The 1.1-mm system has three channels for the telescope, irrigation, and a special channel for surgical instruments. The 1.6- and 2-mm have the same number of channels but can accommodate large-size instruments to the working channel. The optical part, the telescope, is autoclavable.[10–12] Other endoscope models offered for advanced cases are Polydiagnost Salivascope flex, Type PD ZS 2001 1.1 mm (PolyDiagnost, Pfaffenhofen, Germany); Sialoview MDI 1.1 mm (Millennium, Islandia, New York); and Erlangen model (Karl Storz, Tuttlingen, Germany).

The endoscopic systems used in the author's study were the Modular Salivascope (PolyDiagnost, Pfaffenhofen, Germany); Polydiagnost Salivascope flex, Type PD ZS 2001 1.1 mm (PolyDiagnost, Pfaffenhofen, Germany); and the Sialoview MDI 1.1 mm (Millennium, Islandia, New York). The instruments used in his studies were microbaskets, miniforceps, minibiopsy forceps, high-pressure balloons, and microdrills for dilatation; brushes for cytology; and microneedles for injection (PolyDiagnost, Pfaffenhofen, Germany; and Sialotechnology, Ashkelon, Israel).

Recently, a miniature extracorporeal shock wave lithotriptor (ESWL) (Sialotechnology, Ashkelon, Israel) (**Fig. 1**D, E) was developed to assist in sialolithiasis management. It has a miniature generator and applicator, focal point depth of 15 × 15 × 25 mm, large focus zone at 50% of 35 mm, and a penetration depth of 120 mm. The size of the generator is 52 cm height × 42 cm length (20 kg weight) and the working head is reduced to fit the dimensions of the head and neck region. The usual technique delivers 1000 to 1500 shock waves per session. The miniature lithotripter can use an ultrasonic aiming system, or can be directed to the stone using endoscopic identification with the transillumination effect and also clinical findings.

This article assesses the value of and strategies for using the multitude of newly developed instruments and combinations of use, such as lithotripsy-sialoendoscopy methods, for advanced salivary gland sialolithiasis cases.

ADVANCED TECHNIQUES FOR ADVANCED CASES

When to Use Combined ESWL and Endoscopic Techniques?

In the past 2 years, 94 patients (43 males and 51 females, aged from 6–87 years) have been enrolled into the combined treatment. Sixty had pathology of the submandibular gland and 34 had pathology of the parotid gland.[10]