

Sialendoscopy: A Diagnostic and Therapeutic Aid in Salivary Gland Disorders

PADMA CHARAN PATRA¹ and SHAMIMUL HASAN^{2*}

¹Department of ENT, Hi-Tech Medical College, Rourkela, Odisha, India.

²Department of Oral Medicine and Radiology, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India.

*Corresponding author E-mail: shamim0571@gmail.com

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ABSTRACT

Sialendoscopy is an emerging minimally invasive technique that is employed as a diagnostic and therapeutic aid in various non-neoplastic salivary gland disorders such as sialolithiasis, sialadenitis and other obstructive pathologies. Sialendoscopy offer superior diagnostic details as compared to the conventional imaging modalities used for obstructive pathologies. Recently, the introduction of miniaturized endoscopic imaging devices has brought revolutionary advances in the field of sialendoscopy. Preservation of gland function while relieving the obstruction forms the principle advantage of sialendoscopy. Currently, sialendoscopy is utilised for treatment of sialolithiasis, stricture dilation, and as a therapeutic aid for recurrent juvenile sialadenitis, radioiodine induced sialadenitis, and patients who have recurrent sialadenitis from autoimmune processes such as sjogren's syndrome and systemic lupus erythematosus. This paper presents a detailed review about Sialendoscopy- It's history, instrumentation, techniques, advantages, drawbacks and its significance as diagnostic and therapeutic aid in salivary gland disorders.

Keywords: Imaging modalities, Salivary gland diseases, Sialendoscopy, Sialolithiasis.

INTRODUCTION

Obstructive sialadenitis is the most common benign salivary gland disease and accounts to almost 50% of non-neoplastic salivary gland pathologies¹. Obstructive sialadenitis frequently affects the submandibular gland (80% to 90%) followed by parotid (5% to 10%) and sublingual (less than 1%) glands². Sialolithiasis, stenosis, mucus plugs, polyps, foreign bodies, external compression, and variations in anatomical ductal system forms the major etiological factors³. Initial treatment of

obstructive sialadenitis is usually conservative with fluid intake, salivary flow stimulation, anti-inflammatory medication and antibiotics in suspected bacterial infections^{4,5}. For recalcitrant cases, surgical protocol (including papillotomy and gland removal) is usually followed³. While conservative therapy doesn't provide permanent cure, surgical management may be associated with potential nerve injury (marginal mandibular nerve, hypoglossal nerve, lingual nerve and facial nerve), poor cosmetic outcome, gustatory sweating (auriculotemporal syndrome), and paraesthesias⁶. With the introduction of



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sialendoscopy, the management of salivary gland obstruction has undergone a revolutionary change⁷. Sialendoscopy has evolved as an ideal investigative as well as therapeutic modality for of salivary gland pathologies over the last two decades⁸. Sialendoscopy is a minimally invasive procedure that incorporates a small -calibre endoscope and facilitates direct examination of the salivary ductal system⁹.

History

The anatomical description of the major salivary gland ductal system was first accounted as early as late 17th century. In 1990, Konigsberger *et al.* were the pioneer in salivary endoscopy and used a 0.8-mm flexible endoscope.^{10,11} Katz performed sialendoscopy using a flexible scope and a basket, and a wide array of sialendoscopy instruments and methods were further delineated by Nahlieli *et al.* and Marchal^{9,12}. The semirigid sialendoscopes were introduced by Zenk *et al.*¹³ and Nahlieli *et al.* incorporated pediatric sialendoscopy for treatment of recurrent juvenile parotitis and radioiodine sialadenitis patients in 2004 and 2006 respectively^{14,15}. In 2007, the combined technique of endoscopy and external method for sialolith extirpation was put forward by Marshall¹⁶.

Instrumentation

Sialendoscopes may be classified as rigid, semi-rigid and flexible sialendoscopes. Flexible endoscopes are beneficial as their manoeuvring is easier through the tortuous duct system and are generally atraumatic. The disadvantages include-fragility, shorter lifespan, difficult handling and they cannot be autoclaved¹⁷. Rigid endoscopes employ high-quality optical lens system and results in improved exploration of the duct system, are sturdier and autoclaving is possible. These endoscopes show difficulty in handling because of larger diameters and the camera being directly fixed onto the ocular attached to the endoscope¹⁷. These days, semi rigid endoscopes are preferred and considered as the sialendoscope of choice. They exhibit properties intermediate to rigid and flexible sialendoscopes. They are easy to manoeuvre through the ductal system as they possess certain degree of flexibility (45 degrees) and zero degree viewing angle⁸.

Indications

Sialendoscopy serves as an ideal investigative as well as therapeutic protocol for obstructive salivary gland pathologies⁸. With the advancements in instrumentation and wide acceptance of minimally invasive surgeries, sialendoscopy has emerged as the principal therapeutic modality for obstructive salivary gland disorders¹⁸. Sialendoscopy is now widely accepted therapeutic tool for sialolithiasis, stricture dilation, recurrent juvenile sialadenitis,¹⁷ radioiodine induced sialadenitis¹⁹, intraductal masses²⁰, and patients with recurrent sialadenitis due to autoimmune disorders such as systemic lupus erythematosus and sjogren's syndrome²¹.

Sialolithiasis is the major causative factor for sialadenitis and manifest as diffuse unilateral major salivary glands swelling^{11,22}. Generally, sialendoscopy is successful in surgical extirpation of salivary stones less than 4 mm in the submandibular gland and less than 3 mm in the parotid gland respectively. Further disintegration of sialoliths (with holmium laser or lithotripsy) may be required before endoscopic procedure for salivary stones sized between 5-7 mm. Sialoliths of diameter greater than 8 mm necessitate a combined approach technique for stone removal²³. The combined approach technique incorporates a sialendoscope for stone localization and either an intra-oral or an external approach for extirpation of a large submandibular or parotid stones, respectively^{2,11,16}.

Besides the size, location and mobility of stone also have a remarkable influence on therapeutic outcome. According to a study by Nahlieli *et al.*, sialendoscopy was unsuccessful in 13 % of the patients because of intraparenchymal location of stone, anatomic stenosis or tortuous duct course¹¹. Sialendoscopy employs the use of a basket and balloons for free floating stones. Miniforceps or a grasper may be used in those cases where it is difficult to bypass the sialolith^{24,25}.

Ductal stenosis and kinks is the second commonest etiological agent for obstructive sialadenitis, with frequent parotid gland involvement²⁶. Strictures may be seen in juvenile recurrent parotitis, radiation induced sialadenitis, and Sjogren's

syndrome. Isotonic saline irrigation is generally satisfactory for dilation of milder strictures of less than half the diameter of the duct²⁷. Intraductal corticosteroid injection and placement of stent may be required in few cases²⁸.

Contraindication

Acute sialadenitis has been suggested as an absolute contraindication for sialendoscopy. Sialendoscopy, if attempted, during the acute inflammation is associated with difficulty in cannulation and diminished exploration of the salivary ductal system. This results in perforation and stenosis of the duct and may intensify further complications⁸. Patients with microstomia or trismus may pose a challenge to sialendoscopy and regarded as relative contraindications for the procedure.

Technique

Sialendoscopy is usually done with the patient either in a sitting or supine position. For diagnostic sialendoscopy, a sterilized gauze piece soaked in local anaesthesia (4 % lignocaine) is placed over the ductal openings (floor of mouth in submandibular sialendoscopy or along the upper gingivobuccal sulcus in parotid sialendoscopy) half an hour before the procedure. General anaesthesia is usually preferred for interventional sialendoscopies. However, local anaesthesia may be used in certain cooperative individuals and patients who are compromised for general anaesthesia. Sialogogues (lemon or vitamin C tab) may be given prior to the procedure to enhance the salivary flow. This enables accurate location of ductal opening and efficient exploration of the ductal system. Papilla is dilated using scopes of larger diameter and the lumen is thoroughly irrigated with local anaesthetic solution or normal saline in GA cases. Thorough luminal irrigation facilitates efficient manoeuvring of the endoscope and better surgical exploration of the duct system by clearing the accumulated sludge and debris. The method to remove the sialolith is decided further after determining the size of stone⁸.

Post operative management- A 5 day course of antibiotics is prescribed to patients following sialendoscopy. Usually day care procedures are done for patients under local anaesthesia and discharged after few hours of monitoring. Individuals

operated under general anaesthesia are discharged either the same evening or on the next morning. Soft, bland and cold diet is advised and emphasis on adequate hydration is made. Patient is periodically reviewed after a week and month. Stents, if inserted need to be removed after 2-4 weeks⁸.

Advantages

Preservation of functionality of the gland while relieving the obstruction forms the major advantage of sialendoscopy. The procedure can be carried out on a day care basis without local anaesthesia and is minimally invasive with negligible morbidity²⁹. The procedure is amenable to all age groups and is particularly helpful in elderly patients who have other age related co-morbidities³⁰. The status of glandular tissues from appearance of ductal lining can be appreciated. In the healthy gland, shiny appearance of the duct and proliferating blood vessels can be appreciated. In chronic sialadenitis, matted lining, ecchymosis and small blood vessels can be found³¹. Sialendoscopy holds a superior place to plain films, ultrasound, sialography, and computed tomography, in detecting radiolucent stones.

Limitations

An extensive experience and training for operator, difficult manoeuvring of miniature, tortuous and delicate ducts, and the necessity for a skilled surgeon are the few limitations for sialendoscopy. Utmost care and precautions should be taken to prevent trauma while manoeuvring within the delicate salivary ducts. This would minimize perforation of the ductal system and later stenosis. Measures should also be taken to avoid marsupialisation of the duct papillae, thus minimising retrograde air and aliments passage³⁰.

Complications

Post-operative glandular swelling is the most common complication and usually shows self remission within a day or two. Post-operative swelling holds significant consideration in submandibular procedures due to potential risk of airway obstruction³². Ductal avulsion is another serious iatrogenic complication, and can be minimised by preventing excessive traction on the stone. Paresthesia of the lingual nerve has been reported in up to 15% of patients and usually exhibits self resolution. Precautionary measures to

avoid or minimise trauma to the duct or papilla may significantly reduce the incidence of post-operative strictures³³. Salivary fistulas, sialoceles, minor ductal tears, development traumatic ranulas, minor bleeding, and infection have been reported^{11,20}.

CONCLUSION

Sialendoscopy has emerged as an excellent diagnostic and therapeutic aid in the management of obstructive salivary gland disorders. Major advances in optical technologies and the

introduction of miniaturized sialendoscopes are the key factors accountable for significant evolution in salivary gland endoscopy. The recent years have witnessed a paradigm shift to a more conservative management of salivary gland pathologies.

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