Original Article

OBSTRUCTIVE SIALOADENITIS ROLE OF INTERVENTIONAL SIALOGRAPHY

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ABSTRACT:

The Salivary stones and strictures are the most common cause of unilateral parotid or submandibular gland swelling. Traditionally, these patients treated by open surgery submandibular stones are still the most common cause of submandibular gland resection parotid gland resection is less frequent as it is major surgical procedure with postoperative complication like facial nerve paresis. The common cause of stone formation is obstruction, stricture formation leading to stasis of saliva, dehydration, change in salivary pH associated with oropharngeal sepsis.

Over the last two decades, increasing awareness for minimally invasive treatment and with development of interventional radiological procedures for the management of obstructive sialadenitis has led to avoid surgical removal of gland and complications associated with surgery. The interventional sialographic procedures can be used to remove salivary duct stones and is treatment of first choice in salivary duct strictures. For stone removal and stricture dilatation local anesthesia, I/V cannulas of different sizes, balloon dilators and wire baskets are used under fluoroscopy. The wire guided sialographic technique (1) is used for sialography and the I/V cannula used for sialography is used as access for interventional sialography. The stones in the intraglandular ducts, large stones and distal stones near the hilum of the gland are difficult to remove and the small size mobile stones can be easily removed.

KEYWORDS:

Salivary gland, Salivary stone, Salivary duct stricture, Salivary fistula, obstructive sialoadenitis, Interventional Sialography.

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OBSTRUCTIVE SIALOADENITIS ROLE OF INTERVENTIONAL SIALOGRAPHY

The Salivary calculi and strictures are the most common cause of Obstructive Sialoadenitis. Patient present with recurrent painful periprandial unilateral diffuse swelling of the gland due to mechanical obstruction of the main salivary duct known as the "meal time syndrome" (2). The obstruction can remain transitory or can be complicated by bacterial infection (3,4) and patient also has fever and purulent discharge from the ostium of the duct (5) . Traditionally, these patients treated by open surgery submandibular stones are still the most common cause of submandibular gland resection (6.7) parotid gland resection is less frequent as it is major surgical procedure with postoperative complication like facial nerve paresis.

Sialolithiasis is comparatively more common in male patients (8). The age of presentation is between 30 and 60 years (9), and is less commonly seen in children only 3% is seen in pediatric age group (10).

Submandibular gland more commonly effected by sialothiasis 60-80% of cases (10), 20% are radiolucent. Parotid stones effects 15-20% cases, 40% are radiolucent. Most of these calculi are located in the distal third of the duct or at the hilum of the gland few stones are in the intraglandular ducts (11). The minor salivary glands and sublingual glands are rarely effected by the sialothiasis (12).

Pathophysiology of stone formastion are obstruction, stricture formation leading to stasis of saliva, dehydration, change in salivary pH associated with oropharngeal sepsis and impaired crystaslloid solubility.

The hypothysis to stone formation are related to Anatomy of the duct its Upward route, Longer and curved duct and components of saliva like mucus protein and calcium contants.

The annual growth rate of salivary stones has been estimated to be 1 mm per year (13) The have different shpes, most common are oval, they can be round, oval or irregular. According to 2 studies(14,15) the size ranges from 2 mm to 2 cm, with the mean being 3.2 mm and 4.9 mm for parotid and submandibular stones, respectively.

Strictures are the second most common cause of obstructive sialadenitis (16). Parotid duct strictures are common than submandibular strictures and account for up to 25% of recurrent parotid duct swelling. Females are more effected than males. The etiologic factors include are trauma, infection, scar, anatomy of the ductal system. Other causes of obstructive sialoadenitis are foreign bodies, kinks, mucus plug and compression by the neoplasm. Less likely causes can be enlarged intraparenchymal parotid lymph nodes, intraductal polyp, or the granulation tissues associated with immunological disorders such as Sjögren's syndrome (17,18).

DIAGNOSTIC APPROACH:

Sialography is still Gold standard for Obstructive Sialadenitis, no absolute contraindication, relative contraindication can be Severe inflammation of ducts and history of contrast sensitivity.

Ultrasography using real time small parts probe is the first investigation of choice in many centers as it is redialy available. The most important role of ultrasound is to differentiate normal and pathological salivary glands especially when the swelling is at the region of salivary glands from parasailomas. Its sensitivity and specivity is around 80% for detection of stones (19).

Spiral multislice CT scan can be used to detect salivary stones and can be used to rule out salivary stone as cause of salivary galand swelling.

Magnetic resonance (MR) sialography is becoming popular for diagnosis of salivary gland pathologies. MR Sialography has several advantages, no contrast medium is needed, there is no radiation and no cannulation of the duct is required. It can be performed during acute inflammation. An extra sequence after use of lemon juice provide functional evaluation of the affected gland (20). 3-dimensional reconstruction imaging and MR virtual endoscopy for salivary gland ducts are new diagnostic approach as a non-invasive pre-surgical procedure. The disadvantages are in-availability, lack of expertise, high cost of equipment and procedure.

Sialoendoscopy is emerging technology and is useful in detecting ductal anomalies and can be used as therapeutic procedure.

APPLIED ANATOMY OF MAJOR SALIVARY GLANDS

Submandibular Gland:

Wharton's duct is also referred as submandibular duct is almost 5 cm in its length and 1-2mm in diameter. It begins by numerous branches from the deep surface of the gland, and runs forward upward and medially at 45 degree angle to sagittal and horizontal planes between the mylohyoid, hyoglossus, and genioglossus. At mylohyoid the duct curves around the muscle forming acute angle this is the most comon site for stone formation and ductal kink. It opens by a narrow orifice on the summit of a small papilla at the side of the frenulum of the tounge.

Parotid Gland:

Main parotid duct (Stenson's duct) is horizontally oriented approximately 6-7cms long, is thicker and double the diameter of the Wharton's duct. It rests over the masseter muscle it makes a right angle turn to penetrate the buccinators then opens into the vestibule of the mouth across from the

maxillary second molar tooth on the inner surface of the buccal mucosa. The accessory duct if present arises at an acute angle in the mid portion. The acute angle at distal portion of the duct can cause deep cannulation difficult it can be over cum by little pull of the cheek.

MATERIALS AND METHODS:

SIALOGRAPHY EQUIPMENT

I/V cannula 24G or 26G

Guide wire (Flexable Steel wire or prolene)

Connecting tube and 5cc syringe.

Water soluble contrast.

SIALOGRAPHIC PROCEDDURE:

Wire guided sialography technique is used(1). Dry mucosa of gland with gauze, milk gland oriface or use lemon juice to produce a drop of saliva to identify the duct openig. Gently insert 0.5-1cm guidewire into the duct, slide I/V cannula over the guidewire into the duct while removing the guidewire. Take care to remove air bubbles from the cannula hub. Most of the times the saliva come up and fills the hub, if saliva is not filling the hub air can be displaced by contrast injected with needle tip at the base of the hub of the cannula. Connect with connecting tube attached with contrast filled syringe and gently inject contrast, ask the patient to hold the tube between lips. Make position of patient on fluroscopy table and expose the films, more contrast can be injected during fluroscopy if needed. Remove the cannula during fluroscopy to see emptying of contrast from the ducts to rule out stasis indicative of stricture.

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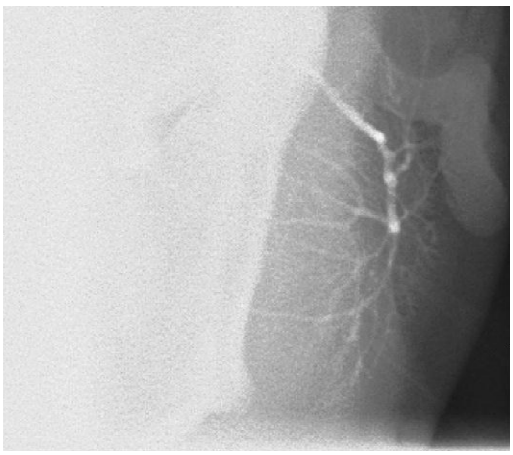
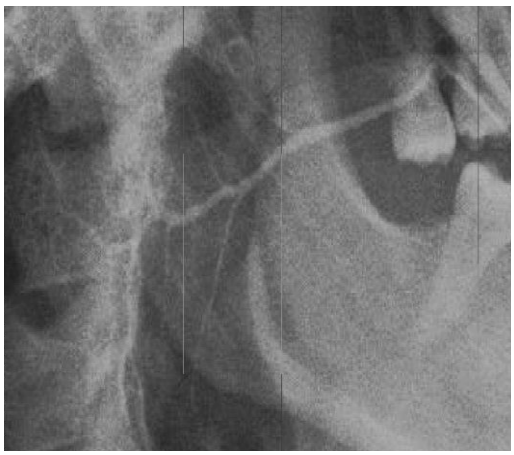
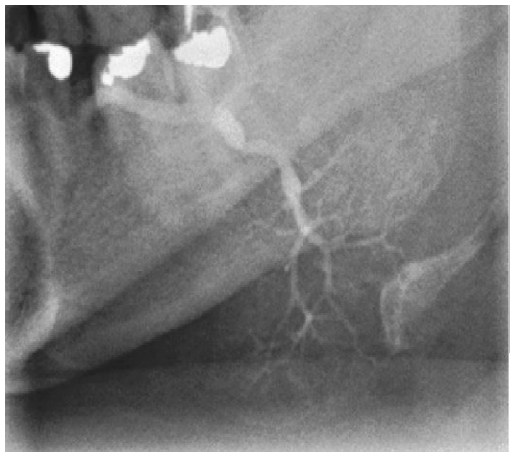


Normal Parotid sialogram (intraglandular ducts)



Normal Parotid Sialogram (Stenson's duct)



Normal Submandibular Sialigram

PATIENT SELECTION:

The stone in the intraglandular ducts are difficult to remove. The freely mobile stones in the main ducts can be remove. The small size stones with AP diameter bigger than 7mm are difficult to remove. Select the stone according to availability of dilating balloon size 1mm less than the diameter of balloon size is required the length of the stone is not a consideration.

INTERVENTIONAL SIALOGRAPHY:

First case reported by Kelly et al. (21), he removed a sub-mandibular duct stone using Dormia baskets under fluoroscopic control in 1991. Since then, various interventional techniques have been used for the removal of parotid and sub-mandibular stones. Most of the interventional radiologist use angioplasty balloon, steel baskets, grasping forceps, wire loop vascular snare, or an embolectomy catheter. All performed procedure under fluoroscopic control.

The technique described below is the one we are using for interventional sialographic procedures.

EQUIPMENT:

I/V cannula from 26G to 16G

Guidewire .018" and .035".

Local anaesthesia.

Balloon dilators

Steel baskets(Zero Tip, Dormia basket)

Grasping forceps.

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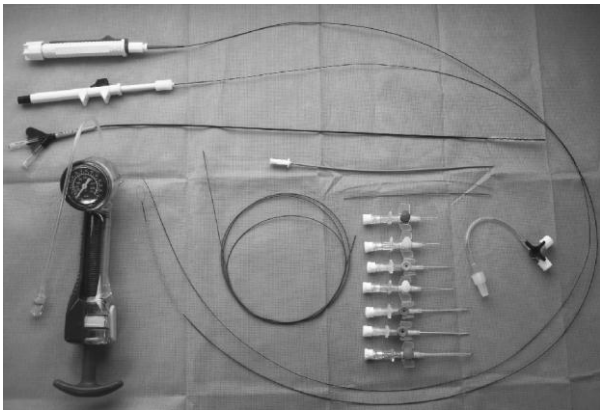


(Equipment used in Interventional Sialography)

TECHNIQUE

PREPERATION:

Antibiotic cover start at least 8hours before the procedure and continue for 3-5 days after duct intervention.

ANAEASTHESIA:

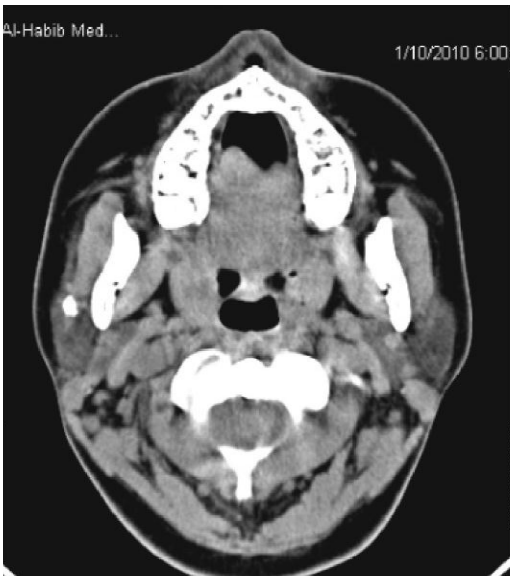
First describe the patient the procedure in detail and assure the patient your sympathy and ask his cooperation as the procedure is inherently painful and uncomfortable for the patient. We use 2% local anesthesia infiltrated around the ostium and injected into the duct mixed with contrast.

PROCEDURE FOR STRICTURE DILATATION

After sialogram the I/V cannula is kept inplace and used as conduit. Graded dilatation is performed with increasing size of I/V cannulas over guide wires for ostieal dilation. .035 guide wire is passed and angiographic balloon is passed over it across the stricture and inflated with inflation device the inflated balloon is kept in place for 5mins and then removed. Post procedure sialogram is performed.

PROCEDURE FOR STONE REMOVAL

Performe the same steps for stricture dilatation as most of the stone formation is due to stricture formation. The balloon selection is done according to size of stone i.e 1mm more then the ap diametr of the stone. The one end of the balloon is kept out side the ostium of the duct to allow its dilatation for easy removal of the stone. The balloon is kept distended for 5 min then deflate and remove it many times after removal of the balloon stone comes out with gush of saliva. A zero tip wire baske or grasper is used to remove the stone in cases of bigger diameter stone the stone stuck at ostium warants incision at ostium. Perform post procedure sialoram before end of procedure.



CT Scan Right Parotid stone

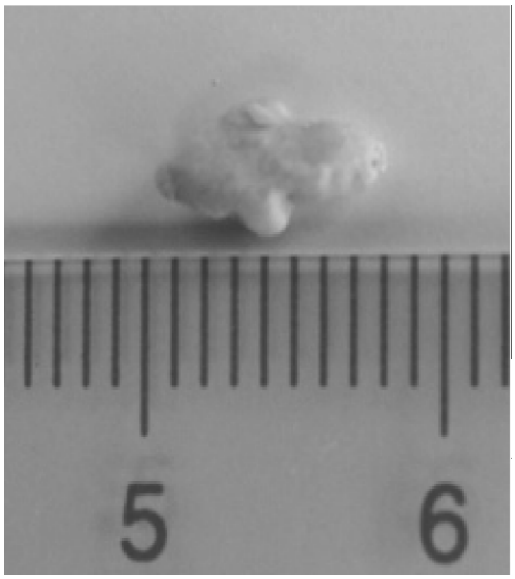
Same stone on Ultrasound

Same stone on sialography

16G I/V cannula in the Stenson's duct

Angiographic balloon inflated

Steel basket catching the stone



Stone after removel

PROCEDURE FOR FISTULA CLOUSURE

The salivary fistula can result after trauma or surgery. The reasons for persistence of fistula can be debries in main duct. Clearing of debris in the main duct is performed using I/V cannulas and guide wires. Focal pressure over fistula for few days especially during eating results in closure.

COMPLICATION:

The most common complications seen after interventional sialographic procedure is gland swelling and infection it resolves with use of non-steroidal anti-inflammatory drugs and antibiotic. Very rarely the stone removing basket can be impacted requiring surgical intervention (22).

RESULTS:

For the stone removal reported success rate ranges from 40% to 100% 9 (22-27). The cause of failures are due to unsuccessful stone identification and poor selection of patients heaving fixed or unreachable stones (22, 25, 28). In 2006, Brown (28) achieved complete dilatation of duct stricture in 71.5% of cases of a series of

125 patients by means of balloon ductoplasty, under fluoroscopic control.

CONCLUSION:

Over the last two decades, awareness for minimally invasive treatment and development of interventional radiological procedures for the management of obstructive sialadenitis has led to avoid surgical removal of the gland and complications associated with surgery. The interventional sialographic procedures provides useful adjuvant method of stone removal and became most suitable technique and procedure of first choice in salivary duct strictures despite the use of radiation

REFRENCES:

1. Aslam M.O, Hussain S., Rizvi I. and Bley W. Technical Report : Wire Guided Sialography Clinical Radiology 1991;44, 350-351
2. Escudier MP. The current status and possible future for lithotripsy of salivary calculi. In: Pregrel M, editor. Atlas of oral and maxillofacial surgery clinics of North America. Philadelphia, Pa: Saunders; 1998. p. 117-32.
3. Lustmann JRegev EMelamed Y Sialolithiasis: a survey on 245 patients and a review of the literature. Int J Oral Maxillofac Surg.1990;19:135-138.
4. Cawson RAGleeson MJEveson JW Sialadenitis. In: Pathology and Surgery of the Salivary Glands. Oxford, England: Isis Medical Media; 1997:33-63.
5. Teymoortash A, Wollstein AC , Lippert BM, Peldszus R, Werner JA. Bacteria and pathogenesis of human salivary calculus. Acta Oto-Laryngol 2004;122:210-4.
6. Crabtree GMYarington CT Submandibular gland excision. Laryngoscope.1988;98:1044-1045.
7. Hald JAndreassen UK Submandibular gland excision: short- and long-term complications. ORL J Otorhinolaryngol Relat Spec.1994;56:87-91.
8. H aubrich J. Klinik der nicht Tumor bedingten Erkrankungen der Speicheldrusen. Arch Otorhinolaryngol 1976;213:1-59.
9. ustmann T, Regev E, Melamed Y. Sialolithiasis; a survey of 245 patients and review of the literature. Int J Oromaxillofac Surg 1990;19:135-8.
10. N ahlieli O, Eliav E, Hasson O, Zagury A, Baruchin A. Pediatric sialolithiasis. Oral Surg Oral Med Oral Pathol 2000;90:709-12.
11. Capaccio P, Bottero A, Pompilio M, Ottaviani F. Conservative transoral removal of hilar submandibular salivary calculi. Laryngoscope 2005;115:750-2.
12. Bodner L. Salivary gland calculi: Diagnostic imaging and surgical management. Compendium 1993;14:572-86.
13. Rauch SGorlin RJ Disease of the salivary glands. In: Gorlin RJ, Goldmann HM, eds.Thomas' Oral Pathology. St Louis, Mo: CV Mosby; 1970:997-1003.
14. Marchal FDulguerov PBecker MBarki GDisant FLehmann W Submandibular diagnostic and interventional sialendoscopy: new procedure for ductal disorders. Ann Otol Rhinol Laryngol.2002;111:27-35.
15. Marchal FDulguerov PBecker MBarki GDisant FLehmann W Specificity of parotid sialendoscopy. Laryngoscope.2001;111:264-271.
16. Nahlieli O, Bar T, Shacham R, Eliav E, Hecht-Nakar L. Management of chronic recurrent parotitis: current therapy. J Oral Maxillofac Surg 2004;62:1150-5.
17. Capaccio P, Minetti AM, Manzo R, Palazzo V, Ottaviani F. The role of the sialoendoscopy in the evaluation of obstructive salivary disease. Int J Maxillo Odontostomatol 2003;2:9-12.
18. Koch M, Zenk J, Bozzato A, Bumm K, Iro H. Sialoscopy in case of unclear swelling of the major salivary glands. Otolaryngol Head Neck Surg 2005;133:863-8.
19. Jäger LMenauer FHolzknecht NScholz VGrevers GReiser M Sialolithiasis: MR sialography of the submandibular duct: an alternative to conventional sialography and US? Radiology.2000;216:665-671.
20. Morimoto Y, Ono K, Tanaka T, Kito S, Inoue H, Shinohara Y, et al. The functional evaluation of salivary glands using dynamic MR sialography following citric acid stimulation: A preliminary study. Oral Surg

Oral Med Oral Pathol Oral Radiol Endod 2005;100:357-64.

21. Kelly IMG, Dick R. Technical report. Interventional sialography:Dormia basket removal of a Wharton's duct calculus. Clin Radiol 1991;43:205-6.
22. Drage N, Brown JE, Escudier M, McGurk M. Interventional radiology in the removal of salivary calculi. Radiology 2000;214:139-42.
23. Buckenham TM, George CD, McVicar D, Moody AR , Colles GS . Digital sialography: imaging and intervention. Br J Radiol 1994;67:524-9.
24. Kim RH , Strimling AM, Grosch T, Feider DE, Varanth JJ. Nonoperative removal of sialoliths and sialodochoplasty of salivary duct strictures. Arch Otolaryngol Head Neck Surg 1996;122:974-6.
25. Y oshino N, Hosokawa A, Sasaki T, Yoshioka T. Interventional radiology for the nonsurgical removal of sialoliths. Dentomaxillofac Radiol 1996;25:242-6.
26. N ixon P, Payne M. Conservative surgical removal of a submandibular duct calculus following interventional sialography. Clin Radiol 1999;54:337-8.
27. N orth E. Submandibular sialoplasty for stone removal and treatment of a stricture. Br J Oral Maxillofac Surg 1998;36:213-4.
28. Brown JE. Minimally invasive techniques for the treatment of benign salivary gland obstruction. Cardiovasc Intervent Radiol 2002:25;345-51.