

# Sialoendoscopy: New and More Physiological Approach for Salivary Gland Disorders

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## ABSTRACT

**Introduction:** In the past, surgical removal of salivary gland was considered treatment of choice for refractory obstructive salivary gland disease, but nowadays with the advent of sialendoscope it is possible to conserve the gland in most of the cases. Sialendoscopy is a physiological approach with very less morbidity. Study aimed to pre-operatively evaluate the cause of salivary gland diseases by imaging techniques and to do interventional sialendoscopy in cases suggestive of obstructive salivary gland diseases.

**Material and Methods:** A retrospective and descriptive analysis of 20 cases who were having salivary gland disorder. All the cases were selected by simple random sampling. Approval of ethics committee was taken before study. Patients those who satisfied inclusion criteria were included in the study. Patients with previous history of operation, acute sialadenitis, mumps and salivary gland malignancy were excluded. Patients who presented at our tertiary care centre and were willing to give consent were enrolled in the study. Detailed clinical history was taken and detailed clinical examination was done in each patient followed by appropriate basic imaging studies. Then these patients underwent Sialendoscopy and results were analysed.

**Results:** It was observed that there was male preponderance, 26-35 years age group was commonly affected (30%). Submandibular gland (60%) was more commonly involved than parotid (40%). Ultrasonography was the main investigation which was supplemented by computed tomography in select cases like sialolithiasis. Intraoperatively calculus was most common finding, diabetes is most common associate co-morbidity. Except swelling there were no other post operative complication.

**Conclusion:** With sialendoscopy, gland can now be conserved in obstructive salivary gland disease.

**Keywords:** Sialendoscopy, obstructive, salivary gland disease

## INTRODUCTION

We are living in the era of endoscopy. Endoscopy is more physiological and has given better results in managing various conditions. To give an example that clearance of Osteomeatal Complex gave far better results in management of sinusitis compared to previously popular Caldwell-Luc's so much so that Caldwell-Luc's Surgery is now considered out dated.

Now we have Endoscopes which can go in Stenson's duct and Warthin's duct to assess the pathology and most of the times treat them so as to avoid radical procedure such as gland removal. Sialendoscopy is a gland preserving and advanced endoscopic technique for visualization of salivary gland ductal system.

3 Major Salivary Glands<sup>1</sup>

- a) Paired: 1) Parotid 2) Submandibular 3) Sublingual
- b) Unpaired: Minor Salivary Glands

These glands in oral cavity help in secretion of saliva which is secretions of various salivary glands with mixture mucus, enzymes and antimicrobial agents. Saliva protects from bacterial teeth decay, mucosal protections from desiccation

and lubricates food which ultimately helps in mastication and digestion of food.

Saliva is transported through ductal system into oral cavity, but sometimes due to an infective pathology in oral cavity these glands may get obstructed due to mucous plug, stone, stricture, stenosis etc. Also due to diet factors i.e. less phytate in diet as phytate is responsible for inhibition of hydroxyapatite crystallization which leads to formation of more calcium and less phytate in diet is responsible for sialolith formation.<sup>2</sup>

This procedure helps in visualization of the above obstructive causes and treat them without an external approach.

Chronic diseases of the salivary gland are classified as obstructive and non-obstructive diseases. Non obstructive salivary gland disease will require conservative management while obstructive will require definitive management.

Obstructive salivary gland disease is the most common inflammatory disease of major salivary glands. It includes chronic sialadenitis with/without sialolithiasis and strictures.

The commonest site is the submandibular gland where 80-90% of calculi are found, 5-10% are found in the parotid gland and approximately 5% in the sublingual and other minor salivary glands. Proteinaceous material was most common finding in parotid gland and calculus was most common finding in submandibular gland which correlates the finding of Dr P. Capaccio et al.<sup>3</sup>

Previously refractory chronic sialadenitis was treated with excision of affected gland which was associated with post operative complications like Facial nerve weakness, Marginal Mandibular nerve dysfunction etc but with Interventional sialendoscopy we can preserve the gland and avoid post operative complications associated with gland removal. Nowadays, previously routine salivary gland excision is now obsolete but gland extirpation can be considered in case of failure of multiple sialendoscopy.<sup>4</sup>

Sialendoscopy is fast emerging as an alternative to traditional surgical techniques, with a less invasive and more efficacious approach. Sialoendoscopy can provide direct and more detailed observation of the ductal system compared with sialography. Previously sialography procedure with bismuth solution was done and radiograph of the duct system was obtained, but due to bismuth poisoning<sup>5</sup>, it was discontinued and attention towards

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sialendoscopy was given. Sialendoscopy is an organ preserving surgical procedure which can achieve satisfactory functional recovery. This is a relatively new approach now emerging as the procedure of choice by using mini rigid endoscope (Figure-1) for diagnosis as well for treatment of salivary gland obstruction.<sup>6</sup> It has the advantage of being a non-invasive procedure and patients donot have an external scar.

So that it is a newer and more physiological endoscopic approach. In our study we managed 20 cases of chronic sialoadenitis with interventional sialendoscopy.

Present research aimed to study the benign salivary gland diseases, to pre-operatively evaluate the cause of salivary gland diseases by imaging techniques and to do interventional sialendoscopy in cases suggestive of obstructive salivary gland diseases and to therapeutically treat the conditions like stenosis, strictures, ductal narrowing and calculus.

## MATERIAL AND METHODS

It was a retrospective descriptive study where we selected 20 patients with the simple random sampling method. Approval of ethics committee was taken before study.

**Inclusion criteria:** Included all patients with ultrasonography of local part suggestive of obstructive salivary gland disease who presented to our tertiary care centre and willing to give written informed consent. Patients those who were having acute inflammatory condition like acute sialoadenitis and mumps, patients previously operated for salivary gland diseases and also patients with salivary gland malignancy were excluded from study.

All patients who presented to the Dept of ENT, B.Y.L. Nair hospital, Mumbai with history suggestive of chronic sialadenitis were evaluated and those who satisfied the inclusion criteria were identified. Detailed clinical history was taken and detailed clinical examination was done in each patient followed by appropriate basic imaging studies i.e. ultrasonography of local part (by using sialogogue like vitamin C)<sup>8</sup> and computed tomography scan was performed. Poor patients were enrolled in Rajiv Gandhi Jivandayi Arogya Yojana Scheme. Patients with imaging suggestive of chronic obstructive salivary gland disease were enrolled in the study. The study protocol was explained to each of the patients and written informed consent was taken. Routine preoperative investigations like Hb, CBC, LFT, RFT, Serum electrolytes, RBS, chest X ray, ECG were done for each patient and Preanaesthesia fitness was taken.

All the patients underwent Sialendoscopy. Firstly conic and serial dilators were used to dilate the ostia and then Guide wire was passed in the gland duct and then sialendoscope was passed over the guide wire and then guide was withdrawn and sialendoscopy was performed with continuous irrigation using distilled water from the irrigation channel and the ductal system was visualized. In 2004 Dr J J Zenk described his experience with new types of sialendoscope with built in channel for instrumentation.<sup>7</sup> Wherever stone was visualized, it was removed with specially designed basket (Figure-2) by Dr Katz with the use of mini (0.8mm) flexible endoscope for the diagnosis and extraction of calculi with basket.<sup>9</sup> Whenever stricture/stenosis, ductal narrowing were encountered they were dilated with balloon.

After completion of procedure, patients were given diluted inj.



Figure-1: Sialendoscope)

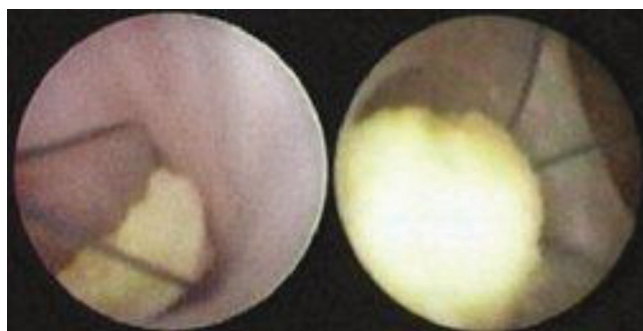


Figure-2: Ductal stone entrapped in a basket)10

Hydrocortisone wash. All patients developed gland swelling postoperatively.

Post operative care included affected gland massage till the swelling subsided along with intravenous antibiotics and Non-Steroidal anti-inflammatory drugs.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used to make tables and graphs. Descriptive statistics like mean and percentages were used to interpret the data and conclude the results.

## RESULT

Total no of patients in our study were 20, selected by simple random sampling.

**Sex Distributions:** Out of 20 patients 11 were male and 9 were female. Males were more commonly affected than females

**Age Distribution of the study patients:** Most of the patients suffering from obstructive salivary gland diseases were vary from age 7 years to 55 years. 3 patients (15%) were found in age group of 5-15 years, 5 patients (25%) were in the age group of 16-25years, 6 patients (30%) were between 26-35 years, 4 patients (20%) were between 36-45 years and only 2 patients (10%) were between 46-55 years. The commonest age of presentation was between 26-35 years.

## Site Involved

Total no of patients with parotid gland involvement were 8 (40%); out of which 3 were of right side, 1 was of left side and 4 (50%) were bilateral. Total no of patients with submandibular gland involvement were 12 (60%); out of which 4 were of right side, 5 were of left side and 3(25%) were bilateral. Submandibular gland was more commonly involved than parotid gland. Bilateral involvement was seen more in parotid gland (Table-1).

Relation with increase in size of gland with meal was commonest, 75% of parotid and 50% of submandibular gland

patients had it. Relief with parotid gland massage was seen in 62.5% and with submandibular gland massage was seen in 50%. Swelling was also a common complaint in both Parotid (50%) as well as submandibular gland (66.6%). Patients suffering from parotid gland pain were 3(37.5%) and with pain in submandibular gland were 1 (8.33%).

33.3% of patients with submandibular gland involvement had history of stones extruding from submandibular gland duct ostia and none with parotid gland had history of extrusion of stones. History of pus discharge was present in 37.5% in cases of parotid gland involvement and 33.3% in cases of submandibular gland involvement. Parotid gland was palpable in 37.5% and submandibular gland was palpable in 58.33%. Prominent ostia was seen in 75% of parotid and in 66.6% of submandibular gland cases. Increase in size of gland with meal was commonest complaint followed by swelling in the region of the gland (Table-2).

**Associated Co-morbidities:** 4 patients had Diabetes Mellitus, 3 had Hypertension, 1 patient had Oral submucous fibrosis, 1 patient had Hypothyroidism and 2 patients were chronic alcoholic. Diabetes Mellitus was most common associated co-morbidity.

### Investigations

**Ultrasonography:** All 20 patients underwent sonography of the neck before sialendoscopy procedure. All the patients had received sialogogue like vitamin C during the ultrasonography which helps in identifying and localizing cause of obstruction. 8 patients were diagnosed as Sialolithiasis, 6 patients were diagnosed as Bulky Gland, 2 patients had intraparotid lymph nodes, 1 patient was of suspicious of stenosis and 3 patients had normal ultrasound findings. Ultrasonography was the most definitive investigations done in all patients.

**Computed tomography of Neck (Plain+ Contrast):** 8 patients underwent Computed Tomography of the neck. 6 patients were diagnosed as Sialolithiasis and 1 patient was diagnosed with necrotic lymph node and 1 patient had Bulky gland. All patients with sialolithiasis underwent computed tomography of neck (plain+contrast)

**Anesthesia:** 5 patients underwent procedure under local anaesthesia (all were of submandibular salivary gland) and 15 patients underwent procedure under general anaesthesia (8 of parotid gland and 7 of submandibular gland). Most of the patients required general anaesthesia.

### Intraoperative Findings

Proteinaceous material was found in 4 parotid gland ducts and in 5 submandibular ducts cases.

Calculus was found in 2 parotid ducts and 5 submandibular ducts. In our series we had narrowing in 1 submandibular duct and in 2 cases of our parotid ducts. There were no adhesions seen in parotid duct endoscopy and only 1 case in our series had adhesions in submandibular duct (table-3).

**Sialendoscopy Sequelae:** All the patients had postoperative swelling which resolved within 24 Hrs. Around 75% of all the patients had pain which was managed with intravenous NSAID.

**Post-operative complication:** Except swelling there were no other post operative complication.

Site	Parotid gland	Submandibular Gland
Right	3	4
Left	1	5
Bilateral	4	3
Total	8(40%)	12(60%)

**Figure-1: Site Involvement**

Symptoms	Parotid %		Submandibular Gland %	
Pain	3	37.5	1	8.33
Swelling	4	50	8	66.6
Increases with meal	6	75	6	50
Relief with Massage	5	62.5	6	50
Passage of stones	0	00	4	33.3
Pus discharge in saliva	3	37.5	4	33.3

**Figure-2: Description of Symptoms**

Findings	Parotid gland	Submandibular gland	Total
Proteinaceous material	4	5	9
Calculus	2	5	7
Stenosis	1	0	1
Adhesions	0	1	1
Ductal narrowing	1	1	2
Total	8 (40%)	12 (60%)	20

**Figure-3: Intraoperative Findings**

**Revision Surgery:** One patient underwent revision sialendoscopy due to recurrence of submandibular sialolithiasis.

## DISCUSSION

As we are living in the era of endoscopy we have concluded that a better method to avoid complications and preserve functional status of salivary glands is 'Sialendoscopy'.

Over the past years, the surgical anatomy and pathophysiology of the salivary gland is the same but the management is changing with time. Nowadays preservation of anatomical as well as physiological function of the gland is the aim of every surgeon. So sialendoscopy helps in more physiological approach to salivary glands in all obstructive salivary gland diseases.

In our series, males were more commonly affected than females which is similar to study by P.Capaccio et al and Haubrich J. et al.<sup>4,11</sup> The commonest age of presentation was 26-35 years whereas P.Capaccio et al had peak incidence between the age of 30-60 years.<sup>4</sup> Submandibular gland (60%) was more commonly involved than parotid gland (40%) where as in studies of P.Capaccio et al and Bodner L.<sup>4,12</sup> submandibular gland involvement was 80-90%. We had significant number of parotid gland lesion as being only centre in Mumbai doing sialendoscopy we had lot of referral cases from Mumbai and surrounding region

Common clinical presentation was increase in gland size with meals and swelling over the respective salivary gland also known as 'meal time syndrome'<sup>13</sup> which was universal. Ultrasonography of local part was done in all patients with before and after sialogogue<sup>8</sup> and Computed Tomography of Neck (Figure-3 ) was done in patients who had sialolithiasis on ultrasonography.

The investigations confirmed salivary gland disease. Depending



upon clinical presentation as well as above imaging reports either diagnostic or therapeutic sialendoscopy was planned.

Sialendoscopy can be performed under local as well as general anaesthesia depending upon the site of involvement and the age of the patient. We did most of the cases under general anaesthesia.

Diagnostic sialendoscopy helped in visualization of ductal system upto terminal branches and also diagnosis of any obstructive pathology of the lumen. It is an essential tool to diagnose obstructive lesion in the ductal system prior to therapeutic sialendoscopy. Even when there was no obstructive lesion like stricture, stenosis or narrowing, we observed that there was edema of ductal system which was cause of symptoms. Injection of diluted Hydrocortisone reduced the edema of ductal

system and prevented recurrence of symptoms.

Those patients with obstructive lesions like sialolithiasis, stricture, stenosis and ductal narrowing were treated by therapeutic sialendoscopy. In case of sialolithiasis, under sialendoscopic guidance removal of calculus was done by the use of burr, basket (Figure-4) and forcep. Sometimes large calculus near to proximal end of the duct required slitting and marsupialization for removal and if anticipated patients were informed about it prior to surgery and consent was taken accordingly.

Use of endoscopic balloon catheter for atraumatic serial dilation and sometimes stenting like in case of ductal narrowing, adhesions, stenosis and stricture can also be done by sialendoscopy. Sialendoscopy can be done by using various sialendoscope (Figure-5).

So now a days salivary gland excision is no longer considered as first option for obstructive salivary gland disease and also procedure of choice for calculus removal.<sup>14</sup>

In our series one of our patient of submandibular gland calculus had recurrence of symptoms for which revision sialendoscopy was done and patient was relieved of symptoms. Our recurrence rate of 5% was similar to Nahlieli O, Baruchin AM<sup>15</sup> who had 2% recurrence and Marchal F et al<sup>16</sup> who had 5% recurrence.

Thus sialendoscopy is minimally invasive, safe, more physiological procedure to treat benign salivary gland conditions.

## CONCLUSION

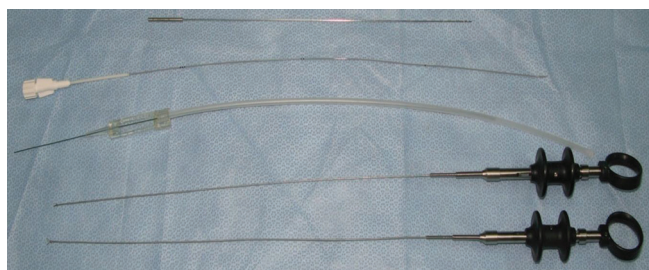
We conclude that sialendoscopy is more physiological and safe approach towards pathology involving the salivary glands. Nowadays salivary gland excision is no longer considered as first option for obstructive disease and also procedure of choice for calculus removal. Sialendoscopy has its limitations like high cost of disposables, lack of training facilities and lack of expertise but with the procedure getting popular steadily lack of expertise will no longer be an issue.

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**Figure-3:** Axial view of CT Scan s/o right Submandibular duct calculus)



**Figure-4:** Instruments of sialendoscopy:from top Burr,Basket,Guide wire,forceps with different grasp)



**Figure-5:** Marchal System of sialendoscopy instruments:diagnostic as well therapeutic sialendoscope)

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