

Sialendoscopy, a minimally invasive diagnostic and interventional procedure for the management of salivary gland diseases

Sialendoskopija, minimalno invazivni diagnostični in intervencijski način obravnave bolezni žlez slinavk

Aleksandar Aničin, Jure Urbančič

University Medical Centre
Ljubljana, Department
of Otorhinolaryngology
and Head & Neck
Surgery, Zaloška 2, 1000
Ljubljana, Slovenia

Korespondenca/ Correspondence:

Aleksandar Aničin MD,
PhD,
e: aleksandar.anicin@
kclj.si

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Izvleček

Izhodišča: Sialendoskopija je nova veja minimalno invazivne kirurgije, ki omogoča posege v sisteme vodov velikih žlez slinavk. Klinika za otorinolaringologijo in cervikofacialno kirurgijo v Ljubljani deluje kot skupni otorinolaringološki sialendoskopski center obeh slovenskih univerzitetnih kliničnih centrov. Želeli smo predstaviti uspehe tega novega načina obravnave pri nas.

Bolniki in metode: V pregled uspešnosti sialadenoskopije smo vključili vse bolnike, ki smo jih od začetka leta 2011 do danes endoskopsko obravnavali zaradi bolezni velikih slinavk. Pri 118 bolnikih smo se odločili za sialendoskopijo oziroma sialendoskopsko vodeno operacijo. Opravili smo 131 tovrstnih posegov (78,6 % v lokalni anesteziji), z načrtovanim endoskopskim pregledom skupaj 137 žlez slinavk. Pogosteje je bil prizadet sistem izvodil podčeljustne žleze (66 %).

Rezultati: Naš delež neuspešnega uvajanja sialendoskopa je znašal 2,9 %, kar je primerljivo z najboljšim rezultatom v tujini. Najpogostejši interventni poseg je bil sialendoskopsko-asistirani kombinirani pristop za odstranjevanje kamnov iz slinovodov (36 bolnikov). Če dodamo še 16 primerov odstranitve kamnov z endoskopsko žično košarico, dobimo skupno število 52 uspešnih odstranitve salivarnih kamnov. Pri 40 bolnikih smo našli zožitve brez kamnov, pri 19 izmed njih opravili dilatacijo slinovoda in v 11 primerih nato vstavili začasno opornico. Pri treh bolnikih s stenozo same submandibularne papile, ki po našem mnenju predstavlja ločeno klinično entiteto, smo naredili mikrokirurško duktostomijo. Večjih zapletov sialendoskopskih operacij nismo zabeležili, se pa je letno število odstranitve žlez slinavk zaradi njihove zastojne bolezni v primerjavi z obdobjem pred uvedbo sialendoskopije znižalo za 90 %.

Zaključki: Menimo, da je sialendoskopija nova paradigma minimalno invazivne kirurgije, ki je temeljito spremenila zdravljenje obstruktivne bolezni žlez slinavk.

Abstract

Introduction: Sialendoscopy is a novel method of minimally invasive surgery, which allows diagnostic and interventional procedures in the ductal systems of the salivary glands. Clinical Department of Otorhinolaryngology and Cervicofacial Surgery Ljubljana is a joint otorhinolaryngological sialendoscopy center, run by both Slovenian University Medical Centers. The authors aimed to present the success of this new approach in Slovenia.

Patients and methods: Since 2011, we have submitted 118 patients to sialendoscopy and sialendoscopy-assisted interventions because of salivary gland swelling, and performed 131 operations (78.6 % under local anesthesia), with an attempted examination of a total of 137 salivary glands. The patients had mainly submandibular problems (66 %).

Results: So far, our rate of failed sialendoscope introductions has been 2.9 %, which is comparable to the best results abroad. The most common interventional procedure was sialendoscopy-assisted combined approach to salivary stone removal (36 cases). Adding 16 cases of wire basket stone retrievals, we achieved a total of 52 successful stone extraction procedures. We found ductal stric-

tures without sialolithiasis in 40 patients and dilatation was performed in 19 of them, followed by a temporary stent insertion in 11 cases. In three patients with submandibular papillary stricture, we performed microsurgical ductostomy; our experience supports its recognition as a specific clinical entity. With no serious complications, the practice of sialendoscopy at our department reduced the need of salivary gland resections due to obstructive disease by 90 %.

Conclusions: We believe that sialendoscopy is a new minimally invasive approach paradigm that fundamentally changes the treatment of obstructive salivary gland diseases.

Introduction

In Slovenia, several new diagnostic and therapeutic procedures were introduced in otorhinolaryngology in the last years.¹ During the last decade, endoscopy of the salivary ducts or sialendoscopy was established in Europe and worldwide. Professor Francis Marchal from Geneva had a crucial role in developing a novel use of a miniaturized endoscope with a rinsing system for sialendoscopy. He achieved good visibility inside the salivary ducts with the use of gradually increasing calibers of endoscopes. In order to facilitate the access to the ducts and the evolvement of interventional techniques, various diameters and types of endoscopes and outer sheath systems were designed.²

Sialendoscopy is a specific surgical procedure. In order to introduce a sialendoscope into a salivary duct, it is necessary to prepare the papilla using dilators of increasing diameters. In the interventional phase of the procedure, we are dealing basically with two types of pathology, i. e. salivary stones and strictures. Various wire baskets are used for the retrieval of whole stones or their particles after lithotripsy. To dilate a stricture, a wide assortment of necessary instruments is available: guide wires, bougies and balloon dilators along with endoscopes and sheaths of various diameters. With the exception of presumably complicated and pediatric cases, most sialendoscopy procedures can be performed under local anesthesia.

From 2011, diagnostic and interventional sialendoscopies have been perfor-

med at the Department for Otorhinolaryngology and Cervicofacial Surgery, the University Medical Centre Ljubljana, Slovenia. The purpose was to present the indications and the success of this new diagnostic and therapeutic procedure in our centre.

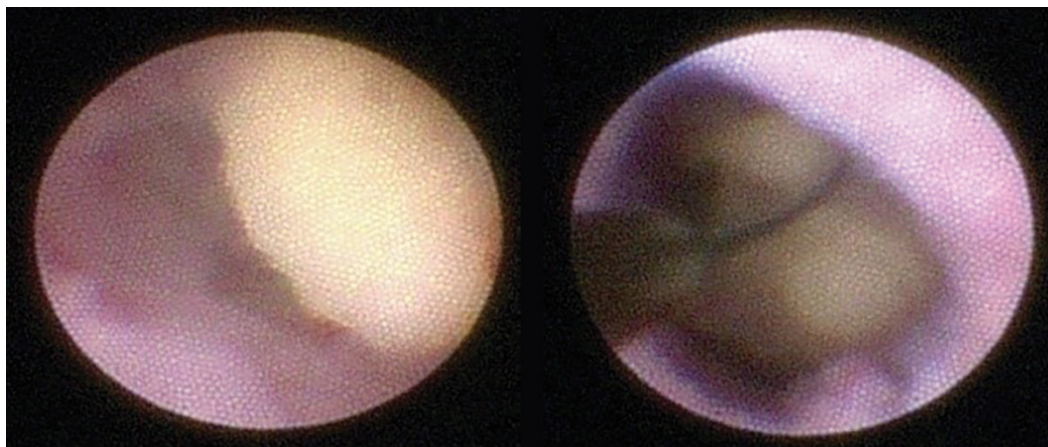
Patients and methods

The purpose of our study is to present the success of sialendoscopy and sialendoscopy-assisted operations in Slovenian otorhinolaryngological setting.

All patients treated for sialolithiasis or swelling of the salivary glands in the period 2011–2015 were included. Since the beginning of 2011, we have performed more than 200 clinical examinations of patients with swelling of the salivary glands.

During clinical examination, we were searching for sialendoscopy candidates, i. e. patients with episodes of salivary gland swelling or sialadenitis. Beside the routine ENT examination, we performed a thorough palpation of the neck, the floor of the mouth and parotid regions searching for swollen salivary glands, other palpable lumps and salivary stones. A focused estimation of the affected gland's papilla (using magnification and salivary probes), the anatomy of the mandible, teeth, tongue, floor of the mouth and the patient's capability to comply with the procedure was particularly useful when deciding on the type of anesthesia.

Figure 1: Salivary stone *in situ* and during wire basket retrieval.



Ultrasound examination was carried out in all patients in order to detect salivary stones, to estimate major salivary glands and to exclude possible tumor growth of any kind; consequently, ultrasound-guided aspiration biopsy was also performed when necessary.

In 10 patients, native X-ray of the floor of the mouth was performed in order to diagnose salivary stones.

Sialography was performed only in two patients with tight distal strictures of the Stensen's duct diagnosed by sialendoscopy, in order to show the state of the proximal ductal system i.e. its part beyond the reach of the endoscope.

As a result of the aforementioned work-up, 118 patients were selected for the endoscopic procedure. There were 57 female and 61 male patients, at an average age of 48 years (median 47.5 years). We performed 131 sialendoscopic and sialendoscopy-assisted procedures rou-

ghly in two thirds because of submandibular pathology (66 %). The actual number of glands submitted to sialendoscopy was in fact higher (137) because the procedure was performed on two different glands in 6 patients.

At the end of almost all sialendoscopy procedures, corticosteroids were injected through the sialendoscope and all patients received antibiotics postoperatively.

The data on the results of imaging before the sialendoscopy, the exact indications for sialendoscopy, the type of procedure, the findings of the procedure and the follow-up of the patients were obtained from the medical documentation. In order to assess the influence of the use of the new endoscopic procedure on the necessity to extirpate the salivary gland because of chronic inflammation, the number of these procedures/per year was presented in the period 1996–2015.

Table 1: The indications for sialendoscopy vs. affected gland in 118 patients submitted to sialendoscopy.

Indication / affected gland	Sialolithiasis	Stricture-dilatation	Stone / stricture / dilatation combined	Malignant / benign oral cavity lesion	Sialadenitis – recurrent gland swelling	JRP	Total
Parotid gland	5	24	2	1	4	3	39
SM	52	16	3	1	7		79
Total	57	40	5	2	11	3	118

SM: submandibular, **JRP:** juvenile relapsing parotitis.

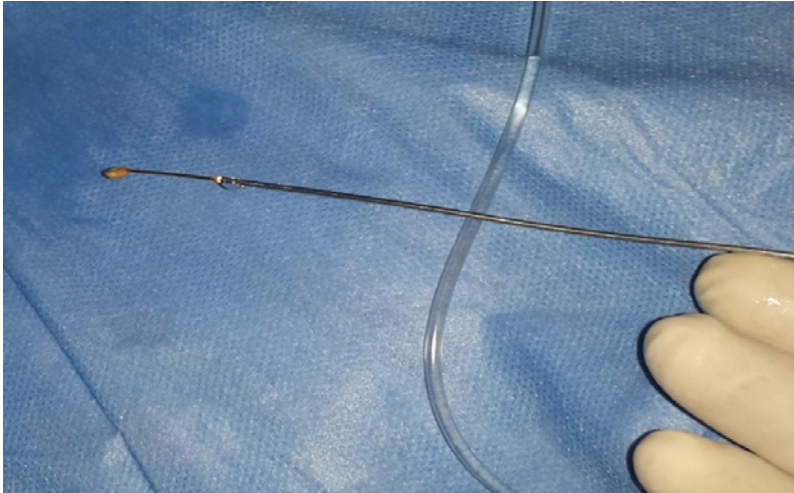


Figure 2: A tiny salivary stone just removed from the Stensen's duct using a sialendoscopic wire basket.

Results

Ultrasound examination proved to be very useful in determining obstructive salivary disease, but in some cases, it failed to diagnose rather long but narrow salivary stones (4 stones with a longer diameter of 8–10 mm and transverse 2.5–4 mm).

Native floor-of-the mouth X-ray showed a salivary stone in five out of 10 patients, and in one of them, even an osteoma of the mandible.

Sialography showed a sausage-like series of strictures and dilatations in one patient and leakage outside the duct at the place of the stricture in another. In the first case, a balloon dilatation with a temporary stent insertion was scheduled at first instance, while the second patient reported a substantial improvement in the sense of lesser intensity and frequency of swelling episodes after just a diagnostic procedure.

We performed most of the procedures under local anesthesia (103/131; 78.6%). Salivary pathology of the patients submitted to sialendoscopy depending on the affected gland is shown in Table 1.

The most common interventional procedure was a sialendoscopy-assisted salivary stone removal by combined approach, which was performed in 32 cases using intraoral mucosal incision, and in 4 cases, skin incisions.

Of a total of 52 successful stone extraction procedures (mostly submandibular–87%), wire basket retrieval of floating salivary stones was performed in 16 cases (Figures 1 and 2). In all patients, a total of only 2 salivary gland extirpations were necessary in order to cure the patient. In one patient, submandibular gland was removed 6 months after a stone extraction by combined approach because of a salivary fistula in the posterior part of the floor of the mouth and an annoying salty taste. In the other case, the gland was extirpated as a final stage of a step-by-step operation, after unsuccessful wire basket retrieval and combined approach through both, intraoral mucosal and skin incisions. We had no emergency salivary gland extirpations due to interventional instruments failure – stuck basket, balloon or wire.

The types of interventions for salivary stone extraction or spontaneous outcomes in 62 patients with sialolithiasis submitted to sialendoscopy, depending on the affected gland (parotid or submandibular), are shown in Table 2.

Table 2: Types of interventions or spontaneous outcomes after sialendoscopy depending on the type of the affected gland in 62 patients with sialolithiasis submitted to sialendoscopy.

Interventions / Glands affected	Wire basket retrieval	Combined approach-mucosal incision	Combined approach-skin incision	Improved flow of saliva	Spontaneous extrusion	Gland removal	Total
Parotid gland	3	1	2	1	1		8
SM	13	31	2	2	5	1	54
Total	16	32	4	3	6	1	62

Figure 3: Stensen's duct stricture on sialendoscopy and intraoral view of a temporary stent in the salivary duct.



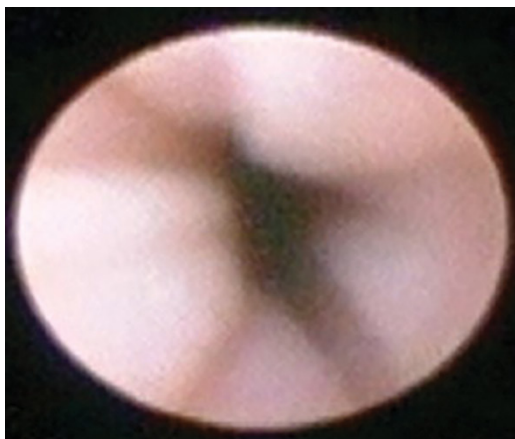
Salivary duct strictures without signs of sialolithiasis were found in 40 patients, mostly of Stensen's ductal system (24 patients). Dilatation was performed in 19 of them, followed by a temporary stent insertion in 11 cases (Figure 3).

In three patients with a stricture of Wharton's papilla proper, a typical, "esophagus-like" endoscopic look of the main duct was observed and a permanent microsurgical ductostomy was created (Figure 4).

We had no serious complications, e.g. heavy bleeding or permanent damage to the nerves passing through the surgical area. In one patient, a paralysis of the lower branch of the facial nerve lasting for approximately 4 hours occurred because of local anesthetic leakage after stricture dilatation.

In five cases, the introduction of the endoscope was conventional but difficult (four times in the Stensen's and once in the Wharton's duct). In eight cases, we managed to insert the endoscope into the submandibular duct via a mucosal incision near the papilla using microsurgical technique, and in three of them, a permanent ductostomy was formed (in two cases, also resecting the papilla). No pronounced fibrosis or inflammation was detected by the histopathological examination of the removed papillae. In four cases, we did not manage to enter the salivary duct (ultrasound of two among them showed severe chronic salivary gland inflammation and cystic dilatations of the salivary duct). Therefore, our rate of failed sialendoscope introductions is 2.9 % so far (4/137).

Figure 4: "Esophagus-like" Wharton's duct in a patient with papillary stricture and a microsurgical ductostomy in the same patient with a probe in the lumen.



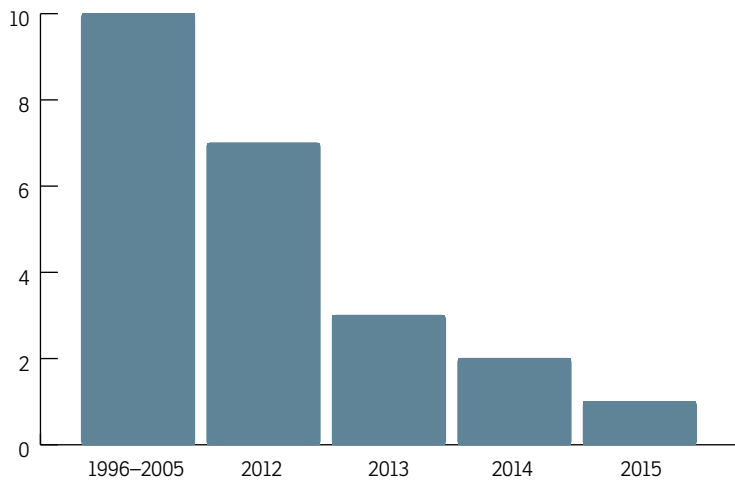


Figure 5: Number of salivary gland resections per year in patients with obstructive salivary disease in the period before the introduction of sialendoscopy (1996–2005) and after introducing sialendoscopy (2012–2015) at the Department of Otorhinolaryngology and Cervicofacial Surgery, University Medical Centre Ljubljana, Slovenia.

True papillotomies (of a maximum length of 3 mm) were performed only with wire basket stone retrievals, by pulling the stone through the papilla.

So far, recurrent salivary gland swelling after sialendoscopy was rare in our patients. Some of them were still suffering from episodes of juvenile relapsing parotitis (3 cases) or swelling/inflamations in the adults, without endoscopic findings of obstruction (5 patients). Four patients were scheduled for a new attempt of sialendoscopic dilatation of stricture and, eventually, either duct reconstruction or resection of the gland. Finally, relapsing episodes in these patients are quite rare and can be coped by introducing small changes in daily diet.

Before the introduction of sialendoscopy at our department, covering the medical care of a population of roughly 1.5 million, we performed on average 10 gland extirpations per year because of obstructive salivary disease (1996–2005; 90 % submandibular glands). Sialendoscopy gradually reduced salivary gland resections at our department by 90 % (Figure 5).

Discussion

According to the review of the results of treatment of the obstructive salivary gland diseases, so far our experience has been encouraging.

In discussing new minimally invasive approach paradigms, the crucial question is whether this new diagnostic and therapeutic approach to the treatment of the salivary glands is changing the routine in terms of reducing the need for classic surgery of the salivary glands. Like in our experience, a reduced need for salivary gland resections, due to the use of interventional sialendoscopy was also reported by other authors,³ thereby justifying its spread worldwide.

The sialendoscope introduction, especially in the submandibular duct, represents in certain cases one of the most demanding surgical procedures. Gentle handling with the papilla under magnification and great experience are the keys to successful sialendoscopy. The incidence of failed sialendoscope introductions in our series (2.9 %) was comparable with the results reported in the literature.^{2,4,5}

We suppose that a stricture of the submandibular papilla constitutes a separate etiological entity, which must not be confused with a common “difficult papilla” or a consequence of an early learning curve phase. In our series, we have performed a resection of a very narrow papilla of the submandibular duct in two patients. Despite the absence of pronounced fibrosis or inflammation in the histopathological findings of the removed papillae, we concluded that in 3 particular cases stricture evolved at the orifice of the Wharton’s duct proper due to: a very small amount of saliva at the papilla

while “milking” the duct, an impossible introduction of even the thinnest probe into the duct, an impossible retrograde dilatation of the papilla, and a really dilated (up to 6 mm) main duct with its endoscopic “esophagus-like” look.

In cases of a true submandibular papillary stricture, a retrograde dilatation with placing a stent is impossible, so it has to be treated by creating a permanent microsurgical ductostomy and even a resection of the inflamed papilla to prevent restenosis. French authors described precisely the histological features of a submandibular papillary stricture: significant deposition of collagen fibers with abundance of inflammatory cells and absence of mucosal folds (6). The absence of the prominent fibrosis and inflammation in our histological sections of the removed impassable papillae can be explained by the small size of the specimen and probable skipping of the true orifice while processing the specimen. Irrespective of the lack of histological confirmation, the other clinical evidence in favor of the diagnosis of papillary stricture was more than sufficient in our cases.

Submandibular papillary stricture is becoming recognized as a separate

clinical entity, and some respective surgical solutions have been described by few authors in recent years (6,7,8). Anyhow, we emphasize a need for microsurgical ductostomy formation along with papillary resection in cases with prominently inflamed and swollen stenotic papillae. When speaking about more proximal strictures, we wish to improve our results with better assortment of endoscopes and disposable supply.

We achieved good results using sialendoscopy in patients with salivary stones. We are expecting even better results with the use of intraluminal lithotripsy system to avoid a part of combined-approach stone removals.

Conclusion

We believe that sialendoscopy fundamentally changed the approach to the treatment of obstructive salivary gland diseases. Sialendoscopy represents a new chapter in minimally invasive surgery, enabling us to spare the salivary glands and avoid open surgery with exposing the facial nerve or its branches to potential damage.

References

1. Šifrer R, Urbančič J. The narrow-band imaging examination method in otorhinolaryngology. *Zdrav Vestn* 2013; 82: 602–11
2. Marchal F, Dulguerov P, Lehmann W. Interventional sialendoscopy. *New Engl J Med* 1999; 341: 1242–1243.
3. Rasmussen E, Lykke E, Wagner N, Nielsen T, Waersted S, Arndal H. The introduction of sialendoscopy has significantly contributed to a decreased number of excised salivary glands in Denmark. *Eur Arch Otorhinolaryngol* DOI 10.1007/s00405-015-3755-x.
4. Marchal F, Becker M, Dulguerov P, Lehmann W. Interventional sialendoscopy. *Laryngoscope* 2000; 110: 318–320.
5. Marchal F, Dulguerov P, Becker M, Barki G, Disant F, Lehmann W. Submandibular diagnostic and interventional sialendoscopy: new procedure for ductal disorders. *Ann OtolRhinolLaryngol* 2002; 111: 27–35.
6. Lopez Jean-Michel. How to recognize a submandibular papillary stricture: when and how to perform marsupialization? In: Marchal Francis (editor). *Sialendoscopy, the hands-on book*. Tuttingen: Karl Storz, 2016, pp. 160–161.
7. Aničin A, Urbančič J. Sialendoscope introduction via a floor of the mouth incision: a case report. In: Marchal Francis (editor). *Sialendoscopy, the hands-on book*. Tuttingen: Karl Storz, 2016, pp. 296–297.
8. Chang JL, Eisele DW. Limited distal sialodochotomy to facilitate sialendoscopy of the submandibular duct. *Laryngoscope* 2013; 123: 1163–7.