ORIGINAL ARTICLE
HEAD AND NECK SURGERY AND ONCOLOGY
DOI: 10.5152/B-ENT.2021.21258

Retrograde probing technique to enter Wharton's duct at sialendoscopy

Gökhan Altın, Necdet Özçelik

Department of Ear Nose Throat and Head and Neck Surgery, İstanbul Medipol University, İstanbul, Turkey

Cite this article as: Altın G, Özçelik N. Retrograde probing technique to enter Wharton's duct at sialendoscopy. B-ENT 2021; 17(4): 249-54.

ABSTRACT

Objective: The retrograde probing technique defined here, that is used where the Wharton papilla cannot be isolated and the standart procedure cannot be applied, has minimal impact on normal anatomy. The efficiency and the safety of this technique is discussed in this study.

Methods: The study was conducted in patients who had been diagnosed as stone in the submandibular gland. The method we call "retrograde probing" was applied to 11 patients in whom the Wharton's duct papilla could not be isolated.

Results: In all cases in this study, it was possible to enter the canal by this method. The insertion of 1.6 mm all-in-one endoscope; as a result, can be evaluated as success. The study did not evaluate stone-related interventions after entering the canal.

Conclusion: Based on the results, retrograde probing is determined as a safe method in cases where Wharton canal entry cannot be isolated.

Keywords: Retrograde probing, salivary glands, sialendoscopy, sialolithiasis, wharton's duct

Introduction

Sialolithiasis is the major cause of obstructive sialadenitis and most commonly occurs in the submandibular gland (1). The clinical picture occurs as a result of the mechanical blockage of the salivary gland ducts caused by the formation of stone. In patients where the blockage is accompanied by infection, fever along with inflamed discharge from the canal orifice and painful swelling of the gland are seen. Ductal stenosis, chronic sialadenitis, foreign body, anatomical variations of the duct, tumors, and so forth are other obstructive pathologies (2, 3).

Since its entry into clinical practice, sialendoscopy has been a preferred diagnostic and treatment tool for ductal diseases of salivary glands (4). In the treatment of sialolithiasis, sialendoscopy, being a minimally invasive method, is considered the first choice. Highly successful results have been obtained in the diagnosis and treatment of obstructive salivary canal pathologies (5-7). Sialendoscopy with endoscopic images allows the removal of stones through the canal using a number of specially manufactured instruments. As the rate of use increases, the excision rate of the salivary gland and the risks of complications associated with surgery decrease (6, 7).

Sialendoscopy includes the following stages respectively; crossing the papilla, endoscopic visualization, and treatment of the salivary canal (6-8). The most important obstacle is dilatation of the papilla in the first stage and passing the endoscope through it. This problem is more pronounced especially in isolating and dilating the submandibular canal papilla. Detecting the submandibular papilla and providing entry from here is more difficult and takes a longer time than the parotis canal papilla (4, 8). In patients undergoing sialendoscopy, inadequate entrance from the papilla of the Wharton canal and dilatation insufficiency is 20% (8). Therefore, in patients where the Wharton canal papilla cannot be found and the standard procedure cannot be applied, we have described a new technique that we call "retrograde probing" to find the canal papilla with minimal effect on normal anatomy and to perform standard sialendoscopy from the canal orifice.

Methods

The study was designed retrospectively. Ethics committee approval was obtained for the study (İstanbul Medipol University, ethical committee, reference number: E.59601). Data were obtained between March 2014 and December 2018 from patients who had been diagnosed with submandibular sialoli-

Corresponding Author: Gökhan Altın, drgokhanaltin@hotmail.com
Received: December 12, 2020 **Accepted:** November 14, 2021
Available online at www.b-ent.be

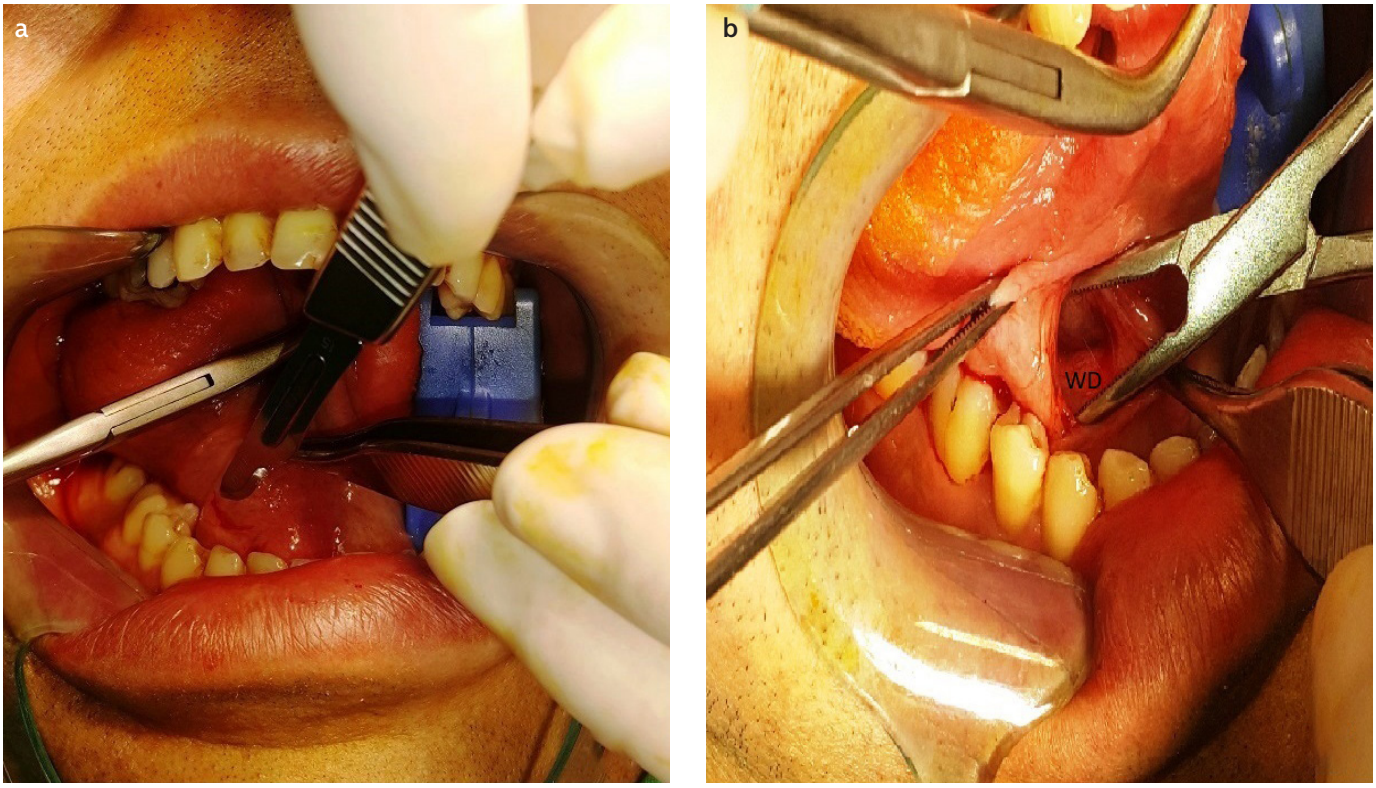

Figure 1. a, b. Mucosal incision to the base of the mouth (a); submandibular canal isolated (b) (WD: Wharton's duct).

thiasis and had undergone sialendoscopy. In all the patients, the diagnosis of sialolithiasis was made using physical examination, ultrasonography, and computerized tomography imaging. Retrograde probing was applied in 11 of these patients whose Wharton's duct papillae could not be isolated during the operation and could not be dilated. Informed consent for the sialendoscopy procedure was obtained from all the patients. Retrograde probing is performed when it is impossible to isolate the orifice of the canal during sialendoscopy. We accepted retrograde probing as a way of isolating the punctum of the salivary gland. The sialendoscopy procedures were performed in the operating room under general anesthesia. The operations were performed by the same surgical team. In this study, a 1.6 mm all-in-one endoscope (KARL STORZ, Tuttlingen, Germany) was used for the sialendoscopy procedure.

In the first stage of the procedure, a local anesthetic was infiltrated into the anterior part of the floor of the mouth. Surgical glasses were used during dissection. A mucosal incision was made to the section matching the canal trace. After incision of the mucosa, the duct was found by blunt dissection (Figures 1a, b). A "fishhook-shaped" green surgical needle was inserted into the canal. The blunt injector tip that curled like a fishing rod, used for washing the lacrimal duct, was advanced retrograde to the punctum from the same place (Figure 2a). Next, the tip of the washing probe was passed through the submandibular papilla into the mouth without any difficulty. The conical dilator with a canal in the center was then placed on the tip of the lacrimal canal washing needle and advanced into the canal through the papilla (Figure 2b). The papilla was dilated with the help of conical dilator with a channel at the center (Figures 3a and b). Then the guidewire was inserted through the conical dilator and inserted into the ductus (Figure 4a). The conical dilator with the middle channel was slid over the guide wire (Figure 4b). The guide was left in place. The sialendoscope was advanced into the salivary canal by Seldinger method (Figure 5a). Endoluminal irrigation was applied, and the 1.6 mm diameter all-in-one sialendoscope was advanced in the canal (Figure 5b). In the above procedure, papillotomy was not performed in any of the patients during endoscope entry through the papilla.

After surgery, a silicone stent was inserted into the canal, paying attention to pass the stent, especially the point that has been entered. The stent was sutured to the mucosa at the base of the mouth and held in place for 3 weeks.

Main Points:

- The most important problem in sialendoscopy is the dilatation of the papillae and passing the endoscope at the first stage.
- The retrograde probing technique provides an easy-to-use solution for the detection and enlargement of the papilla in patients where the submandibular gland papilla is not detected.
- The retrograde probing technique protects normal anatomy for sialendoscopy, is effective, and has a low risk of complications.

Results

A total of 11 patients, 6 females and 5 males, were included in the study. The size (length) of the stones ranged between 3 and 12 mm with an average of 5.4 mm. There was no previous

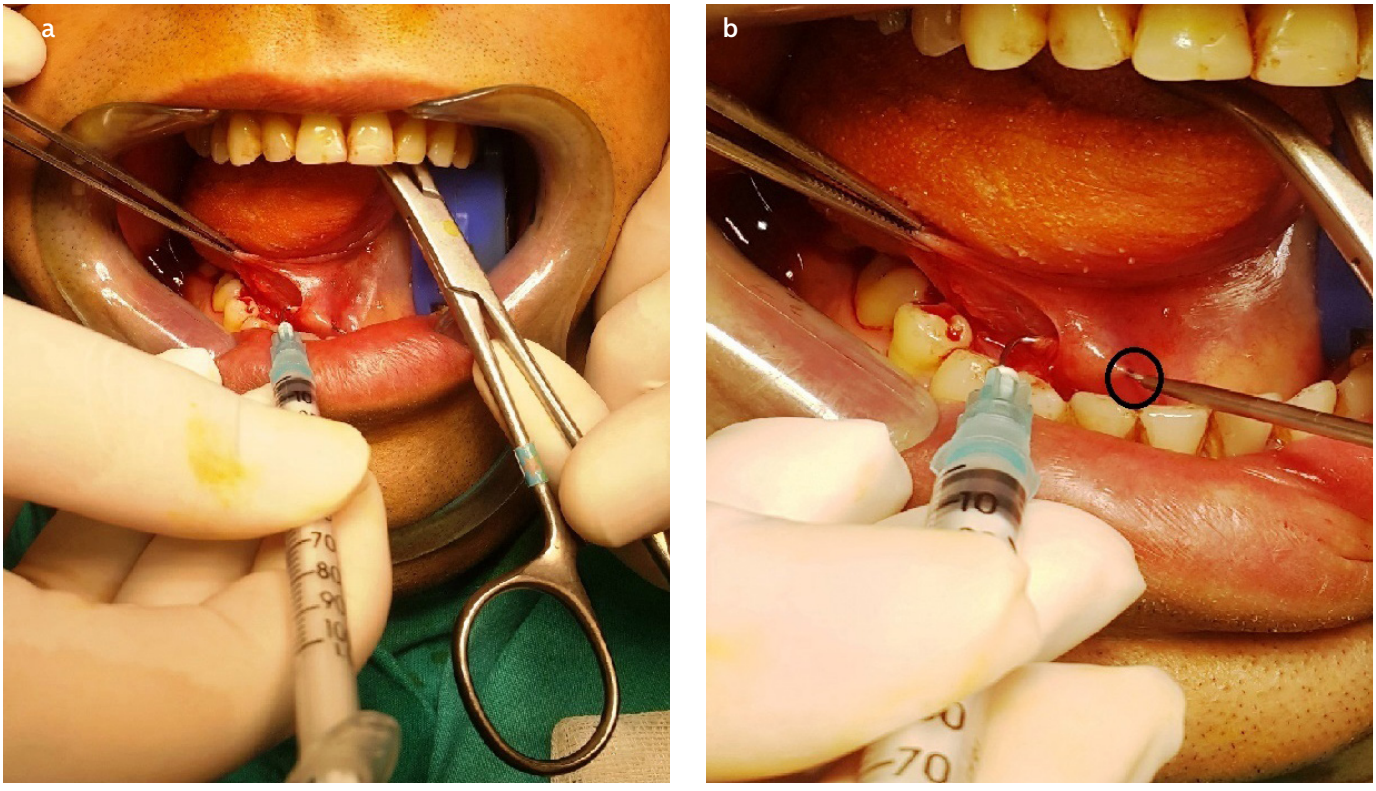

Figure 2. a, b. Fish-hook shaped curled blunt syringe tip advanced retrograde to the punctum. The blunt tip is passed through the papilla into the mouth (a). Conical dilator with a channel at the center is placed at the end of the lacrimal canal washing needle (b) (black ring: duct's papilla).

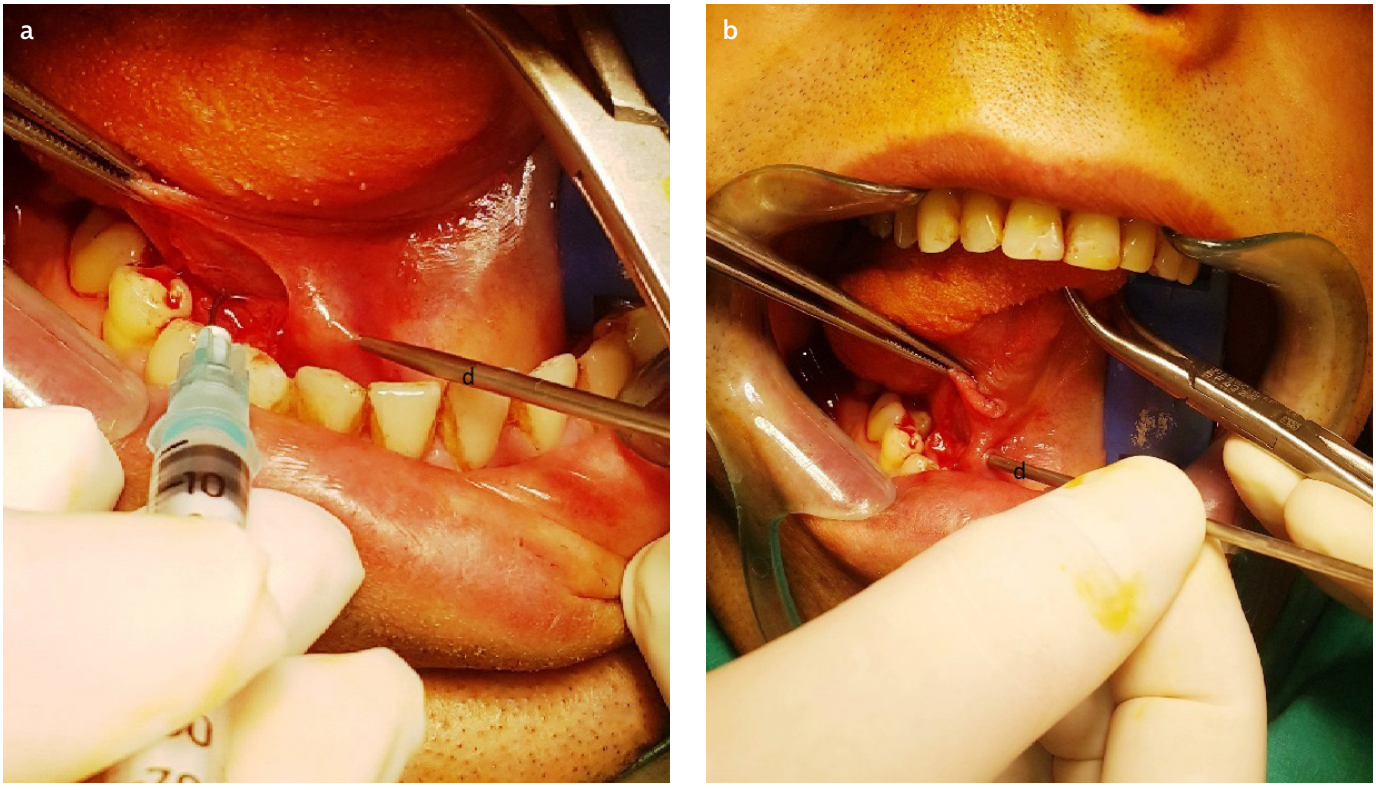

Figure 3. a, b. Dilator advanced into the canal, passing through the papilla (a) and papilla is dilated (b).

history of intervention in any submandibular gland canal. Patients whose submandibular lithiasis was detected as a result of evaluation and whose ductal papilla of the canal could not be dilated during sialendoscopy were included in the study.

As a result of retrograde probing, insertion of 1.6 mm all-in-one endoscope to the salivary canal and initiation of sialendoscopy were accepted as success. In this study, the interventions related to stone and the results of removal of stone were exclud-

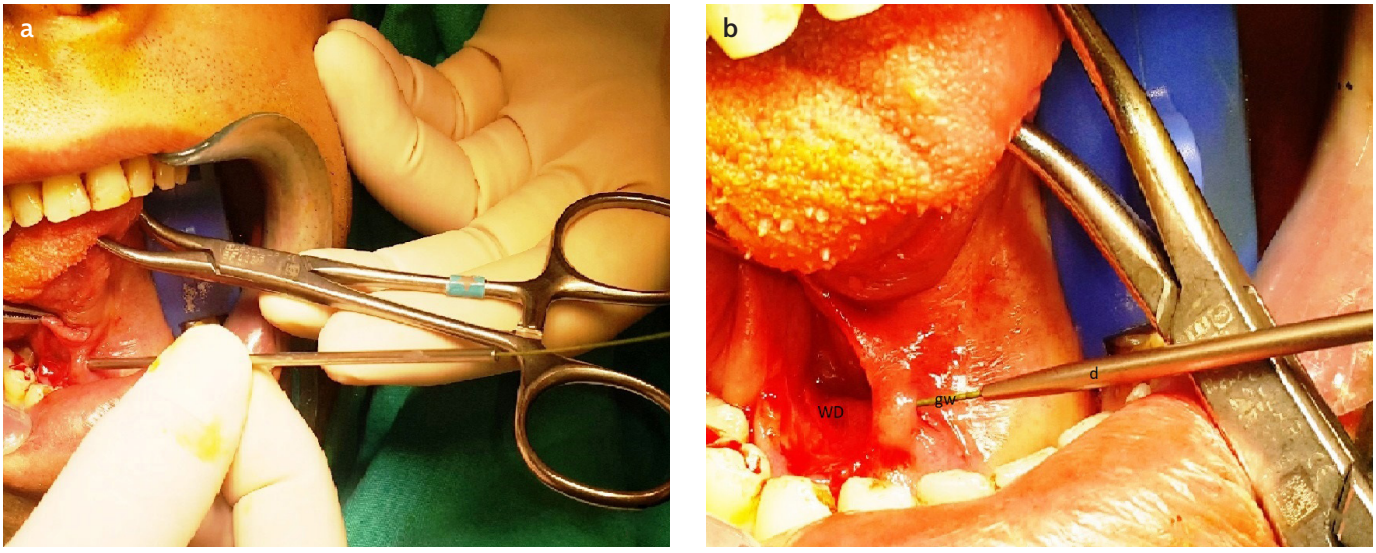

Figure 4. a, b. Guidewire inserted through conical dilator with a channel at the center advanced into duct (a); conical dilator removed leaving guidewire in the Wharton's duct (b).

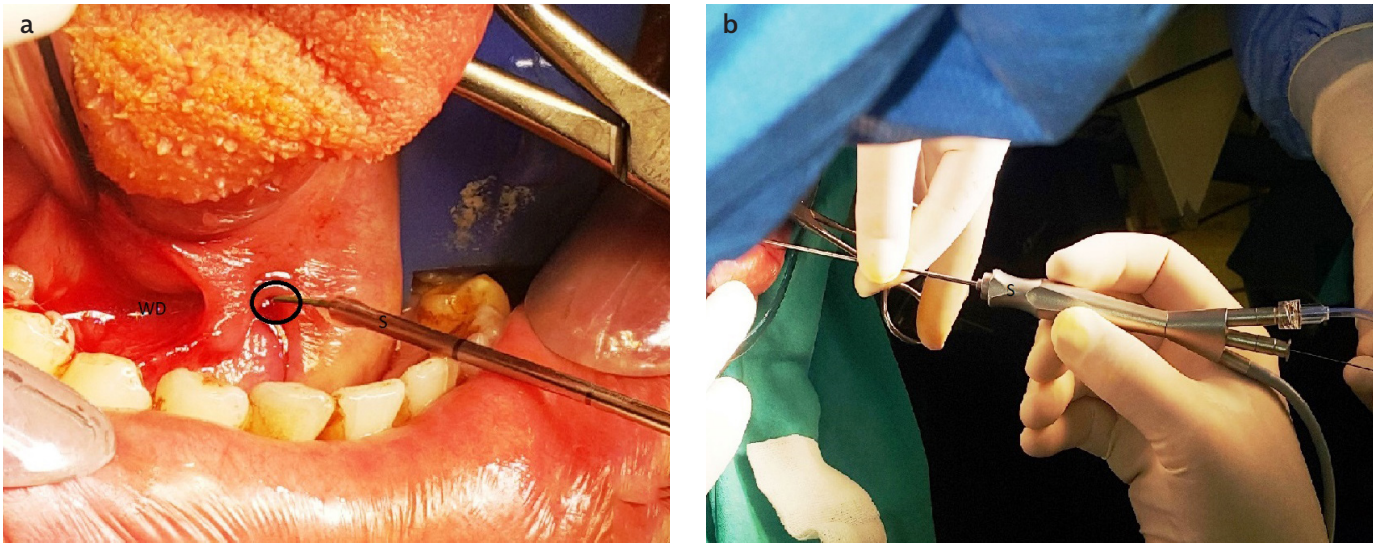

Figure 5. a, b. The guidewire is passed through the intervention channel of the sialendoscope (a); the endoscope is in submandibular canal with the help of guidewire (b).

ed from evaluation. In all patients, the submandibular papilla was isolated and dilated by this method. Sialendoscopy procedure was completed from the normal submandibular canal papilla with the method described.

The canal was entered from a needle hole, and none of the patients had any deficiency in the hydrostatic pressure required to advance the endoscope in the canal. None of the patients had any complications during perioperative and postoperative follow-ups. The patients were followed up for an average of 4.5 months (2-6 months) postoperatively. During the follow-ups, there were no signs of obstruction of the submandibular gland canal in the patients. No additional revision surgery was required in any patient. We observed that staying of stent in the canal for 3 weeks was an unpleasant experience for the patients but did not cause intolerable pain.

Discussion

Although sialendoscopy reduces the complications and risks of sialadenectomy, it is not a very simple technique. Achieving satisfactory results have been shown in studies to be related with the number of procedures carried out and gaining experience through such repeated practice. With the development of appropriate technical instrumentation and the increment of experience of well-trained surgeons, sialoendoscopy has become a safe and indispensable technique (4, 9).

The first step in sialendoscopy is to find the punctum and dilate it until it reaches sufficient width to advance the endoscope. In the standard methods defined and applied, this step is carried out with probes of increasing diameter in sequence. However, sometimes it is not possible to find the canal orifice, and the surgical procedure becomes too prolonged. Therefore, the first step of sialendoscopy is considered the most difficult

step, especially for beginners in sialendoscopy. To overcome this obstacle, we incised the mucosa distally from the papilla and found the duct which was penetrated and followed retrograde to the papilla.

Because of the difficulty in identifying the papilla, various methods have been reported by surgeons performing sialendoscopy. Luers et al. (10) in their study, dripped methylene blue to Wharton's duct outlet at the point where the salivary secretion came out with massage. The point where "wash-out sign" has been seen was determined as canal output. However, massage may not always lead to salivation. Even if it does happen, the location may not often be identifiable. Su et al. (11) used a 20-gauge modified angiocatheter as an applicator at the tip of the sialendoscope to facilitate safe passage through the papilla. They emphasized that the initial difficulties were greatly reduced with this technique, and the operating time was shortened.

There are many studies reporting papillotomy in sialendoscopy applications (12, 13). Studies have reported that papillotomy may cause stenosis and iatrogenic obstruction in later stages (13, 14). In the described technique, no papillotomy was required during the transition of the endoscope to the canal. The reason for this is that after the papilla has been found retrograde, it is dilated enough to allow the endoscope to pass. To avoid stenosis in the postoperative period, we placed an intraductal stent in all the patients.

In their study, Chang et al. (15) made a limited incision in the canal in patients where standard papilla dilatation was not possible, which allowed the endoscope to be advanced into the canal. They inserted the sialendoscope from the distal sialodocotomy into the canal. They left the submandibular canal as opened to the oral cavity. In the retrograde probing method, the canal was entered through the needle hole. The papilla was found and dilated, and the sialendoscope was inserted from the papilla into the canal as in the standard method. In this study, we used laser for the purpose of lithotripsy. Stone fragments, that were fragmented by laser, were removed by a basket catheter and taken out from the papilla. The papilla function continued postoperatively. In addition, we believe that the very small hole we made into the canal did not create a significant deficiency in water pressure in terms of the required hydrostatic pressure after the endoscope had been inserted into the canal.

Chang et al. (15) contended that excessive dissection near the sublingual gland ductules should be avoided to prevent the formation of ranula. We tried to perform submucosal dissection along the submandibular gland ductus area and did not encounter the formation of ranula postoperatively. In addition, none of the patients had recurrent obstructive symptoms during postoperative follow-up. With the technique we used, we were able to achieve successful results without any complications**.** After sialendoscopy, some rare complications such as disruption of canal or papilla anatomy, ductal stenosis, infection, or ranula formation can be encountered. None of the complications listed previously were seen at follow-ups after performing retrograde probing. Retrospective study poses difficulties at clear assessment of complications. Although it does not cause any disorder in the canal anatomy, leaving the stent in the canal for up to 3 weeks caused dissatisfaction in the patients. Considering the reliability of this technique, keeping the stent for less than 3 weeks may be acceptable.

In conclusion, the retrograde probing technique provides an easy-to-use solution for the detection and dilation of the papilla in patients where the submandibular gland papilla cannot be isolated. The success rate of sialendoscopy will be increased by overcoming the difficulties in finding the orifice of the duct with the help of retrograde probing. The most important advantage of this technique is preserving the normal anatomy of the papilla.

Ethics Committee Approval: This study was approved by Ethics committee of İstanbul Medipol University, (Approval No: E.59601).

Informed Consent: Verbal informed consent was obtained from the patients who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – G.A., N.Ö.; Design – G.A., N.Ö.; Supervision – G.A., N.Ö.; Resources – G.A., N.Ö.; Materials – G.A., N.Ö.; Data Collection and/or Processing – G.A., N.Ö.; Analysis and/or Interpretation – G.A.; Literature Search – N.Ö.; Writing Manuscript – G.A., N.Ö.; Critical Review – G.A., N.Ö.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Bodner l. Salivary gland calculi: diagnostic imaging and surgical management. Compendium 1993;14: 572-86.
2. Maresh A, Kutler Di, Kacker A. Sialoendoscopy in the diagnosis and management of obstructive sialadenitis. Laryngoscope 2011;121: 495-500. [Crossref]
3. Koch M, Zenk J, Iro H. Algorithms for treatment of salivary gland obstructions. Otolaryngol Clin North Am 2009; 42:1173-92. [Crossref]
4. Luers JC, Damm m, Klussmann JP, et al. The learning curve of sialoendoscopy with modular sialoendoscopes: a single surgeon's experience. Arch Otolaryngol Head Neck Surg 2010; 136: 762-5. [Crossref]
5. Koch M, Hung SH, Su CH, et al. Intraductal lithotripsy in sialolithiasis with two different Ho:YAG lasers: presetting parameters, effectiveness, success rates. Eur Rev Med Pharmacol Sci 2019; 23: 5548-57.
6. Strychowsky JE, Sommer DD, Gupta MK, et al. Sialendoscopy for the management of obstructive salivary gland disease: a systematic review and meta-analysis sialendoscopy for salivary gland obstruction. Arch Otolaryngol Head Neck Surg 2012; 138: 541-7. [Crossref]
7. Witt RL, Iro H, Koch M, et al. Minimally invasive options for salivary calculi. Laryngoscope 2012; 122: 1306-11. [Crossref]
8. Chossegros C1, Guyot L, Richard O, et al. A technical improvement in sialendoscopy to enter the salivary ducts. Laryngoscope 2006; 116: 842-4. [Crossref]
9. Farneti P, Macrì G, Gramellini G, et al. Learning curve in diagnostic and interventional sialendoscopy for obstructive salivary diseases. Acta Otorhinolaryngol Ital 2015; 35: 325-31. [Crossref]

10. Luers JC, Vent J, Beutner D. Methylene blue for easy and safe detection of salivary duct papilla in sialendoscopy. Otolaryngol Head Neck Surg 2008; 139: 466-7. [Crossref]
11. Su CH, Hung SH. Easy insertion into the duct: The use of an angiocatheter as a sialendoscopy applicator. Laryngoscope 2018; 128: 1392-4. [Crossref]
12. Bowen MA, Tauzin M, Kluka EA, et al. Diagnostic and interventional sialendoscopy: a preliminary experience. Laryngoscope 2011; 121: 299-303. [Crossref]
13. Nahlieli O, Baruchin AM. Sialendoscopy: three years' experience as a diagnostic and treatment modality. J Oral Maxillofacial Surg 1997; 55: 912-8. [Crossref]
14. Marchal F, Becker M, Dulguerov P, et al. Interventional sialendoscopy. Laryngoscope 2000; 110: 318-20. [Crossref]
15. Chang JL, Eisele DW. Limited distal sialodochotomy to facilitate sialendoscopy of the submandibular duct. Laryngoscope 2013; 123: 1163-7. [Crossref]