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RESEARCH ARTICLE

Retrospective Evaluation of the Treatment of Wharton's Duct Stones with Transoral Approach

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Abstract

Objective: Sialolith is one of the most common causes of salivary gland obstruction and often leads to sialadenitis. It usually seen in the submandibular gland around 80-90 percent. In this retrospective study, we aimed to retrospectively evaluate the treatment of sialoliths in different parts of the Wharton duct with transoral approach using minimally invasive techniques.

Methods: After the clinical and radiological examination of eight patients, six male and two female patients, transoral removal of sialoliths detected in Wharton duct was decided. All surgical interventions were performed with a transoral approach using minimally invasive surgical techniques. Six patients were treated under general anesthesia and two patients were treated under local anesthesia.

Results: 8 patients aged between 29-81 years who were transoral surgically removed Wharton duct stones. During the 20-month follow-up period, no intraoperative or post-operative complications such as bleeding and lingual nerve injury were observed. According to the results of the survey, 75% of the patients were very satisfied, 12.5% were satisfied and 12.5% were dissatisfied with the result**.**

Conclusion: The transoral approach may be considered as a more effective option for the treatment of Wharton duct sialoliths because of the high success rate and the wider use indication compared to non-invasive procedures such as ESWL and sialendoscopy.

Key words: Wharton duct, sialolith, transoral

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Introduction

Sialolith is a calcified structure of salivary glands, often causes acute and chronic infection and obstruction of salivary gland duct (Im et al., 2017). The sialoliths is usually seen in the submandibular gland around 80-90 percent, followed by the parotid gland 5-20 percent (Lustmann et al., 1990; Matsunobu et al., 2014). The reason of the high rate in the submandibular gland is the secretory content is rich in calcium, two perpendicular curves during the course of the duct and the long channel length (Fonseca, 2000; Liao et al., 2007).

Patients usually refers to dentist complaint of swelling and pain during eating, however sialolith can be noticed without any symptoms while routine clinical and radiological examination (Kraaij et al., 2014; Goodstein et al., 2017). Standard x-ray films, computed tomography, sialography, ultrasonography which is a noninvasive method of

diagnosis, and magnetic resonance sialography, is a new diagnostic procedure, can be used for diagnosis of sialoliths (Marchal and Dulguerov, 2003). 40 percent of the submandibular sialolith are seen in the anterior third of the Wharton duct and can be easily removed by intraoral approach. Removable of the submandibular sialolith in the proksimal part via intraoral approach, especially posterior third, is more difficult. At the same time, this treatment modality, is the minimally invasive traditional surgical technique, increases the submandibular gland and lingual nerve damage (McGurk et al., 2005).

Traditionally, the sialoliths are treated with medical drugs or intraoral-extraoral surgical procedures such as the excision of the salivary gland (Matsunobu et al., 2014; Goodstein et al., 2017). Lingual or facial nerve damage and morbidity are usually seen after major surgeries that are worrying for patients and requiring hospitalization (Hald and Andreassen, 1994; Combes et al., 2009; Matsunobu et al., 2014). Recently, minimal invasive techniques which are Extracorporeal Shock Wave Lithotripsy (ESWL) and sialendoscopy, are use for the treatment modalities of the salivary gland stones (McGurk et al., 2005; Goodstein et al., 2017). ESWL and sialendoscopy are successful procedure in a limited number of patient (ESWL, <8mm stones; Sialendoscopy, <4mm stones). However, combined therapy is usually required for this patient.

In this retrospective study, we aimed to evaluate retrospectively the sialoliths which were located in different regions of the Wharton's duct has treated using minimal invazive techniques with transoral approach.

Methods

Study design

The data were analyzed retrospectively at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Ordu University. The medical records for all patients treated with transoral approach due to sialolithiasis in the wharton's duct between 2012 and 2017 were evaluated. The patients without systemic disease who were decided to remove the sialoliths after the clinical and radiological examination, were included in the study and who had psychiatric illness and systemic disease, failed to fill out the forms for any reason, had incomplete data, wanted to withdraw from the study and could not be cooperation, were excluded. Also, the patients with insufficient follow-up data were excluded from the follow-up study cohort. The study conducted with the approval of ethics committee of Ordu University (2019-27).

Surgical procedure

All surgical interventions were performed with a transoral approach using minimally invasive surgical techniques. The sialoliths in the distal part of the canal (3/8) under local anesthesia; the sialoliths in the proximal part of the canal (5/8) were taken under general anesthesia (Figure 1).

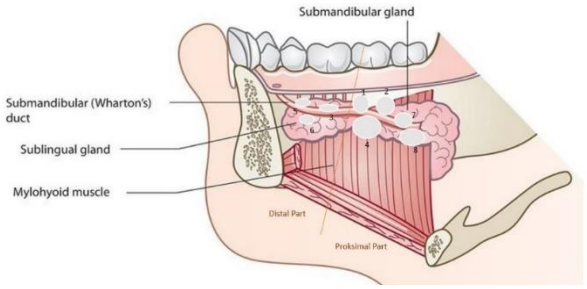

Figure 1. Schematic view of the localization of all excised sialoliths.

Briefly; local anesthetic infiltration was performed in the sublingual region near the salivary calculus with injection of 4% articaine, associated with 1:100,000 epinephrine to effect local vasoconstriction. Then, the duct was sutured by posterior of the sialolith to prevent escaping into the proximal part of the canal. Intraoral access was obtained by making a linear incision along the path of Wharton's duct in the floor of the mouth posterior to the sublingual caruncle. The Wharton ducts membrane was passed, after the soft tissue was dissected carrefully, the sialolith was reached and removed (Figure 2,3). The drainage catheter was inserted into the Wharton duct for normal saliva flow from submandibular gland, after the sialolith was removed (Figure 4). An antibiotic (amoxicillin + clavulanate, 2000 mg/day) and an analgesic (parasetamol + propifenazon 400 mg/day) were prescribed postoperatively for 5 days. The drainage catheter was removed after 48 hours. Patient controls were performed at the end of the first week after surgery.

Figure 2. The duct was sutured by posterior of the sialolith. After blunt disection, the sialolith was identified.

Figure 3. It is showed the removal of the sialolith.

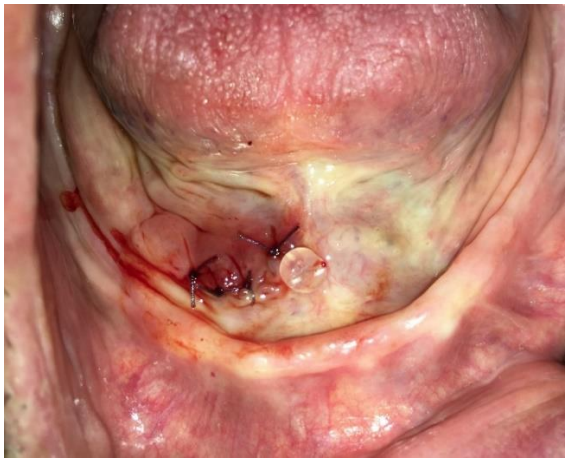

Figure 4. The catheter was inserted for submandibular gland drainage

Statistical analysis

Age, location of the sialoliths, preoperative and postoperative symptoms which were swelling, pain, edema and pus as well as complications and recurrences were noticed. Furthermore, the patient's satisfaction is recorded according to the patient satisfaction index, is shown in Table 1.

Table 1. Patient satisfaction index

Dissatisfied	Resolving of 50% or less of the pre-operative symptoms
Normal	Resolving of 50% - 75% of the pre-operative symptoms
Satisfied	Resolving of 75% or more of the pre-operative symptoms
Very satisfied	No remaining of the pre-operative symptoms

Results

This study group consists of 8 patients (6 males and 2 females) aged between 29-81 years who were transoral surgically removed submandibular canal stones from 2012 to 2017. After clinical and radiological examination, 38% of all sialoliths were determinated in the distal part of the Wharton's duct (anterior third) and 62% in the proximal part (middle and posterior third). The mean size of the sialoliths at the distal part were 1.41 cm and the proksimal part were 2.51 cm. Six of the patients had pain and swelling, especially during eating, and one of them had pus formation, one patient has no symptoms and the other patient has only pain.

In addition, submandibular gland stones which were located at the proximal part (62%), were treated under general anesthesia, and the stones of the distal part (38%) were treated under local anesthesia. These characteristics of patients are evidenced in Table 2.

There was no intra-operative or post-operative complication, such as lingual nerve damage and bleeding, in our cases during the follow-up period, average 20 months. As a result of the survey, 75% of the patients were very satisfied, 12.5% satisfied and 12.5% dissatisfied with the result. Postoperative pain and swelling occurred in one patient. The patient's clinical symptoms and ultrasound images revealed that improved the recurrent sialolith formation in the same submandibular duct. The result evaluation is shown on Table 3.

Table 2. Patients characteristics

Patients	Sex	Age	Pre-operative Symptoms	Enfection	Localization of Sialolith	Anesteshia
1	M	74	Swelling, Pain	-	Middle Third	G
2	M	36	Swelling, Pain	-	Middle Third	G
3	M	81	Swelling, Pain	Edema, Pus	Anterior Third	L
4	M	45	Swelling, Pain	Edema	Middle Third	G
5	F	29	Swelling, Pain	Edema	Anterior Third	L
6	F	75	-	-	Anterior Third	L
7	M	45	Swelling, Pain	Edema	Posterior Third	G
8	M	53	Pain	-	Posterior Third	G

Table 3. Evaluation of clinical outcomes

Complication	Satisfaction	Recurrence	Follow-up (Months)
-	Very Satisfied	-	24
-	Very Satisfied	-	36
-	Satisfied	-	5
-	Very Satisfied	-	18
-	Dissatisfied	+	6
-	Very Satisfied	-	28
-	Very Satisfied	-	24
-	Very Satisfied	-	24

Discussion

We aimed to evaluate the results of the transoral approach in the treatment of Wharton's duct stones and to evaluate this application against other minimally invasive techniques. This procedure is a simple and successful treatment option that eliminates the possible disadvantages of variable procedures which are extraoral approach, ESWL, sialendoscopy or laser fragmentation, are used in the treatment modalities of salivary stones. In particular, the major techniques, submandibular gland excision with extraoral approach, used in the treatment of stones in the proximal part of the Wharton's duct or intraglandular stones have disadvantages such as facial nerve damage and scarring (Eun et al., 2010). However, it has been reported that inflammation and mucosel or retention cyst formation occur due to the fact that the gland is not completely removed by the extraoral approach (Blatt, 1966; Berini-Aytes and Gay-Escoda, 1992). Hong and Kim (2000). reported no facial nerve damage, minimal residual gland formation (3%) and abscess formation (3%) in the postoperative period of the patients underwent submandibular gland excision with intraoral approach. In the same study, decreasing of lingual nerve sensitivity and tongue movements were stated in the early post-operative period. In our study, for the purpose of removing the stones in the proximal part of Wharton's duct (62%), we performed the treatment using the intraoral approach without the excision of the submandibular gland and all patient were very satisfied and there were no complications such as nerve damage, abscess formation and taste changes.

Successful results were obtained with sialendoscopy, especially in the treatment of minor sialoliths (<4mm) (Matsunobu et al., 2014; Gerni et al., 2017). Goodstain et al (2017). reported that they obtained successful results in stones up to 6 mm in their study. Furthermore, the sialendoscopy procedure in Wharton's duct was more difficult than Stensen's duct (Chossegros et al., 2006) and narrowing of the duct during the post-operative period and traumatic ranula development have been reported (Nahlieli et al., 2006). It was stated that only sialendoscopy treatment is not sufficient in the majority of cases and may be used in combination with other techniques such as ESWL or laser fragmentation (Marchal and Dulguerov, 2003; Matsunobu et al., 2014; Schwartz et al., 2015). In ESWL method, it is aimed to dispose the dissected sialolites into small pieces from salivary gland duct with normal saliva by using shock waves without the need for surgical treatment. In the literature, it was reported that using in the treatment of sialoliths which are smaller than 8mm has been shown and damaged the vital structures in cases with incorrect focus (Lafont et al., 2018; Foletti et al., 2018). Also, ESWL is unsuccessful in some cases and limited application in submandibular glands has been described in previous publications (Zenk et al., 2001; Escudier et al., 2003). Ottaviani et al (Ottaviani et al., 1996). stated that in order to treat larger sized sialolites more effectively, surgical treatment should be preferred instead of expensive and time-consuming ESWL procedure.

We extracted Wharton's duct sialoliths with an average size of 2.01 cm, directly from the duct without auxiliary equipment as used other minimal invasive procedures. In the previously published studies, the success rate of treatment with a transoral approach ranged from 85% to 100% has shown by Gerni at al. (2017). Thus, according to the data of our study, the success rate (87.5%) is consistent with the literature.

Conclusion

The transoral approach may be considered as a more effective option for treatment of Wharton's duct sialoliths because of high success rate and the wider use indication compared to non-invasive procedures such as ESWL and sialendoscopy.

Ethics Committee Approval: Ethics committee approval was received for this study from Clinical Research Ethics Committee of Ordu University.
Informed Consent: Oral and written informed consent was obtained from the participants.
Peer-review: Externally peer-reviewed.
Author Contributions: Concept – A.F., K.K.; Design- A.F., K.K.; Supervision- A.F., K.K.; Funding- A.F., K.K.; Materials- A.F., K.K.; Data Collection/Data Process- A.F.; Analyze or Comment- A.F., K.K., Literature Scanning- A.F., K.K.; Writer of Paper- A.F.; Critical Review- A.F.
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