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The treatment of sialolithiasis by sialolithotripsy

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Abstract

Aim. To study the effectiveness of treatment of sialolithiasis by sialolithotripsy.

Methods. Between 2015 and 2018, extracorporeal shockwave lithotripsy of salivary stones of 39 patients was performed in the Nasreddin Tusi Memorial Clinic. The stone was located in the submandibular gland and its duct for 33 patients and the parotid salivary glands and its duct for 6 patients. The average age of patients was 50±3.38 (between 22 and 77).

Results. Stone fragmentation as a result of sialolithotripsy was achieved in 36 (92.7%) of 39 examined patients (p=0.031). In 3 patients the stone was completely fragmented, but due to the narrow lumen of the main duct, it did not move away. In 3 patients with calculus size more than 2 cm, the stone was not fragmented. According to our results, the necessary effect was achieved in 85% of cases and was unachieved in only 15% of cases.

Conclusion. Given the complexity of the surgical treatment in patients with salivary stone and potential postoperative complications, especially with the stone localization within the parotid gland, we concluded that extracorporeal shockwave lithotripsy is a promising alternative treatment for patients with salivary stone.

Keywords: sialolithiasis, sialolithotripsy, salivary glands.

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Background. Salivary stone disease (sialolithiasis) is the most common disease pathology of the salivary glands. According to various authors, it is registered in 20.5% to 78% of cases [1]. Because of the emergence of new diagnostic methods, this pathology is now detected more often and at earlier stages [2].

The issue of the etiology and pathogenesis of sialolithiasis (SL) has not yet been finally resolved. All theories of the origin of SL, including stagnation and thickening of saliva, the penetration of microorganisms into the salivary gland duct, and disorder of mineral metabolism in the body, are polyetiological in nature. These theories have been confirmed by numerous studies by various authors. For example, there are many studies of the role of the bacterial component in the onset of SL, its development and clinical course [3, 4]. Clinicians have established that SL affects submandibular salivary glands more often (90%–95%), and the parotid glands less often (5%–8%). However, clinical cases of stones in the small salivary glands have also been reported [5].

Surgical treatment of SL can lead to adverse postoperative complications [6, 7]. With parotidectomy, there is a risk of postoperative facial paresis due to special aspects of the anatomical relationship between the facial nerve and the parotid salivary gland. There have also been cases of respiratory obstruction during intraoral surgical removal of salivary stones [8].

Shock wave lithotripsy of salivary gland calculi has been introduced into practice in clinics in Europe and Asia since 1989 [9].

Numerous studies *in vitro* and *in vivo*, clinical examinations using neurography of the facial nerve and electromyography of facial and masticatory muscles have shown that extracorporeal lithotripsy is safe for body tissues and anesthesia is not required during lithotripsy of salivary gland stones [10].

The study aimed to investigate the efficiency of the treatment of SL using the sialolithotripsy method.

Material and methods. The study was conducted at the Department of Dentistry and Maxillofacial Surgery of the A. Aliyev Azerbaijan State Institute for Advanced Medical Education and at the Nasreddin Tusi Clinic. The scientific work was approved by the Ethics Committee of the A. Aliyev

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Fig. 1. A patient during a sialolithotripsy session

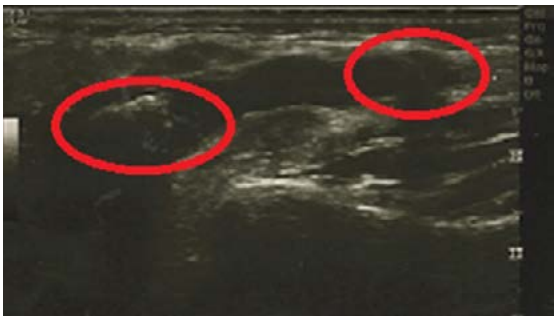

Fig. 2. Ultrasound examination of a patient with calculus in the parotid duct before sialolithotripsy

Fig. 3. Ultrasound examination of a patient with calculus in the parotid salivary gland duct after two sessions of sialolithotripsy

Azerbaijan State Institute for Advanced Medical Education at the meeting on September 20, 2015.

Lithotripsy was performed using a STORZ MEDICAL Duolith SD1 apparatus. Lithotripsy was performed by extracorporeal shock wave lithotripsy, three to six sessions for each patient, depending on the degree of stone fragmentation. Sialolithotripsy sessions were performed with a frequency of one to two sessions per week (Fig. 1).

Each session had the characteristics of 4.6 bar, 9.0 Hz, and 2,000–3,000 beats per minute. Before each session, the exact location of the stone was determined using ultrasound. The method of extracorporeal shock wave lithotripsy is based on the impulse impact on the calculus by a focused shock wave in order to destroy it.

From 2015 to 2018, at the Nasreddin Tusi Clinic, extracorporeal lithotripsy of salivary stones was performed in 39 patients; 33 patients of them had a stone in the submandibular salivary gland and its duct, and in six patients, it was located in the parotid salivary gland and its duct. The patients' age was 50 ± 3.38 years (22 to 77 years). The patients included 21 men and 18 women. Thirteen patients had a history of type 2 diabetes mellitus. They were consulted by an endocrinologist who identified no contraindications to sialolithotripsy. The sizes of stones were in the range of 0.2–2.0 cm (seven stones of 0.5 cm in size, 18 stones from 0.5 to 1.0 cm, nine stones from 1 to 1.5 cm, and eight stones from 1.5 up to 2 cm).

In order to increase salivation, 1% solution of pilocarpine (pilocarpine hydrochloride) was prescribed to the patients before meals, six drops per os three times a day, or Kovalenko's mixture [11] (potassium iodide 5.4 g, sodium salicylate 6 g, calcium gluconate 4.5 g, menthol water 180 mL) 1 tablespoon three times a day before meals. In order to expand the duct and its outlet, drotaverine was prescribed at a dose of 40 mg two times a day [11].

After the end of the session, attention was paid to the condition of the skin over the gland, and the presence of blood traces in the discharge from its duct.

The main statistical characteristics of the description of the study results include the number of cases (n), the arithmetic mean (M), the standard error of the mean (m), and the level of statistical significance (p).

Results and discussion. As a result of sialolithotripsy, stones were fragmented in 36 of 39 patients (92.3%, $p = 0.0323$). The calculus was fragmented in 16 patients during sialolithotripsy or immediately after session one. In eight patients, it was achieved after session two, in six patients after session three, in three patients after the session four, and in three patients after the session five (Fig. 2 and 3).

In three patients, the stone was completely fragmented; however, due to the narrow lumen of the main duct, it was not removed. Fragmentation was not achieved in three patients with calculi larger than 2 cm (with stone localization in the submandibular salivary gland). In seven patients, redness and a slight discharge of blood from the duct were registered. Mouth rinses with antiseptic solutions (nitrofural) were prescribed to them, after which these symptoms disappeared.

According to the results of our studies, it can be stated that in 85% of cases (33 patients out of 39), both stone fragmentation and the removal

of stone fragments through the duct outlet were achieved without additional surgical interventions ($p = 0.031$).

The medical literature presents the information that [12] in most cases, to remove fragments of the crushed stone, a surgery was performed to create a new duct using the Afanasyev–Starodubtsev method. The therapeutic treatment prescribed and lithotripsy of stones to smaller fragments enabled to achieve complete separation of fragments in 33 patients without additional surgical manipulations. Fragmentation was not achieved in three of 39 patients with large calculi (more than 2 cm).

CONCLUSION

Based on our results, it can be stated that extracorporeal shock wave lithotripsy is a promising alternative method for treating patients with SL with stones less than 2 cm in size.

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Conflict of interest. The author declares no conflict of interest related to the article presented.

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