

Conservative management of a large salivary calculus in the submandibular gland

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_Surgical management of salivary gland diseases has always been challenging because it carries a considerable risk of nerve damage, pain and complications. This case report presents an innovative ambulatory laser-assisted technique with the use of the Erbium laser (Er;Cr:YSGG, 2,780 nm) that could be an alternative method for removal of sialolithiasis.

_Introduction

Sialolithiasis is the most common disease of the major salivary glands. It affects 12 in 1,000 in the adult population. The great majority of salivary calculi (80 per cent) occur in the submandibular gland, mainly in the duct; 10 per cent occur in the parotid gland and the remaining 10 per cent in the sublingual and the minor salivary glands.¹ Calculi may be located in different positions along the salivary duct and gland. Submandibular stones close to the hilum of the gland tend to become large before they become symptomatic. Sialolithiasis occurs evenly on the right and left sides.² Males are affected twice more than females and there is a slight predilection for occurrence in males above the age of 40 years. Salivary calculi are usually unilateral and do not cause a dry mouth period.³ Clinically, salivary calculi are round or ovoid in shape with a rough or smooth surface and of a yellowish colour. They consist of mainly calcium, phosphate with smaller amounts of carbonates in form of hydroxyapatite, with minimal amounts of mag-

nesium, potassium and ammonia. This mix is distributed evenly throughout the calculus.⁴

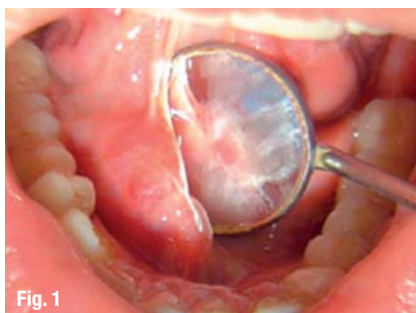
Sialolithiasis typically causes pain, discomfort and swelling of the involved salivary gland by obstructing the food related surge of salivary secretion. Calculi may cause stasis of saliva, leading to bacterial ascent into the parenchyma of the gland and therefore infection, pain and swelling of the gland. Long-term obstruction in the absence of infection can lead to atrophy of the gland with resultant lack of secretory function and ultimately fibrosis.⁴ Some may be asymptomatic until the stone passes forward and can be palpated in the duct or seen at the duct orifice. These can be managed conservatively by gentle massage. It may be possible that obstruction caused by large calculi is sometimes asymptomatic as obstruction is not complete and some saliva manages to seep through or around the calculus.⁵ Larger sialolithiasis may need to be managed by surgical removal of the stone itself when possible but if there is significant inflammation, the entire gland may need to be excised.⁶ Surgical management of salivary gland diseases has always been challenging because it carries a considerable risk of nerve damage, pain and complications. The development of additional conservative management techniques would be beneficial. This case report presents an innovative ambulatory laser-assisted technique with the use of the Erbium laser (Er;Cr:YSGG, 2,780 nm) that could be an alternative method for removal of Sialolithiasis.^{7,8,9}

_Patient

A fifty-year-old man consulted for possible implant placement in the left mandibular region. His medical history was unremarkable, his blood pressure and pulse rate were within normal limits, chest radiographs, electrocardiography, total blood count, urine sediment, liver and kidney function tests were also normal. Extra-oral examination revealed a palpable right sub-

Fig. 1 _Mass in the floor of the mouth.

Fig. 2 _Mandibular occlusal radiograph shows a submandibular salivary calculus.



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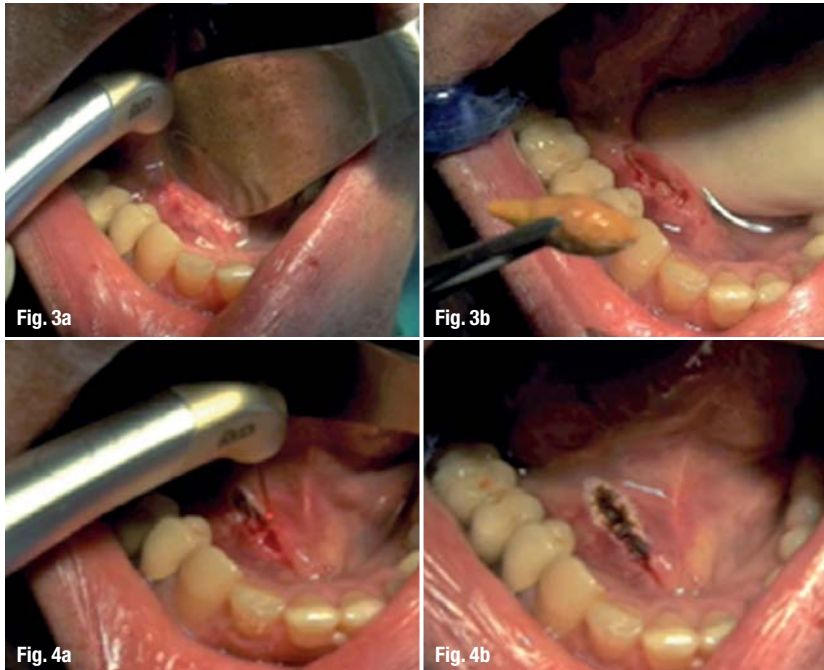
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Figs. 3a & b Laser incision in the floor of the mouth and removal of sialolithiasis.

Figs. 4a & b Laser bandage and post-op wound.

mandibular gland and bimanual intra-oral palpation of the floor of the mouth, in a posterior to anterior direction revealed a large, firm, non-tender swelling in the right anterior floor of mouth in the region of the submandibular duct. Intraorally, there was a large, asymptomatic, firm and non-tender swelling in the right anterior floor of mouth in the region of the submandibular duct (Fig. 1). The patient was unaware of swelling and only noticed it when it was pointed out by the dentist. A mandibular occlusal film and panoramic projection radiograph confirmed the diagnosis and showed a radiopaque structure in the right premolar region (Fig. 2). It measured approximately 1.5 cm along its greatest length.

Intervention

A diagnosis of the submandibular duct calculus was established and the decision to remove the stone using the Erbium laser (Er;Cr:YSGG, 2,780 nm)¹⁰ was made. The Er;Cr:YSGG, 2,780 nm has the possibility to be used in hard tissue and soft tissue by using long pulse duration of up to 600 ms with an appropriate amount of energy and an appropriate distance between the laser beam and the surface of the tissue. Thereby, the presence of

water particles layer of at least 1 mm can help with the selectivity of tissue ablation due to the explosive vaporisation phenomena. With pulse durations longer than the relaxation time of tissue, energy is lost to the interior of the tissue by conduction, increasing the energy needed to cause ablation. Topical anaesthetic gel (EMLA) was applied at site for five minutes and no injections were administered. The procedure consisted of locating the stone, isolating the duct from the surrounding tissues, introducing a button probe, ductal incision above the stone, sialolithotomy, and checking duct patency (Figs. 3a & b). The duct, together with the oral mucosa, was incised until the stone localised within the distal part of the Wharton duct in the floor of the mouth was visible using the Waterlase MD Er;Cr:YSGG laser at 2.5 W, 30 pps, S mode using the gold handpiece with the Z tip.¹¹ It was then removed and no bleeding occurred during this procedure due to laser hydrokinetic energy ablation. The closing of the connective tissue was controlled using the same 2,780 nm laser at 1.0 W, 0 per cent air, 0 per cent water, S mode (600 ms), using the gold handpiece with the Z tip, achieving the homeostatic effect¹² (also called laser bandage; Figs. 4a & b), no sutures were needed in this procedure eliminating by consequence the post-operative discomfort of the sutures in this particular sensitive site. The oral pathology report confirmed the pre-surgical clinical diagnosis (Fig. 5). No analgesics or antibiotics were required after the procedure. The patient was seen one week postoperatively to check salivary function of the gland (Figs. 6 & 7). The healing was uneventful and without any usual postoperative side effects such as scar formation, injury to the lingual nerves, swelling, pain, or inflammation since the Er;Cr:YSGG laser only cuts 5 to 10 cell layers deep and does not produce any histamine release, effectively blocking any inflammatory reaction.¹³ Wound healing was excellent and achieved rapidly.¹² Five years post-operative, no further abnormalities could be observed (Figs. 8a & b). On review, the right submandibular gland was palpable and clear saliva could be expressed from the duct. Patients should be seen in almost every six months to monitor the absence of recurrent lithiasis.

Discussion

There are various methods available for the management of salivary stones, depending on the gland

Fig. 5 The calculus shown to scale (1.5 cm).
Fig. 6 The laser bandage.
Fig. 7 One week post-operative.



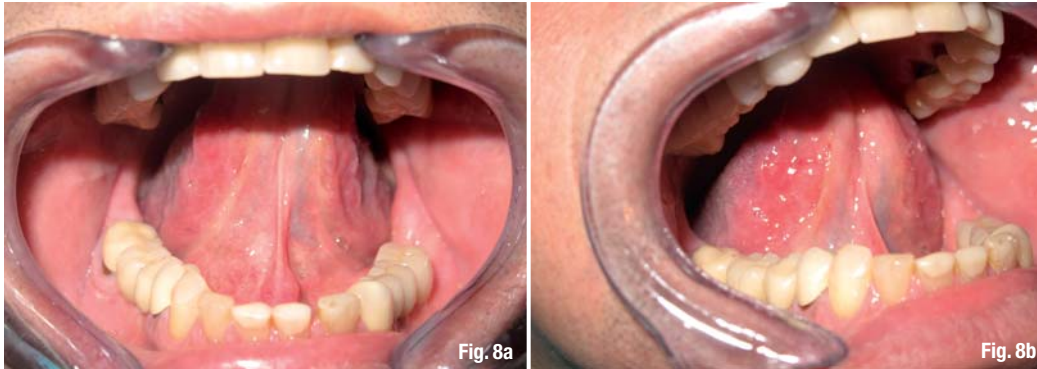


Fig. 8a & b Five years post-operative.

affected and the stone location.⁶ Surgical removal of the calculi is performed when located in the excretory duct near the opening. Er,Cr:YSGG laser has been widely used and replaced surgical interventions in selected patients. Its advantages are the relative absence of pain and the elimination of the need for an operation with its surgical risks. Er,Cr:YSGG laser use is a modern approach for the management of salivary calculi and treatment oral soft tissue lesions and should be considered as an alternative to conventional scalpel surgery. If the calculi are located in the gland itself, fragmentation can be performed by extracorporeal or endoscopic laser lithotripsy.

Conclusion

Patients should be educated regarding the mechanism of their underlying pathology and methods of

maintaining control over them by emphasising the value of hydration and excellent oral hygiene, which lessens the severity of the attacks and prevents dental complications. Once the diagnosis of a salivary gland stone is established attempts at removal by minimally invasive techniques should be considered.

Editorial note: A list of references is available from the publisher.

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Kurz & bündig

Sialolithiasis ist eine der häufigsten Erkrankungen in der großen Speicheldrüse, betroffen sind 12 von 1.000 Erwachsenen. Die Mehrheit der Speichelsteine (80 Prozent) treten in der Unterkieferspeicheldrüse auf, 10 Prozent in der Ohrspeicheldrüse und weitere 10 Prozent in Drüsen unter der Zunge und kleinen Speicheldrüsen.¹

Im Artikel wird der Fall eines 50-jährigen Mannes beschrieben, der eigentlich wegen einer möglichen Implantatplatzierung vorstellig wurde. Seine medizinische Geschichte war unauffällig, eine extraorale Untersuchung offenbarte jedoch eine spürbare Unterkieferdrüse auf der rechten Seite. Die beidhändige intraorale Abtastung des Mundbodens offenbarte eine große, feste, unempfindliche Schwellung auf der vorderen rechten Seite im Bereich des submandibulären Duktus (Abb. 1). Eine Aufnahme mandibulär okklusal und eine Panoramaschichtaufnahme zeigten eine radiopake Struktur im rechten Prämolarebereich (Abb. 2) mit einer Länge von 1,5 cm. Der diagnostizierte Speichelstein sollte mittels einer neuartigen, ambulanten lasergestützten Technik entfernt werden. Zur Entfernung der Sialolithiasis wurde der Erbium-Laser (Er,Cr:YSGG, 2.780 nm)¹⁰ verwendet.^{7, 8, 9}

Während der Behandlung wurde der Stein zunächst lokalisiert und der Duktus vom umgebenden Gewebe isoliert. Danach wurde eine Tastsonde eingeführt, ein duktaler Schnitt über dem Stein gemacht und eine Sialolithomie sowie eine Überprüfung der Duktusdurchgängigkeit durchgeführt (Abb. 3). Der Duktus zusammen mit der Mundschleimhaut wurde aufgeschnitten, bis der Stein sichtbar und dann entfernt wurde. Der Verschluss des Gewebes erfolgte ebenfalls mit dem Erbium-Laser (Abb. 4). Analgetika oder Antibiotika waren zur Nachbehandlung nicht mehr nötig. Der Bericht zur oralen Pathologie bestätigte die vorangegangene klinische Diagnose (Abb. 5). Eine Woche nach der Operation wurde die Funktion der Speicheldrüse überprüft (Abb. 6). Die Wundheilung erfolgte problemlos (Abb. 7 & 8). Insgesamt zeigt der Fallbericht, dass eine lasergestützte Behandlung einer Sialolithiasis eine Alternative zur konventionellen Chirurgie darstellt.