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Sialolithiasis-Management with Laser Lithotripsy

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Abstract

Sialolithiasis is the presence of a stone in the salivary duct and is the main cause of obstructive salivary disease. The symptoms produced include pain and swelling of the gland especially while eating or chewing. While small salivary stones sometimes pass out of the duct on their own, larger stones usually remain in the gland until they are removed.

The approach used to extract these salivary stones depends both on the size and the location of the stone. In this series, we present a series of cases treated with Holmium Yag laser for extraction of the stone. Six patients who complained of 2 or more episodes of submandibular gland/parotid gland swelling accompanied with pain, with or without pus or a fluid being discharged from the orifice of the duct were enrolled in the study. This procedure was performed on all our patients under general anesthesia using the Karl Storz sialendoscopy system and symptoms improved in all patients. Based on our initial experience of using the Holmium Yag laser for extraction of salivary stones in our series, we can conclude that it is a good tool for calculus greater than 4 mm, adherent or difficult to retrieve with the routine technique.

Keywords: Sialendoscopy; Laser Sialolithiasis; CT; MRI; ENT

Introduction

Sialolithiasis is the presence of a stone in the salivary duct and is the main cause of obstructive salivary disease. Although the exact cause of sialolithiasis remains unclear, salivary stones may be related to dehydration, reduced food intake, or medications that lower the production of saliva, like certain anti-histamines, anti-hypertensive's and anti-psychotics [1]. The symptoms produced include pain and swelling of the gland especially while eating or chewing. While small salivary stones sometimes pass out of the duct on their own, larger stones usually remain in the gland until they are removed. Treatment algorithms for sialolithiasis have been reported by several authors and these reports generally reach a consensus that small, mobile stones with diameters of 3 mm to 4 mm or less can typically be removed via simple basket extraction [Sialendoscopy], while larger, impacted stones with diameters greater than 8 mm are generally treated with combined endoscopic and transoral/external approaches. For midsized stones between 4 mm and 8 mm, the best mean of treatment is more variable [2]. If found to be too large for simple basket retrieval, they must be fragmented for endoscopic extraction to be successful. Stones located within the gland or in the proximal part of the duct are generally treated by excising the gland while for distal stones the relatively new therapeutic option used is laser lithotripsy. This technique utilizes laser to break up the stones. The broken fragments can then pass out along the duct or can be removed by basket assisted retrieval of stone with sialendoscopy. External Surgery, like excision of the gland however, carries risks, such as possible injury to the facial nerve, lingual and hypoglossal nerves. Here in this report we present a series cases treated with Holmium Yag laser for extraction of stone.

Material and Methods

With approval of the Review Board of our Hospital, 6 patients were included in our study. This is a retrospective study conducted by the department of otolaryngology and head and neck surgery, in a tertiary referral centre. The study is approved by the institute's ethical committee. The data was retrieved from the case records of the patients. A detailed history was noted and those patients who presented with fever, dry mouth or recurrent pain and swelling of the cheek or swelling below the jaw specifically increasing after chewing were included in this study. A thorough clinical examination was conducted. The diagnostic methods included Ultrasound, CT scan, MRI, Diagnostic Sialendoscopy (salivary gland endoscopy).

Study design

All of the patients enrolled in the study complained of 2 or more episodes of submandibular

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gland/parotid gland swelling accompanied with pain, with or without pus or a fluid being discharged from the orifice of the duct. The evaluation protocol included taking a full clinical history. The patients underwent a complete Ear, Nose, and Throat (ENT) examination, and an ultrasound evaluation which confirmed the diagnostic suspicion of submandibular/parotid sialolithiasis in all cases. Ultrasonography detected the number, position, and maximum diameter of salivary stones. Patients with intraparenchymal stones or with sialoliths less than 4 mm or greater than 8 mm in diameter were excluded from this study. All the selected patients underwent intracorporeal lithotripsy with Ho:YAG laser under sialendoscopy control and general anesthesia. Before the surgery, the surgeon took an informed consent about the risks associated with the use of this technology which included stenosis or perforation of the duct and also the possibility of abandoning the procedure if the stone could not be fragmented in rare situations. Patients were also informed that the procedure may not be resolutely and that treatment would be converted into a combined approach or excision of the gland in case the lithotripsy failed. All sialendoscopy were performed by a single surgeon in collaboration with his team. At the end of each procedure, the patients were encouraged to follow a normal diet to restore salivary flow as soon as possible. All cases were reevaluated and recorded 7 days after the procedure followed by a series of follow up for a year.

Surgical technique

This procedure was performed on all our patients under general anesthesia using the Karl Storz sialendoscopy system. These sialoendoscopes have an external diameter of 1.3 mm in adults, and an irrigating system maintaining constant irrigation with saline to improve visibility. The papilla was identified and then dilated with duct probes and conical dilators. The sialoendoscopes was then passed with continuous irrigation and advanced up to tertiary level of branching under visualization. When the impacted sialoliths appeared on the monitor, the laser fiber was introduced into the working channel of the endoscope. Intraoperative lithotripsy was performed using a Ho:YAG. The tip of the fiber was positioned the center of the stone and then activated (Figure 1). The laser was used under clear vision, avoiding contact with the ductal wall. After fragmentation, debris of the stones was removed using wire baskets or microforceps or via irrigation. The ductal system was then flushed with normal saline followed by administration/introduction of a steroid and antibiotic solution into the duct upto the tertiary ductless.

Results

We included 6 patients in our study of which four were males and two were females. The mean age was 35 years. The site of calculus was in the submandibular duct in four of the patients and in the parotid duct in two of the patients. In four patients there was a single calculus whilst in two of the patients there were multiple calculi. The size of calculus was between 4 mm to 6 mm in six patients and between 6 mm to 8 mm in two patients. Location of the stone was in the middle part of the duct in one patient, proximal portion of the duct in three patients and the secondary ductule in two patients. In four out of six patients, there was a need to place a stent. In one patient, a second sitting of laser lithotripsy was required as the calculus was tightly adherent to the ductal wall. The symptoms improved in all patients and there was no ductal stenosis. A free flow of saliva was present in all cases and the post operative ultrasound showed no recurrence. The follow up period for the patients was six months.

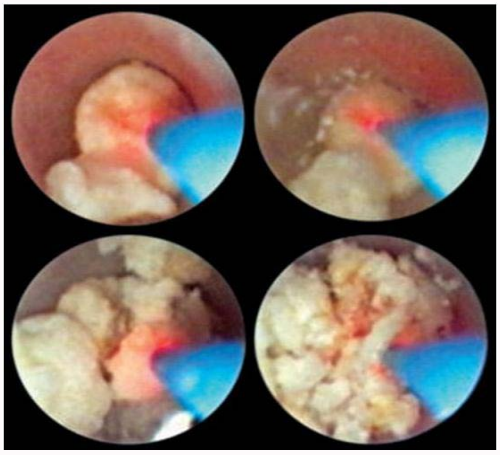

Figure 1: Showing positioning of the laser under direct vision in centre of the calculus avoiding contact with duct wall.

Discussion

Sialolithiasis refers to a calcified stone in the salivary duct or the gland. Among the salivary glands it's predominantly seen in the submandibular glands. The most common presentation in these patients includes pain and swelling in the area of the affected salivary gland which exacerbates after chewing or eating. In severe cases there could be associated cellulitis and abscess of the salivary gland which can progress to gland atrophy or a fistula. There are many ways of treating these stones which include excision of the salivary gland containing the stone or intraoral sialolitholomy or a sialendoscopy. In the recent years, sialendoscopy is being increasingly performed because it is minimally invasive and provides an opportunity to preserve the gland and also reduces the risk of injury to nerves. In cases where the stones are larger than 4 mm, adherent to the duct or difficult to extract with the routine basket or forceps, endoscopic laser lithotripsy is being used. Endoscopic laser lithotripsy using Ho:YAG lasers have become a routine procedure for the treatment of urinary calculi [3]. Recent studies suggest that use of this laser type is also effective in eliminating salivary stones [4]. Research has not yet been able to ascertain whether the composition of a salivary stone effectively predicts its disintegrability by using laser energy. This, whether or not it should be recommended clinical practice to determine the physical composition of the stone prior to attempting laser lithotripsy, still remains a question to be answered. In order to address this question, a study was conducted by Florian Schrotzlmair et al. The study concluded that all salivary stones could be disintegrated irrespective of their physical and radiological composition. A study done by Emilio et al. found laser lithotripsy to be ineffective because the surface of the calcium phosphate calculi is smooth and white and resistant to laser 6, but we in our series have used laser in all our patients with good outcome on all of them [5,6]. Currently, there is no consensus on which laser is the most appropriate in achieving safe and effective lithotripsy in the salivary glands. The Ho-Yag laser was preferred laser in our study as it has a high absorption co efficient in water thereby presenting an advantage of being safe when used in an aqueous environment like saliva. The possibility of splitting the stone and extracting it immediately with sialoendoscopes represents the advantage of this laser [7]. In our series we were able to extract the fragmented calculi with simple irrigation or with basket. In our series of 6 patients we were successfully able to extract the calculus in a single sitting in five of our patients while one patient required a

second sitting due to the calculus being tightly adhered to the wall of the duct. The use of laser in fragmenting calculi in secondary ductile had revealed risks of soft tissue damage and surrounding tissue damage owing to the thermal energy but in our series we had two patients who had the calculus in the secondary ductule and we could successfully fragment and retrieve them with the help of laser [8]. Based on our initial experience of using the Holmium YAG laser, we can conclude that it is a good tool for calculus greater than 4 mm, adherent or difficult to retrieve with the routine technique.

Conclusion

In our experience of using the Ho:YAG laser to treat 6 cases, the laser was found to be effective in extracting large and difficult calculi without the need of excising the gland.

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