Sialendoscopic Pneumatic Lithotripsy in Sialolithiasis

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Introduction

The current surgical philosophy advocates minimally invasive approaches from the point of view of both the physician and the patient. Thus, since 1990, the technique of sialendoscopy has been applied in obstructive diseases of major salivary gland ducts in order to avoid gland resection. The state-of-art sialendoscopes present ever-increasing visual quality which widens their scope of applications. When sialendoscopic removal is not convenient by traditional endoscopic instruments, stone fragmentation should be necessary and so we are in need of new instrumentation and surgical tools in this situation. In this preliminary study we intended to have an alternative surgical application to Ho:Yag and other laser stone fragmentation.

Material-Method

Between the years of 2010 and 2012 twelve cases of sialolithiasis, which their stones were found not removable by traditional basket or forceps use during sialendoscopy, were undertaken intraductal stone fragmentation by pneumatic lithotripsy not only to facilitate the stone removal but to search for the eligibility of fragmentation of salivary stones. We performed interventional sialendoscopic pneumatic sialolithotripsy in 7 female and 5 male patients between 22 and 64 years old. Eight of the glands were parotid and four of them were submandibular gland. The salivary stones were classified regarding to LSD classification endoscopically (**1**). All the procedures were carried out in the operating room and under general anesthesia.

ISWL (intracorporeal shock wave lithotripsy) has been applied by using intracorporeal pneumatic lithotripter (Calcusplit, Karl Storz AG, Tuttlingen, Germany) in all cases through by semi-flexible miniature straight forward telescope with 1.6mm OD (Erlangen-type). We designed a probe 0.7mm in diameter specifically compatible with working channel of the sialendoscope and performed contact lithotripsy in single shot modality and intermittent pulse application at the pressure of 3.5 atm. The shot rate was between 4 to 16 (in average 9 shots) and the stones were considered not fragile if they were not fragmented after the first 4 shots (**Figure 1,2**).

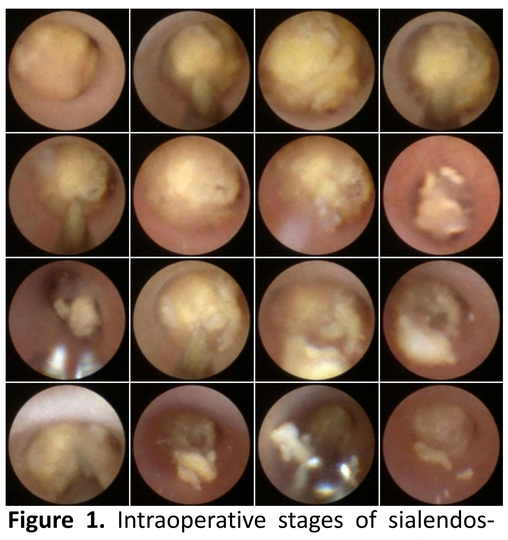

Figure 1. Intraoperative stages of sialendoscopic contact pneumatic lithotripsy of a L2a parotid stone. Fracture lines are visible and attempts of fragmentation and forceps removal are seen.

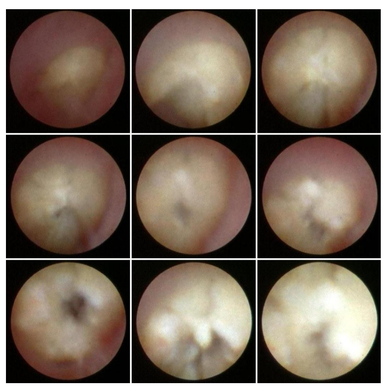

Figure 2. Intraoperative stages of sialendoscopic contact pneumatic lithotripsy of a L2b submandibular stone. Fragmentation lines and a hole in the stone can be seen.

Results

Regarding to the LSD classification, 6 of the 12 stones in this study were L1 (floating stone), 4 were L2a (fixed stone, totally visible, less than 8mm), 1 were L2b (fixed stone, totally visible, more than 8mm) and 1 were (fixed stone, partially visible, nonpalpable).

The location of the 9 stones were hilum, and the remaining were in the proximal duct. One of the two unbroken stones was submandibuler L2a and the other parotid L3b, and both of them were located in the proximal duct.

All the 7 parotid and 3 submandibular stones could be fragmented by pneumatic lithotripsy and ten stones out of twelve were considered fragmentable. Most of the stones have fracture lines or fragmented pieces at the first one or two initial shots (**Figure 3,4**).

Figure 3. A L1 parotid stone fragmented easily by the initial shots.

Figure 4. Fragmented pieces of stone removed by forceps or basket after the sialendoscopic contact pneumatic lithotripsy.

The shot rate was between 4 to 16 (in average 9 shots). There was no complication in all cases other than minor and lasting bleedings which interferes sialendoscopic view for a couple minutes in two cases.

Discussion and Conclusion

In recent years, as a result of the popularization of the minimal invasive techniques, coupled with the technical developments in endoscopes, sialendoscopy has become the primary method in surgical treatment of obstructive diseases of the salivary glands, taking the place of the intraoral approaches and gland resection.

One of the most challenging situation is the stone fragmentation when it seems to be necessary in interventional sialendoscopy. We previously reported our attempts of searching for a new tool other than lasers to fragment the stones intraductally to widen the options in this field (**2,3**). According to Iro et al. in their in vitro and animal experimental studies the clinical use of pneumatic lithotripsy were found to be not justified because of the possibility of ductal perforation (**4**). On the other hand contact pneumolithotripsy has been used widely in urologic lithotripsy for several years (**5,6**). So we used contact lithotripsy in twelve salivary gland stones without any complication and ten of the twelve stones were fragmentable by this technique. Although we are at the beginning of this invivo study we strongly considered that the technique of contact pneomatic lithotripsy is a safe and effective procedure in experienced hands.

With the rapid development of technologies and increasing experience, it can be stated that the variety of intraductal interventions will increase and that we will be able to treat the majority of cases sialendoscopically without needing to resort to even minimally invasive intraoral inscisional techniques.

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