*https://doi.org/ 10.33472/AFJBS.6.5.2024. 5386-5395*

African Journal of Biological Sciences


# Through the Looking Glass: Comparative Insights into Sialoendoscopyand Extracorporeal Sialolithotripsy-A narrative Review

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Article History
Volume 6, Issue 5, 2024
Received: 09 May 2024
Accepted: 17 May 2024
doi: *10.33472/AFJBS.6.5.2024. 5386-5395*

## ABSTRACT

Aim and background: Sialolithiasis is a condition marked by the formation of calculi, or stones, within the salivary glands. Traditional management of obstructive salivary disorders has transitioned to minimally invasive, gland-preserving techniques.This narrative review compares the efficacy, safety, and outcomes of ESWL and sialoendoscopy in managing sialolithiasis.

Methods: Literature search conducted in major medical databases including PubMed, Embase, and Cochrane Library. Studies comparing ESWL and sialoendoscopy in terms of success rates, complications, recurrence rates, and patient satisfaction were included.

Results: Extracorporeal sialolithotripsy is a non-invasive procedure utilizing shock waves to fragment stones, often requiring multiple sessions. It has minimal complications, higher potential for damage of the gland and lower success rates in cases of larger stones. In Sialoendoscopy, there is direct visualization and retrieval of stone through endoscope thereby allowing for real-time monitoring and precise intervention. It has higher success rates, even in larger stones along with minimal complications, but the risk of duct injury is higher in this technique as compared to sialolithotripsy.

Conclusion: Both extracorporeal sialolithotripsy and sialoendoscopy are effective modalities for sialolithiasis management. Selection should be based on stone characteristics, gland anatomy and patient preferences.

**Key words:** extracorporeal sialolithotripsy, laser,sialoendoscopy, sialolithiasis

## INTRODUCTION

The most common cause of obstructive sialadenitis is sialolithiasis, responsible for 50% of all salivary gland disease[1-2]. Sialolithiasis most commonly affects the submandibular salivary gland (80-90%) followed by the parotid gland.[3-4] The tortuous upward path of the Wharton's duct and thick consistency and rich phosphorus content of the saliva, increases the chances of stone formation[5-7].

Symptomatic sialolithiasis has been managed traditionally with a wide range of therapeutic options. In recent years, the trend has shifted towards minimally invasive techniques among which sialadenoscopy and sialolithotripsy is more common.[8] Several factors such as the mobility of the stone, presence or absence of stenosis, the proximity of the stone, size, shape and orientation of the stone influences the sialoendoscopic technique. If the size of the stone is less than 4mm it can be removed by pure endoscopic technique but if it is larger and not completely visible, additional techniques such as intra-ductal laser-assisted lithotripsy, intraductal pneumatic lithotripsy or combined techniques are needed for complete stone removal.[9-17]Lithotripsy refers to the fragmentation of stone within the salivary duct. There are many types of lithotripsy, based on (a)energy (laser, piezo-electric, electromagnetic. pneumatic) (b)approach (extracorporeal, intracorporeal).

In this review article, we aim to critically evaluate and compare the utility of sialoendoscopy and extracorporeal sialolithotripsy in the management of sialolithiasis. By synthesizing existing literature and clinical evidence, we seek to provide insights into their respective indications, procedural techniques, outcomes, and potential complications

## MATERIAL AND METHODS

We searched a wide range of electronic databases, including the Cochrane Library, Embase, PubMed/MEDLINE, and Scopus. The search was conducted utilizing a combination of pertinent keywords and Medical Subject Headings (MeSH) phrases]. The goal of the search strategy was to locate research comparing extracorporeal sialolithotripsy with sialoendoscopy in the management of sialolithiasis. Requirements for inclusion were research comparing extracorporeal sialolithotripsy versus sialoendoscopy in the treatment of sialolithiasis, case-control studies, case series, prospective or retrospective cohort studies, and randomized controlled trials (RCTs) and studies that had been released in English. Studies with insufficient data or unclear methodology were excluded. Full-text articles meeting the inclusion criteria were assessed for eligibility, and relevant data were extracted.

## RESULTS

Across the literature, both sialoendoscopy and extracorporeal sialolithotripsy demonstrated efficacy in managing sialolithiasis, with varying rates of stone clearance and complication profiles reported. Symptom improvement and restoration of salivary gland function were commonly observed outcomes post-intervention. Sialoendoscopy may be technically challenging in cases of complex ductal anatomy or small ductal diameters, necessitating expertise and specialized equipment. Conversely, extracorporeal sialolithotripsy may be less effective for certain stone compositions or locations, requiring adjunctive procedures or repeated sessions.

# DISCUSSION

## Extracorporeal Lithotripsy:

Since 1989, Extracorporeal lithotripsy (ESWL) was practised in sialolithiasis treatment.[18] Electromagnetic ESWL is the most frequently used which is an electric impulse propagated from a generator to a flat coil in which a galvanic change happens in the nearby metal membrane, and the shock wave propagates into a water coupling medium.When a piezoelectric source is used, high-frequency is produced by a pulse generator that, stimulates all of the ceramic elements making up the piezoelectric acoustic radiator; causing sudden expansion, with the generation of shock waves and their transmission occurring through the water coupling medium[18].

## Mechanism Of Action:

Shock wave works on the mechanism by which salivary gland stones are fragmented into smaller pieces. They are generated by alteration in the impedance at the stones and water interface inducing compressive wave that causes cavitation in the stone making it easily removable. These shock waves can be generated extracorporeal by piezoelectric or by selection magnetic technique or by electro-hydraulic pneumatic or laser by intervention endoscopy[12-15].

ESWL are easy to perform, safe, well tolerated by the patients and can be done without anesthesia on an outpatient basis. The main drawback of using ESWL is incomplete removal of the stones that causes retention of small fragments inside the ductal system leading to recurrences. Hence it's

mandatory to do sialendoscopy followed by ESWL treatment to remove all the fragments. Also, it is time-consuming as it needed to be repeated 30 minutes at intervals for a few weeks.[19]

The minimum size of the electromagnetic focus is 2.4 mm hence stones larger than 2.4 mm in diameter can be treated with electromagnetic ESWL, which typically uses a pulse frequency of 0.5-2 Hz during each session. The relative contraindications include the presence of complete distal duct stenosis and pregnancy while the only absolute contraindication is following the implantation of a cardiac pacemaker.[20,21]

Sialoendoscopy:

Sialendoscopy is frequently completed in a single session and can be utilized for both therapeutic and diagnostic purposes. In the past, there were two surgical methods for treating salivary duct stones: either the whole salivary gland was removed, or the duct was marsupialized and the stone was removed. However, Stenson's duct stones posed a serious obstacle. Despite being the recommended treatment for parotid stones, parotidectomy was rarely carried out because of the inherent danger of damage to the facial nerve. As a result, the majority of these patients used to have recurrent parotitis and go untreated. A paradigm shift in the treatment of parotid duct stones has been brought about via sialendoscope. The sialendoscope can be used to remove smaller stones. With the aid of sialendoscopes, ductal strictures that may be secondary to ductal calculus can be treated extremely well. Sialendoscopy aids in the accurate and direct assessment of the kind, location, and length of ductal strictures, as well as the best course of action.[22,23,24]

Sialendoscopy should not be undertaken when the salivary glands are severely inflamed. It could make an already inflamed gland more painful and swollen. Inflammation lowers the pace of cannulation and impairs vision of the ductal system, which can lead to complications such duct perforation that causes stenosis in the duct, which raises the rate of failure and complications overall.

## PROCEDURE

In Wharton's duct, a sialoendoscope with a wire basket or grasping forceps can be used to remove sialoliths up to 3.4 mm in size.[24] However, a sialendoscope by itself can also be used to remove extremely long, thin stones that have their long axis along the ductal lumen.[25] Following the identification of the stone within the duct, a tiny incision is made in the mucosal floor of the mouth, and the duct is opened and dissected directly over the stone. The floor of the mouth mucosa is reapproximated and sutured back, the duct is sealed with absorbable extramucosal sutures, and the stone is softly placed.

With sialendoscopy alone, stones in Stenson's duct less than 3 mm can be treated. Larger stones are reduced in size, usually using ESWL, microdrilling, or laser technology. The simplicity of use of the external technique and the accuracy of the endoscope, reduces the amount of dissection required to locate the stone in the duct and lowers morbidity. Similar to a parotidectomy, a skin incision is made, and the skin flap is elevated anteriorly. To transport the stone, the parotid duct is split open in this location. Fine absorbable sutures are used to seal the duct extramucosally and a tiny suction drain is implanted before the skin flap is repositioned. A facial nerve can be used in this procedure to avoid any damage to the branches of the nerve.[24]

## CONCLUSION

In summary, sialoendoscopy and extracorporeal sialolithotripsy represent valuable tools in the armamentarium of interventions for sialolithiasis, offering tailored approaches to stone management with the shared goal of restoring salivary gland function and improving patient quality of life. Through ongoing research and collaborative efforts, we endeavor to further optimize treatment strategies and enhance the care of patients affected by this challenging condition.

## ACKNOWLEDGEMENT

I express my sincere gratitude to my guide whose valuable insights and expertise enriched this article. Your collaborative spirit have been instrumental in shaping this work.

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