A SPECTRUM OF THE SURGICAL MANAGEMENT OF SUB-MANDIBULAR SIALOLITHIASIS — A STUDY

1MUSLIM KHAN, 2BUSHRA MEHBOOB, 3TARIQ AHMAD

ABSTRACT

Sialolithiasis means formation of calcific structures in salivary glands. It is most common in sub-mandibular gland. Various theories have been proposed to explain its etiology. A study was carried out among patients reporting to department of oral and maxillofacial surgery Khyber College of Dentistry, with Sialolithiasis to find out disease characteristics, surgical treatment offered along with post operative complications.

A proforma was filled after diagnosis of sialolithiasis by a detailed history, clinical examination and necessary radiographic investigation. Stones in the anterior part of the duct were treated by duct incision and sialodochoplasty intra-orally while gland removal was done for stones in hilum and gland parenchyma. Patients were followed post operatively for a period of one year.

Out of 57 patients, 56% were males while rests of 44% were females. The age ranged from 19 to 60 with mean age of 32.63 ± SD 7.8 years. The number of patients from age range of 31-40 were found to be highest i.e., 30 (53%). Single isolated stone was found in 53 (93%) patients, while 4 (7%) patients had multiple stones. Location of isolated stone in present study was, in anterior part of duct (n= 27, 47%), distal part of duct (n= 26, 46%), Duct parenchyma 5% and both anterior and posterior of the duct 2%. Duct incision followed by retrieval of stone and sialoduchoplasty was carried for 27(47%) stones. Rest 30(53%) patients were treated by sub mandibular gland excision. All the stones were unilateral.

Immediate Post-operative complications were Hematoma in the floor of the mouth and the submandibular region in one patient each, paresthesia of the lingual nerve (n=4). Weakness of the marginal mandibular branch of the facial nerve (n=2). Nerve paresthesia improved over a period of 4 months in subsequent follow up visits.

Key Words: Submandibular gland, Warthon’s Duct, Sialolithiasis, Salivary Duct Stones.

INTRODUCTION

Sialoliths are calcified structures that develop within the salivary ductal system. About 80-90% of cases occur in sub-mandibular gland, while the rest occur in parotid gland and minor salivary glands.¹ The reason for increased frequency in sub-mandibular gland may be long and tortuous path of Wharton’s duct. Also the secretions are thick and mucoid leading to increase chance of stasis of the saliva.²

The exact etiology of salivary gland duct stones is not known, however various theories have been proposed. According to mechanical theory a pseudo gel is formed as a result of shift in mucoid elements of saliva caused by hypo-secretion and stasis. Calcium deposition occurs around this gel leading to stone formation. According to metabolic theory increases in the salivary bicarbonate level alter the calcium phosphate solubility and cause the precipitation of calcium and phosphate ions causing stone formation.³ In addition to these theories Marchal et al suggested a retrograde mechanism whereby migration of food debris and bacteria serve as a nidus for stone formation.⁴

The classic investigation methods for sialolithiasis include conventional radiography and imaging such as, ultrasound, computed tomography CT scans and sialography. Conventional radiography like orthopantomogram (OPG) and occlusal view fail to show presence of radiolucent stones.⁵ Thick radiological slices and lack of precise localization limits the usefulness of CT scans.⁶ Ultra sound is of advantage however expertise is required for identification of stones and associated changes within the duct system.⁷

Conventional sialography has been used long since for the evaluation of salivary gland diseases. It is an invasive technique that involves cannulating the duct, more over it can be both diagnostic and therapeutic.⁸ Recent advances in diagnostic imaging for sialolithiasis include Magnetic resonance sialography⁹ and more recently Cone beam CT has been combined with sialography for greater accuracy.¹⁰ Sialoendoscopy is another diagnostic modality that has emerged as the most important tool for sialolithiasis. It involves
introduction of miniaturized tools into ductal system thus allowing direct visualization of pathology along with therapeutic benefit.11

The management options for sialolithiasis include duct dilation, incision and delivery of stone from duct, and salivary gland removal.12,13 However the current concept of treating stones in salivary gland demands more conservative approach. These include shockwave lithotripsy, sialoendoscopy, interventional radiology, endoscopically video-assisted trans-oral and cervical surgical retrieval of stones.14,15 The purpose of this study was to find out the age and gender distribution, along with location of the stone, proposed management and post operative complication seen among patients with sialolithiasis.

METHODOLOGY

This study was carried out over time duration of 6 years that is from July 2009 to October 2015. Approval was taken from hospital’s ethical review board. Study sample consisted of a total of 57 patients with sialoliths in sub mandibular gland. A detailed proforma was designed for this study. After taking informed consent from the patient, detailed history followed by clinical examination was done. Radiographs such as occlusal view, orthopentomogram (OPG) and sialograms were advised as necessary. The patients were diagnosed as having sialolithiasis in sub mandibular gland on basis of clinical and radiographic findings.

Patients underwent surgical removal of stone under general anesthesia. Necessary pre operative evaluation and assessment for anesthesia was done. Patients who had stones in anterior part of the duct that is anterior to first molar tooth were removed intra-orally by mucosal incision on top of the duct after digital palpation. Before incision suture was passed distal to stone to prevent slippage during procedure. After stone removal the lining of the duct was stitched with oral mucosa to redirect the saliva. Stones in distal part of the duct and within gland parenchyma were removed by gland excision through extra oral submandibular approach using layered dissection. Redi vac drain was placed after removal of gland to eliminate the dead space. All the patients were followed up for a period of one year and post operative complications encountered were noted.

RESULTS

The present study was carried out on a total of 57 patients. Out of these 32 patients were males while numbers of Female patients were 25 with male to female ratio of 1.28:1. Patient’s age ranged from 19 to 60 years with mean age of 32.63 ± SD7.8 years. Most of the sufferers of the sialolithiasis were in their fourth decade of life i.e., 31-40 years, (30%). Single isolated stone was found in 53 (95%) patients, while 4 (%) patients had multiple stones. Location of isolated stone in present study was, in anterior part of duct (n= 27, %), distal part of duct (n= 25, %). Also in 4 cases stones were multiple, 3 patients had multiple stones located within the gland parenchyma, and while in one patient 2 stones were found in hilum and second near opening of the duct. Duct incision followed by retrieval of stone and sialoduchoplasty was carried for 27 patients. Rest
30 patients were treated by sub mandibular gland excision. Immediate Complication was Hematoma in the floor of the mouth (n=1), submandibular region (n=1), paresthesia of the lingual nerve (n=4) and weakness along the distribution of the marginal mandibular branch of the facial nerve (n=2). Nerve paresthesia improved over a time period of 4 months in subsequent follow up visits of the patients.

DISCUSSION

In the present study, a total of 57 patients with sialolithiasis were seen over a period of 6 years. A slightly higher number of Males sufferers of sialolithiasis reported i.e., 56% as compared to females 44%. Slight male preponderance among patients with sialolithiasis is also found in other studies.10 However equal gender distribution and slight female preponderance has also been noted.11 Mean age of patients in this study was 32.63 ± SD 7.8 years with greater percentage of patients among 31-40 years age group. Sialolithiasis is most found commonly from 3rd to 8th decades.12 Moreover it is an uncommon finding among children, according to Nahlieli, only 3% of cases are found among pediatric population.13

In current study, all the patients had involvement of gland unilaterally. Also 93% of stones were single while only 7% were multiple. Studies have shown that stones occur in sub mandibular gland mostly unilaterally; however this occurrence is without any preferred site (equal right left distribution).16 In a study by Mckenna JP only 3% of cases were found bilaterally.20 The number of stone (single vs. multiple) found in our study is also compatible with other studies, where multiple stones are less in number as compared to single stone.21,22

With regards to location of stone, 27 (47%) were found in proximal part of duct, 26 stones (45%) were found in distal part of duct while in one patient 2 stones were found, 1 in hilum and another near opening of the duct. Only 5% of stones were located in gland parenchyma. According to literature majority of stones are found in distal third of duct or duct hilum, while stones in duct parenchyma are found to be rare.23 According to McCain JP 9% of calculi are found in the gland parenchyma, 90% in the duct, 60% in the hilum, and 30% to be in the distal duct.24 The reason may be that duct of the sub mandibular gland is long and tortuous and has a genu or bend thus majority of stasis occur in these portions leading to increase in stone formation and precipitation in these locations.

Surgical treatment was offered to all patients. For anterior location duct incision and sialodochoplasty was performed while stones in posterior part of duct and gland parenchyma were treated by gland removal. In literature management of sialolithiasis is divided into two approaches, a classic approach and current conservative approach. In the classic approach, stone close to Wharton’s papilla is treated by sialodochoplasty while gland removal is advocated for posterior and intraparenchymal stones. Similar approach was used in current study. Removal of stone through intra oral duct incision was done by incising the duct on top of the stone. Adequate pre surgical evaluation of position of stone by clinical palpation and radiography is paramount before undertaking this procedure.26 Various techniques have been described in literature for incising the duct. These include performing the incision directly over the palpated stone without dissecting the duct27, or by first identifying the duct at distant proximal point and opened above the stone.28 In another study incision of the duct was done by proceeding from the ostium.29 Main point of concern is the risk to lingual nerve that runs in close proximity to the duct; this however is not problematic in anterior parts of the duct.30 Stone removal in this manner has the benefit of minimal morbidity, moreover gland is preserved, and it is known from scintigraphic studies that affected gland function and secretion improves after intra oral stone removal in this manner.31

Despite the recent paradigm shift towards gland preserving approaches, sialolithiasis is the most common indication for gland removal.32 This is a common belief that a gland with stone formation is no longer functional however in a study on histological analysis of sub mandibular glands after removal showed no correlation between infectious symptoms and alteration in gland structure.33 Thus recent literature stresses more on conservative options rather than gland removal. However Ellis M in his study on sub mandibular gland removal concludes that gland removal should be considered in cases of sialadenitis, where infection is not found lithotripsy is a much better option.34 The reason for gland resection in our study is the fact that all these patients suffered from multiple episodes of sialadenitis thus intervention was necessary, another reason being the non availability of lithotripsy and sialoendoscopy in our institute.

All the patients were followed post operatively for short and long term complications. The complications encountered were hematomata in floor of the mouth and sub mandibular region (3.5%), injury to marginal mandibular branch of facial nerve (3.5%) and lingual nerve (7%). Hald J in his study on sub mandibular gland removal came across similar complications and it was noted that in 92.3% of patients complete recovery of nerve function was seen.35 In another study following sub mandibular gland removal early complications (particularly infection) developed in 14.6% of the cases. Also neurological complications were observed in 16% of the cases. In 37.4% of the cases, these lesions resolved spontaneously in a mean period of 4 months.36

CONCLUSIONS AND RECOMMENDATIONS

Sialolithiasis affecting submandibular gland is slightly more common in males as compared to females with fourth decade as the most common age group. Majority of stones are single, unilateral and are found in anterior part of the duct. Duct incision (sialodo-
chloplasty) for anterior stones while gland removal for stones in hilum and gland parenchyma is the adopted treatment modality in our institute. Knowledge about the anatomy of the submandibular gland and its relations, strict adherence to the surgical principles and meticulous care during dissection of anatomical planes will decrease the frequency of complications. Sialodochoplasty is the mainstay of treatment for stones in anterior part of the duct. In the absence of recent technology like lithotripsy and sialoendoscopy, gland excision remains the preffered modality. However in order to reduce the morbidity like scar formation and nerve damage such advances should be introduced and practiced.

REFERENCES
