

Surgical Profile of Patients Undergoing Submandibular Gland Excision in a Tertiary Care Centre

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ABSTRACT

Introduction

Submandibular gland is a major salivary gland responsible for the production of saliva. It has to be surgically excised for neoplastic and various non-neoplastic diseases. This study was aimed to evaluate the demographics, chief complaint, indications and complications of submandibular gland excision in a tertiary care hospital.

Methods

It is a descriptive cross-sectional study of patients who underwent submandibular gland excision, from 1 January 2021 to 31 December 2023. Ethical approval was taken from the Institutional Review Committee of the hospital. Transcervical approach was used in all the patients. Patients were followed until discharge from the hospital. The intra-operative and immediate post operative complications were noted.

Results

Out of 32 patients, 20 (62.5%) were males and 12 (37.5%) were females aged 8-62 years with 31-40 years being the most affected age group (31.2%). Painful submandibular swelling was complained by 18 (56.2%) patients as the most common complaint. The most common indication for surgery was the sialolithiasis in 13 (40.6%) patients followed by sialadenitis in 8 (25%) patients. Four (12.5%) patients were operated for the neoplastic diseases. Marginal mandibular nerve paresis was the commonest surgical complication that occurred in 3 (9.3%) patients. One patient each (3.1%) had hematoma, residual stone and surgical site infection, respectively.

Conclusion

Sialadenitis and sialolithiasis were the most common indications for the submandibular gland excision. Painful submandibular swelling was the most common presentation in the majority of the patients. Marginal mandibular nerve paresis was the commonest surgical complication.

Keywords

Sialadenitis; demography; sialolithiasis; salivary gland diseases; submandibular gland

INTRODUCTION

The submandibular gland (SMG), one of the three major paired salivary glands, plays a vital role in saliva production, aiding in digestion, oral lubrication, and maintenance of oral hygiene. It contributes approximately 60–70% of unstimulated salivary flow. Surgical excision of the submandibular gland is frequently indicated in both neoplastic and non-neoplastic conditions, including chronic sialadenitis, sialolithiasis, ranula, pleomorphic adenoma, hemangioma, and lymphangioma.^{1,2}

Among benign conditions, sialolithiasis remains one of the most common indications for gland excision due to ductal obstruction and recurrent infections.³ Despite being a relatively routine procedure, submandibular gland excision carries certain risks, including injury to the marginal mandibular branch of the facial nerve, lingual nerve damage, postoperative hematoma or infection, and aesthetic concerns related to scarring.^{4,5} These complications, although often minor, can significantly affect patient satisfaction and quality of life.⁶

Studies conducted in various countries have documented the clinical profile, surgical indications, and outcomes of submandibular gland excisions.^{2,5,7} However, limited data are available from Nepal on the demographic distribution, chief presenting complaints, intraoperative findings, and postoperative complications in such cases. Moreover, the lack of context-specific evidence makes it difficult to compare disease patterns and surgical success rates across different populations.^{3,6}

In the Nepalese context, very limited study has comprehensively analyzed the surgical profile of patients undergoing submandibular gland excision at tertiary care centers. Understanding the demographic patterns, clinical presentations, indications, and complications will help optimize clinical decision-making, and minimize complications, particularly in resource-constrained settings.

This study, therefore, aims to evaluate the demographics, chief complaints, indications and complications of submandibular gland excision in a tertiary care centre in Nepal.

METHODS

This was a descriptive cross-sectional study conducted in the Department of Ear, Nose, and Throat, and Head and Neck Surgery (ENT) of Chitwan Medical College Teaching Hospital, Chitwan, Nepal. Ethical approval was taken from the Institutional Review Committee of the hospital (reference number: CMC-IRC/081/082-074). The records of patients of all ages, who underwent SMG excision in a period between 1 January

2021 to 31 December 2023 were included for the study. Patients with submandibular ductal stones removed via intra-oral approach by an incision alone over the Wharton's duct were not included in this study. Similarly, the SMG excision carried out as a part of radical neck dissection for malignancies of non-salivary structures were excluded.

The protocol approved by the Ethics and Research Committee of the institution was followed and the record review proforma was developed that include demography of patients, clinical history, indication for surgery and the surgical complications. The collected data were entered in Microsoft Excel 2019 and analyzed using IBM SPSS version 26.0. The surgical complications evaluated were the specific complications such as injury to the marginal mandibular, lingual and hypoglossal nerves; and general complications such as hematoma, wound infection, salivary fistula and surgical scar formation. All the patients were followed up till discharge from the hospital, hence, early complications were recorded.

RESULTS

A total of 32 patients underwent excision of SMG during this study period of three years. Twenty (62.5%) patients were males and 12 (37.5%) were females with the male to female ratio of 1.6:1. In our study the youngest age of the patient was 8 years old, who had plunging ranula. The oldest patient was 62 years old who had adenocarcinoma. Most of our patients, who underwent SMG excision, belonged to age group 31–40 years (Table 1).

Regarding the most common presenting symptom, painful submandibular swelling was the chief complaint in 56.2% of patients while the painless submandibular swelling was complained by 34.3% of our patients; and 9.3% patients complained of swelling in the floor of the mouth. Most of the patients with sialolithiasis had history of salivary colicky pain, which was aggravated during or after eating sour foods.

Table 1. Age distribution of the patients (n=32)

Age group	n (%)
0-10 years	2 (6.2%)
11-20 years	2 (6.2%)
21-30 years	7 (21.8%)
31-40 years	10 (31.2%)
41-50 years	6 (18.7%)
51-60 years	4 (12.5%)
>60 years	1 (3.1%)

Table 2. Indications of submandibular gland excision (n=32)

Diseases	n (%)
Sialolithiasis	13 (40.6%)
Chronic sialadenitis	8 (25%)
Plunging ranula	3 (9.3%)
Pleomorphic adenoma	2 (6.2%)
Nonspecific lymphadenopathy in submandibular region	2 (6.2%)
Lipoma	1 (3.1%)
Submandibular abscess	1 (3.1%)
Mucoepidermoid carcinoma	1 (3.1%)
Adenocarcinoma	1 (3.1%)

In our study, the most common indications for surgery was the sialolithiasis (40.6%) followed by chronic sialadenitis (25%). Non-neoplastic diseases were more common than the neoplastic diseases (Table 2). Out of four (12.5%) cases of neoplasms, two were benign; both pleomorphic adenoma and remaining two were malignant; one each cases of adenocarcinoma and mucoepidermoid carcinoma. Three patients with plunging ranula underwent excision of both the sublingual and submandibular glands. Two patients with multiple non-specific lymphadenopathy in the submandibular triangle also underwent excision of the SMG along with the lymph nodes for the histopathological diagnosis.

Regarding the surgical complications, paresis of the marginal mandibular nerve (MMN) was the commonest complication in our study that occurred in 3(9.3%) patients (Table 3). Other complications were relatively uncommon. One patient each (3.1%) had hematoma, residual stone and surgical site infection, respectively.

DISCUSSION

Swelling in the submandibular triangle of the neck is commonly associated with the diseases of the SMG. The diseases of SMG can be broadly classified as non-neoplastic and neoplastic based on the etiological basis. Non-neoplastic diseases such as sialadenitis, sialolithiasis, sialadenosis, sialorrhoea and cysts may result from developmental, obstructive, inflammatory, infectious and autoimmune factors.³ Stone formation in the SMG gland is much more common than the parotid and accounts for more than 90% stone formation among all salivary glands.⁸ This is probably due to several factors such as predominantly mucinous content of the viscous saliva, long and tortuous duct with the narrow opening, and the anti-gravity

Table 3. Complications of submandibular gland excision

Complications	n (%)
Marginal mandibular nerve paresis	3 (9.3%)
Hematoma	1 (3.1%)
Residual ductal stone	1 (3.1%)
Surgical site infection	1 (3.1%)

drainage of the saliva causing stagnation of saliva.⁹ Single or multiple stones may form in the duct or the parenchyma of the gland by the deposition of calcium phosphate and calcium carbonate around the organic center.¹⁰

Poor oral hygiene, dehydration, radiotherapy and immune-compromised status are the predisposing factors for the inflammatory condition of this salivary gland.³ Acute sialadenitis usually results from bacterial or viral infections. Obstructive pathologies such as ductal stones or stenosis are commonly associated with chronic sialadenitis, which often requires surgical treatment. Sialadenosis is the generalized swelling of the salivary gland from hypertrophy of acinar component of the gland or fatty infiltration into the gland.² It can result from several systemic diseases like diabetes mellitus, hypothyroidism, chronic alcoholism and bulimia.³ Autoimmune diseases like Sjogren's syndrome can affect SMG but are rare. Neoplastic diseases include pleomorphic adenoma, adenoid cystic carcinoma, adenocarcinoma and mucoepidermoid carcinoma.¹¹ Moreover, hematological malignancies such as Hodgkin's and Non-Hodgkin's lymphoma can also involve SMG. Enlarged submandibular lymph node with non specific cytological findings can occasionally pose a diagnostic dilemma. It is commonly associated with the infections of tooth, gingiva and upper respiratory tract. Tubercular lymphadenitis being a common disease entity in a developing country like Nepal, it is not rare to find submandibular lymph node involvement by the disease. Besides, infectious mononucleosis, Kimura's disease and cat scratch disease can cause submandibular lymphadenitis. Two of our patients having multiple matted nodes in the close proximity to the SMG underwent excision of the lymph nodes along with this gland for the histopathological diagnosis.

Ultrasonography and FNAC are the common diagnostic tools for the evaluation of submandibular gland pathology. Submandibular sialoliths are usually radio-opaque so plain X-ray occlusal view alone can be very useful. Radio-imaging such as CT and MRI may have to be done in cases of malignancies to know the disease extent

Table 4. Incidence of patients having neoplasm, sialolithiasis and sialadenitis in various Studies

Authors	Total No. of Patients (%)	No. of Patients with Non-neoplastic diseases (%)	No. of Patients with Neoplastic Diseases (%)	Sialolithiasis (%)	Sialadenitis (%)
Goh and Sethi ⁸	93(100%)	56(60.2%)	37(39.8%)	12(12.9%)	38(40.8%)
Erbeck et al ¹⁴	45(100%)	31(68.9%)	14(31.1%)	14(31.1%)	16(35.6%)
Carvalho et al ¹⁶	117(100%)	39(33.3%)	78(66.7%)	28(23.9%)	11(9.4%)
Preusss et al ¹⁷	258(100%)	207(80.2%)	51(19.8%)	119(46%)	88(34%)
Torrano et al ¹⁸	40(100%)	27(67.5%)	13(32.5%)	19(47.5%) combined	
Kukuckova and Svec ¹⁹	86(100%)	63(73.2%)	23(26.8%)	34(39.6%)	29(33.7%)
Our study	32(100%)	28(87.5%)	4(12.5%)	13(40.6%)	8(25%)

and involvement of the adjacent structures. Ductal system of the submandibular gland is better evaluated with the sialography and the sialendoscopy. These techniques have both diagnostic as well as therapeutic roles.

The majority of our patients belonged to age group of 31-40 years. This could be due to the fact that sialolithiasis and sialadenitis are the two most common indications for SMG excision and majority of those falling in this age group. Similar study by Mizrachi et al., reported identical finding with majority of patients within the 31–40 years age group, coinciding with the peak incidence of sialolithiasis and sialadenitis, which predominantly affect individuals in their fourth decade.¹¹ History of intermittent and painful submandibular swelling aggravated on taking meal is an important characteristic feature of sialolithiasis.¹² Occasionally, the stones in the distal Wharton's duct may present as floor of mouth swelling. Neoplastic diseases usually present with painless swelling but it can cause pain especially when there is stretching of the gland capsule due to the enlarging neoplasm. Regarding the chief complaint of the patients in this study, 56.2% presented with the painful submandibular swelling while 34.3% had painless submandibular swelling and 9.3% patients had the floor of the mouth swelling. This aligns with the broader understanding that inflammatory and obstructive pathologies are the most common indications for submandibular gland surgery.¹³ Erbeck et al reported painful swelling in 62.2% patients and the remaining 37.8% patients had painless swelling.¹⁴

Surgery is the mainstay of treatment for neoplastic diseases. Similarly, non-neoplastic diseases such as sialolithiasis and those not responding to medical treatment are managed surgically. Minimally invasive surgical treatment options like sialendoscopy, lithotripsy and laser are useful for sialolithiasis but none of these are available in our country till date. In our set up, distal ductal stones are usually

removed intra-orally via a simple incision along the duct, while the excision of the SMG is reserved for proximal and intra-glandular sialolithiasis. Excision of SMG can be done via transoral approach, external approach, endoscopic approach and robot assisted approach.¹⁵ Retroauricular and submental approaches have also been used for both the open and endoscopy assisted approaches. We routinely use the transcervical approach in our practice.

Though varying rate of incidence of SMG diseases being managed with surgical treatment modality are mentioned in many studies, the majority of the patients belong to sialolithiasis and sialadenitis, which is shown in Table 4. In the present study 28(87.5%) patients had non-neoplastic salivary gland diseases while 4(12.5%) had salivary gland neoplasm. Among the non-neoplastic diseases, sialolithiasis and sialadenitis comprised 40.6% and 25% of the patients respectively. Goh and Sethi reported 60.2% of non-neoplastic diseases and 39.8% being neoplastic diseases.⁸ Among the non-neoplastic diseases, sialadenitis and sialolithiasis were present in 40.8% and 12.9% patients respectively. Other researchers found 23.9% to 46% of sialolithiasis and 9.4% to 47.5% of sialadenitis among non-neoplastic diseases of SMG.^{14,16-19}

In our study, an equal number of benign and malignant neoplastic lesions is noted with a total neoplasm in 12.5% patients. Pleomorphic adenoma was the only benign neoplasm that was present in 6.2% patients. Of the remaining 6.2% patients with malignancies; 3.1% each of patients had adenocarcinoma and mucoepidermoid carcinoma respectively. None of our patient had the adenoid cystic carcinoma. Goh and Sethi had reported 39.8% of neoplasms and pleomorphic adenoma was the only type of benign neoplasm in 33.3% patients while malignancy was identified in 5.3% patients.⁸ Erbeck et al reported 26.7% of benign and 4.4% of malignant neoplasms respectively; pleomorphic adenoma (24.4%) was the most common benign

neoplasm and adenoid cystic carcinoma in 2.2% patients.¹⁴ Carvalho et al reported 59.8% of benign neoplasm affecting SMG, all being pleomorphic adenoma; and 6.8% of malignant neoplasm.¹⁶ Mucoepidermoid carcinoma and adenoid cystic carcinoma were found in each 2.5% patients. Benign and malignant neoplasms were respectively found in 10% and 9% of the patients in a study by Preuss et al.¹⁷ Torroni et al reported 10 to 15% of neoplastic diseases involving SMG, and about half of them being malignant.¹⁸ Kukuckova and Svec reported 26.7% cases of neoplastic diseases. Of them 15.1% were cases of benign neoplasms and 11.6% were of malignancies. Pleomorphic adenoma was the most common benign neoplasm comprising 61.5% patients while adenoid cystic carcinoma was the malignant tumor identified in 4.6% patients.¹⁹

Besides the primary salivary gland diseases, sometimes the other conditions; such as lymphangioma, ranula or lipoma lying in the close proximity to SMG necessitates the removal of the gland itself to ensure the removal of complete cyst wall so that the chances of recurrence can be minimized. For example, the sublingual glands are more commonly involved by the simple and plunging ranulas, but if in any case difficulty in determining the site of origin or any uncertainty over the involvement of SMG is encountered; SMG along with sublingual gland needs to be removed.⁹

Neurological injuries are the most feared complications in SMG excision. Varying rate of temporary (paresis) and permanent paralysis (palsy) of MMN as a surgical complication has been reported in the literature. The permanent paralysis of MMN accounts for 0 to 8%, the lingual nerve being affected in 0 to 12%, and the hypoglossal nerve in 0 to 1.4%.¹⁶ In our study temporary paresis of MMN was the most common complication that occurred in 9.3% of the patients. This study had not encountered a single case of permanent palsy of MMN. Goh and Sethi reported a very low (4.3%) overall rate of complications.⁸ Many studies had documented various incidence rates of MMN paresis ranging from 2.1-14%.^{8,16,17,19} Erbek et al reported temporary and permanent paralysis of MMN in 15.6% and 2.2% of patients respectively.¹⁴ Carvalho et al reported 7.7% of MMN paralysis while the permanent paralysis occurred in 0.85% cases.¹⁶ Thorough anatomical knowledge and meticulous tissue dissection are important for the prevention of injury to the nerves.³ Electrocautery should meticulously be used especially near the nerves to minimize the chances of thermal injury and gentle retraction should be applied by the assistant to prevent traction or pressure injury to the nerves. The injury to the lingual nerve can be avoided by gentle traction of the mylohyoid muscle during dissection of SMG, and by the ligation/

dissection of the Wharton's duct after visualization of the lingual nerve.¹³ Hypoglossal nerve is at risk of injury especially when the surgeon is nervous while using electrocautery to achieve the hemostasis for the bleeding occurring from the vena comitans accompanying the hypoglossal nerve.²⁰

Regarding the non-neurological complications, one of our patients with multiple sialoliths had residual stone in the proximal duct which was missed intra-operatively that required revision surgery to remove the stone intra-orally. Another patient who developed swelling at the surgical site on the first post-operative day due to hematoma formation that was evacuated by wound exploration. Hematoma might have resulted from diffuse venous bleeding collecting in the dead space of wound cavity. Similarly, we had a patient who developed wound infection at the surgical site, which was managed with broad spectrum antibiotics.

The major limitation of our study is that the study was conducted only in a single centre; hence our sample size was less. We strongly recommend conducting multicentric studies with long term follow-up that would be more informative in evaluating the pattern of diseases and incidence of complications in our part of the world.

CONCLUSION

Sialadenitis and sialolithiasis were the most common indications for the submandibular gland excision. Painful submandibular swelling was the most common presentation in the majority of the patients. Marginal mandibular nerve paresis was the commonest surgical complication.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

RP designed the study and critically reviewed and revised the manuscript, TRL and KC assisted in drafting; SM assisted in analysis and interpretation. All authors approved the final version.

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