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Incidence and Management of Obstructive and Traumatic Lesions of the Salivary Glands: A Prospective Institutional Study

Raja Kumar[1], Dr. M. P. Santhosh Kumar*[2], Gidean Arularasan[3]

[1]Graduate Student, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077

[2] Corresponding author Professor, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, 600077. santhoshsurgeon@gmail.com

[3]Associate Professor, Department of Oral and Maxillofacial surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 77

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ABSTRAC

Objectives: Salivary glands could be affected by a variety of diseases: local and systemic. The glands could also be infected by viral, bacterial, rarely fungal or its ductal obstruction which can cause painful swelling or obstruction, affecting their functions. Benign and malignant tumors are yet another important pathology of salivary glands. The aim of this study was to assess the incidence and management of salivary gland pathologies such as mucoceles, ranula and sialoliths in our regional population.

Materials and Methods: All the cases reported between the month of June 2023 to January 2024 for salivary gland pathology were chosen for this study. Data of 20 patients who were affected and treated for various obstructive and traumatic lesions of salivary gland disorders were analyzed, tabulated and were subjected to statistical analysis.

Results: From the statistical analysis, it can be observed that of all the lesions considered, mucoceles were highly prevalent (50%) when compared to sialoliths (30%) and Ranula (20%).

Conclusion: Within the limitations of this study, the commonly observed lesion was mucocele especially in patients among the age group of 3 to 15 years and primarily encountered in males.

Keywords: Excision; Mucocele; Ranula; Sialoliths; Innovative technique

INTRODUCTION

Diseases of the salivary glands are rather common. Obstructive sialadenitis is the most common non-neoplastic salivary condition. It can be caused by calculi, fibro mucinous plugs, duct stenosis, foreign bodies, anatomic abnormalities, or anomalies of the duct system that result in a mechanical obstruction linked to stasis (1,2). Known best as the "meal-time syndrome," obstructive sialadenitis patients typically have painful history, periodic enlargement of affected gland, fever, and purulent discharge at the papilla. This condition is typically worsened by recurrent bacterial infections (3,4). The predominant obstructive salivary disease is sialolithiasis, which accounts for approximately 50% of major salivary gland illnesses and 66% of cases (5-7). According to post-mortem investigations, salivary calculi are 1.2% common among the public. Despite this, Escudier et al reported that the annual incidence of 59 cases of salivary calculi were symptomatic and had a clinical prevalence of 0.45% (7–9).

Eighty to ninety percent of cases of sialolithiasis involve the submandibular gland; the condition is primarily unilateral and does not have a favorite side. Recent post-mortem morphometric investigations that revealed symmetry between the two sides help to explain this conclusion. As per numerous researchers, submandibular stones have an average size of 7.3 mm, and up to 7 cm have been described. Pure intraparenchymal stones are

rare; most calculi are found at the gland's hilum or in the distal portion of the submandibular duct (10–13). The significant disparity between submandibular and parotid stones is connected with the submaxillary gland's sharper, ascendent inclined ducts, mostly mucous. In around 0-5% of cases, other minor salivary glands and sublingual glands are rarely affected (13). The conventional etiopathogenetic causes for the production of salivary calculi include dehydration, blockage, oropharyngeal sepsis-related changes in salivary pH, and decreased salivary flow. Duct dilatation, incision and dissection in the case of distal stones (occasionally followed by marsupialization, with the risk of postoperative stenosis), and sialoadenectomy in the case of intraparenchymal, proximal, and hilar sialoliths are the traditional treatments for obstructive salivary disorders (14).

With the exception of irritant fibromas, mucoceles are the most prevalent benign soft tissue masses found in the oral cavity. Mucoceles, by definition, are made of mucus and cavities. Because of the resemblance of the swelling to the vocal sacs of a frog, they are named ranula when they are on the oral floor (15). The most important secretory product of the sublingual salivary gland is mucus, which is only produced by the accessor salivary glands. Extravasation or retention are the processes that lead to the formation of mucus cavities. While retention is much less common, it happens when a narrowed ductal opening is unable to adequately accommodate the exit of produced saliva, leading to ductal dilatation and surface swelling. Extravasation occurs due to leakage of fluid into adjacent tissues. The main reason behind the auxiliary salivary glands is mucus extravasation for the development of mucoceles, whereas physical trauma serves as the trigger (16, 17). Mucous cysts rarely cause serious issues like discomfort, difficulty speaking and biting food, and extraoral edema. When eating or swallowing, the tongue may compress the ranula to such an extent that it obstructs the flow of submandibular saliva when there are particularly big sublingual salivary gland mucoceles. This results in the gland's clinical hypertrophy and obstructive symptoms (18). On rare occasions, mucoceles involving the Blandin-Nuhn glands were also visible on the tongue's ventral side. This is usually the consequence of self-inflicted bite wounds. Rarely, the glands in the retromolar pad area and the auxiliary gland in the anterior oral floor may also be affected. The most prevalent sources of ranula are the deeper regions of the sublingual salivary gland, with the retention cysts from the Rivini ducts following in a lesser degree (19).

There are three possible methods for managing lower lip mucoceles, and mucoceles in the cheek and palate. The tiny lesions are generally entirely excised, ensuring to encompass the accompanying salivary gland tissue with any marginal glands before closure. Because excision or resection would be difficult and put important structures like the mental nerve at danger, the recommended course of treatment for large mucoceles is an unroofing technique (marsupialization) (20,21).

The aim of this study was to assess the incidence and management of salivary gland pathologies such as mucoceles, ranula and sialoliths in our regional population.

MATERIALS AND METHODS

A prospective study was conducted to analyze the management and prevalence of obstructive and traumatic lesions of salivary glands like sialolithiasis, mucoceles and Ranula in patients visiting a private dental college from June 2023 to January 2024. A total of 20 patients were considered. Scientific Review Board - Saveetha Dental College approved the study (SRB/SDC/UG-1801/23/OMFS/157). Prior permission to assess the patients was obtained from the University human ethical board committee (IHEC/SDC/UG-1801/23/OMFS/337).

Data on gender, age, type of salivary gland pathology and its management was checked. Statistics were done using SPSS version 20.0 with p value <0.05 was considered as statistically significant.

RESULTS

Three salivary gland pathologies were documented. Mucocele had the highest prevalence (50%), followed by obstructive lesion sialoliths (30%), followed by ranula (20%) (Figure 1). On comparing the age of occurrence with that of the pathologies considered, mucoceles were predominantly seen in the age between 3 to 15 years (35%), sialoliths, mucocele, and Ranula were equally present in ages of 16 to 30 years (5%) and mucocele was seen equally present in ages of 31 to 55 years (10%) with a p value of 0.17, (Pearson Chi-Square Value: 0.707) showing no statistical significance (Figure 2). Prevalence of mucoceles were common among males (35%), sialoliths were exclusively encountered in males in the current study (20%) and ranula was 15% and 5% in males and females respectively (Pearson Chi-Square Value: 0.079; p=0.12) and the results were statistically not significant (Figure 3). In the current study mucoceles were commonly seen on the lower lips, sialolith were seen commonly on the left submandibular gland and ranula on the floor of the mouth with a p value of 0.001 showing statistical insignificance (Pearson Chi-Square Value: 40.000; p=0.001) and the results were statistically significant (Figure 4). In the current study, mucocele and ranula were treated by excision and sialolithiasis were treated by removing the sialoliths from the duct [trans-oral sialolithotomy of the involved duct].

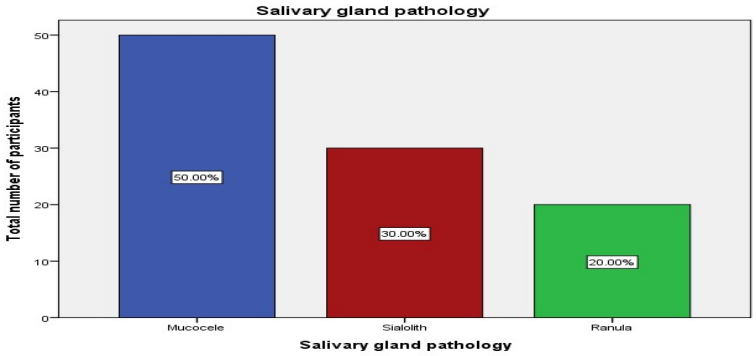

Figure 1: Prevalence of pathologies related to salivary glands.

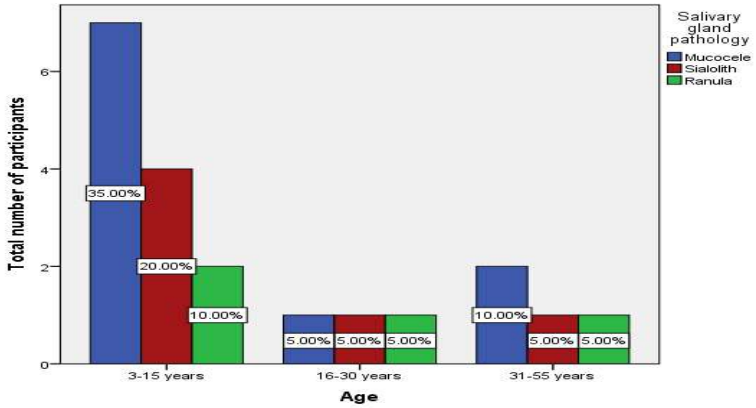

Figure 2: Age distribution based on the prevalence of salivary gland pathology.

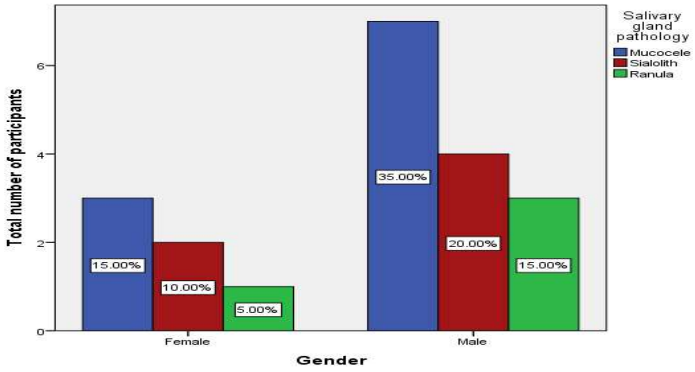

Figure 3: Gender distribution based on the prevalence of salivary gland pathology.

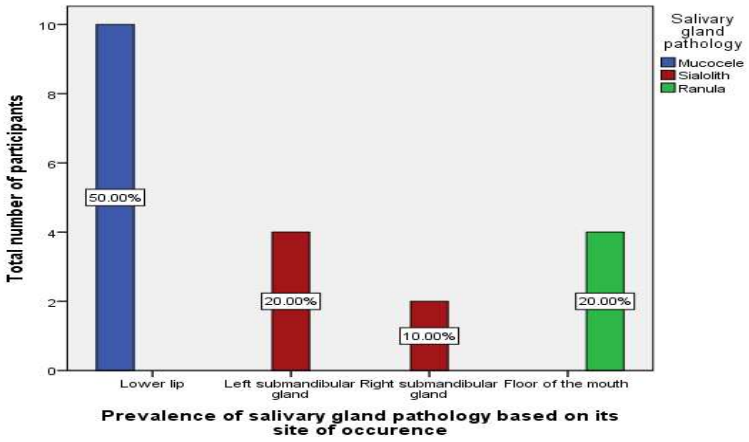

Figure 4: Association between the site of occurrence and the prevalence of salivary gland pathology.

DISCUSSION

On commenting about the incidence of obstructive and traumatic lesions of salivary glands, mucoceles were commonly encountered (50%) when compared to ranula (30%) and sialoliths (20%). The results obtained were similar to a study conducted by Chandramani B et al., who concluded the highest prevalence of mucoceles (22). Mucocele represents the 17th most common lesion of the oral cavity with a prevalence of 2.4 cases per 1000 people (23-25). Lustmann et al stated that Sialolithiasis is a frequent disorder affecting the salivary glands with an incidence rate of 2.9 -- 5.5 per 100,000 person-years (11). The Incidence rate of sialolithiasis was confirmed to be 7.27 - 14.1% by Schrøder et al, which was almost similar to the results of the current study (26).

With regard to the incidence of salivary gland pathologies with age, mucoceles were common and encounters among the age group of 3 to 15 years (35%) followed by 31 to 51 years of age (10%), sialoliths were commonly seen in the age group of 3-15 years (20%) and ranula was seen equally among the age groups of 3 to 15 years (10%). The results are identical to a study done by Chandramani et al., who concluded that extravasation type to be highly prevalent in the age group of 15-24 years (22). Huang et al., concluded that Sialoliths to be more commonly seen in middle-aged males (25). However, with regard to sialoliths, Schrøder et al, concluded sialoliths to be commonly prevalent among the age group of 60 - 70 years which doesn't match the results of the current study (26).

According to our study, prevalence of mucoceles were commonly seen among males (35%), sialoliths were exclusively seen among male patients (20%) and ranula was 5% and 15% in females and males respectively. Chandramani et al, conclude mucoceles to have a slight male predilection of 51% which was dissimilar to the results of the current study (22). With regard to sialoliths Huang et al., concluded that Sialoliths to be more commonly seen in middle-aged males which was similar to the results of the current study (25).

According to the current study's findings, mucoceles are most frequently observed on the lower lips (50%) and sialoliths impact the left and right submandibular glands (20%) and the floor of the mouth (20%). Extravasation type mucoceles, as described by Carrillo et al., are often observed on the buccal mucosa, lower labial mucosa, and retromolar area. They can be a false cyst with ill-defined walls and can be caused by mechanical trauma to the gland's excretory duct, resulting in rupture, with subsequent extravasation of mucous material into the tissue stroma. Less frequently than extravasation, the retention type typically affects older people and is most commonly observed on the upper lip surface, oral cavity floor, and sinuses. They are called ranula when they are on the oral floor. Lower lip (36.20%), tongue's dorsal surface (15.52%), buccal mucosa (10.34%), tongue's ventral surface (25.86%), upper lip (5.18%), floor of mouth (5.18%), and palate (1.72%) were the areas affected by mucocele. The most frequently afflicted site by extravasation type of oral mucocele was the lower lip. The most frequently affected site by retention type of oral mucoceles was floor of the mouth (22).

A calcified blockage within the salivary duct is known as sialolithiasis (27). Sialoliths can develop in any of the major or minor salivary glands or their ducts, however they are most commonly found in the submandibular gland, and Wharton's ducts are the most commonly engaged in 83% of the instances. This assertion aligns with the findings of the present investigation (28). The higher occurrence of sialoliths in the submaxillary gland can be attributed to multiple reasons. These include the saliva's higher phosphate concentration due to its higher viscosity mucus content. This results in a higher alkaline pH, which precipitates the more reactive species dibasic phosphate dihydrate/brushite and promotes the solid-liquid phase exchange of phosphate species in the mouth as well as dentition maintenance. Saliva stagnation is aided in this process by Wharton's duct's ascending course and tiny opening in relation to the duct's overall caliber (25).

This study indicates that traumatic Obstructive lesions like sialoliths were treated by making an incision in the

duct and then removing the sialolith from it. Excisions were used to treat lesions like mucoceles and ranula. If the mucocele is symptomatic, recurring, or persistent, excision of the lesion with the small salivary gland that is associated with it is usually the best course of action. Marsupialization is conducted for extensive lesions as it prevents major tissue loss (29). Sialoliths are identified and removed after a longitudinal incision is made along the duct's course and a periodontal probe is inserted to measure the length of the duct after which saline lavage was performed (30). Numerous studies have been done in this particular domain in varied population which have shown many surgical modalities in the management of obstructive and traumatic lesions of the salivary glands, thereby obtaining successful outcomes (31-41).

This study's limitations include its geographic focus, which limited its consideration to populations primarily from South India, and its unicentric design. When multiple ethnic populations are taken into account, the study results will be more valid.

CONCLUSION

It can be concluded that among the salivary gland pathologies considered, mucoceles were commonly encountered when compared to ranula and sialoliths. Mucoceles were commonly seen on the lower lips, frequently encountered in the age of 3 to 15 years predominantly in males. Thus, as a clinician, it is important to diagnose the pathologies perfectly to aid in better treatment and thus helps to have a better prognosis

Conflict of Interest

The authors declare no potential conflict of interest.

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