Review Article

Evaluation of the Salivary Gland Diseases, Review Article

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Abstract

Salivary gland problems can be caused by bacterial, viral, inflammatory, and neoplastic factors, with symptoms ranging from chronic to reoccurring to acute. The source of inflammation is generally some kind of blockage involving a duct stricture or a stone, and management of the condition is focused on removing the obstruction or impediment. Salivary glands are also the source of tumors, which typically show as a painless solitary neck mass. Typically, these are either malignant or benign, and a diagnosis can be obtained via biopsy and/or imaging. However, salivary gland tumors are generally benign in most cases, and removing them surgically is the practiced course of action. The Medline, Pubmed, Embase, NCBI, and Cochrane databases were searched for studies of patients with non-alcoholic fatty liver disease. Incidence, etiology, and management options were analyzed. Many pathological entities are involved in salivary gland disease. These include both systemic disease symptoms as well as salivary gland-specific diseases.

Keywords: Sialolithiasis, Sjögren's syndrome, Xerostomia, Pleomorphic adenoma, Salivary gland disease

Introduction

Humans have three main salivary glands: the parotid, submandibular, and sublingual glands (paired), and hundreds of minor salivary glands distributed throughout the oral cavity (palate, floor of mouth, lips, cheeks, tongue). They are all subject to being affected by salivary gland disease. A patient may have only one affected gland, or they may all be affected. When only one gland is affected, it usually is the case of a salivary-specific disease such as an infection, an obstructive disorder, or a salivary tumor. In the event that all glands are affected, a systemic disorder is likely responsible. These include sarcoidosis, lymphoma, metabolic diseases, or Sjögren's disease [1].

The presentation history of salivary disease is, by itself, its diagnostic tool. Clinical examination is also a useful pointer to diagnosis but not to the same extent, as, for example, with obstructive disease, there may be minimal clinical indication of the disease. This is why, most of the time, special investigations will be used to determine the diagnosis beyond a doubt. However, the tools required for such special investigations are not available to the average practitioner, rendering the diagnosis and management of salivary gland disease the business of hospitals. Sialography, ultrasounds, endoscopies, and MRIs are among the tests used.

Salivary glands are prone to diseases similar to other glands in the body. These include inflammatory disorders such as blockages and infections, autoimmune diseases like Sjögren's syndrome, systemic diseases presenting in the gland such as HIV, and neoplasms. Of all of these, neoplasms, obstructive disease, and Sjögren's syndrome are the three most frequent [1].

Function of Salivary Glands

The primary use of this network of major and minor salivary ducts and glands is to maintain the oral cavity's fluid equilibrium. The glands comprise serous and mucous cells, which in turn create serous-mucous fluid, i.e., saliva. Saliva waterproofs, lubricates, mechanically cleanses, and physically protects the mouth, as well as hydrolyzes starches to maltose. Speaking clearly and comprehensibly is made easier by lubricating the tongue, teeth, and mucosa. Every 24 hours, around 1,5 L of saliva is produced, with the parotid and submandibular glands producing 90%, the sublingual glands producing 5%, and the other minor glands producing 5%.

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Salivary glands each produce different components of saliva-based on their cell histology [2]: Salivary amylase, such as the parotid glands, generates ptyalin and initiates starch digestion, presenting as a thin serous floriferous-mucous fluid and digesting enzymes are released by the submandibular glands. The sublingual and minor salivary glands also produce other enzymes, but their primary function is to produce a thicker, more viscous liquid. Saliva's mucous component lubricates the oral mucosa and protects the oral cavity by capturing bacteria and foreign particles for eventual elimination by gastric fluids. This participates in the prevention of infection of the oral cavity and also helps prevent dental caries [3].

Salivary Gland Obstructive Disease

Obstructive disease has been the medium through which the most important breakthroughs in salivary gland disease management have been made over the last twenty years. The patient often has long periods of normal function, sometimes months or even years, with intermittent periods of obstruction. When symptoms are present, they typically manifest when eating, when the body typically makes more saliva, which in turn is prevented from passing the obstruction. This leads to a buildup of saliva and swelling of the gland and ductal system. The swelling normally goes away within a few hours when saliva seeps past the stone or stricture, leaving no evidence of prior swelling and often perplexing patients. Such symptoms might appear at any time; the average duration between the development of the mealtime syndrome and a visit to the hospital is roughly 5 years, and most of the time, it is precipitated by an episode of subacute sialadenitis (inflammation of the salivary gland).

Antibiotics, salivary massage, hydration, and sialagogues such as lemon drops or vitamin C lozenges are used to treat acute suppurative sialadenitis, which causes sudden pain and swelling. Mumps and human immunodeficiency virus are examples of viral etiologies, and therapy focuses on the underlying disease. Recurrent or chronic sialadenitis is more likely to be inflammatory rather than infectious; examples include infantile parotitis and sialolithiasis.

Large stones (superior or equal to 1 cm in diameter) appear during an episode of sialadenitis episode, and patients presenting with them do not necessarily have a history of obstruction if the stone made its way through the main duct and into the diverticulum. However, approximately 50% of all major salivary gland disorders are believed to be caused by obstructive salivary gland disease [4], with an incidence of 60 patients per million in the UK each year, according to NHS admission data [5]. These figures are based on the premise that the majority of sialadenitis admissions are due to salivary gland calculi, but these numbers are considered an underestimate according to a retrospective review of sialograms performed over 10 years at Guy's and St Thomas' NHS Trust. This study showed that strictures caused 23% of obstructed cases, 4% were mucus plugs, and the remaining were stones [6], bringing the actual number closer to 75 cases per million population per year. This is partially because the conditions do not tend to lead to sialadenitis and admission to the hospital.

Few treatment options were available for patients presenting with sialadenitis until fairly recently. Indeed, patients who presented with stones that were not immediately close to the opening of the duct and which could not be easily removed under local anesthesia had to have the entire gland removed. These surgical operations presented serious risks to the branches of the facial nerve, which carried serious consequences, including gustatory sweating, known as Frey's syndrome [6].

Nowadays, 80% of stones can be removed without damaging the salivary gland or otherwise leaving it in an asymptomatic, functional state. Both human and animal studies [7] have shown the improvement of gland function after the obstruction has been removed, as evidenced by post-retrieval sialographs, which demonstrate increased clearance of contrast solution compared to sialographs taken before the treatment, thus implying improved gland function [8]. This tells us that salivary glands can fully recover and regenerate, thus motivating practitioners to avoid sialadenectomy and prefer a treatment more likely to preserve the gland in situ.

Treatment Options for Stone Removal

The three treatment options for proximal salivary calculi, not amenable to simple surgical release, are basket retrieval (via endoscopic, fluoroscopic sialography, or ultrasound guidance) [9], lithotripsy, or surgical removal (with endoscopy guidance for parotid stones) [10]. Choosing which modality to utilize is determined by factors such as the size and location of the stone, which are considered crucial considerations. A basket cannot engage a calculus in the gland parenchyma or small secondary ducts. Stones in the submandibular duct that are located beyond the genu (the bend in the duct as it approaches the hilum) are difficult to access. The stone must be retrieved from the duct, rendering size an important consideration. Basket retrieval targets are small, movable stones.

The different gland/s involved will determine which treatment will be utilized for big and/or permanent stones. For large Stones, practitioners tend to use extracorporeal shock-wave lithotripsy. This works similarly to kidney stones, where the stone is broken by high-energy ultrasound waves. However, lithotripsy is not very efficient in the treatment of submandibular gland stones, partly because of the difficulty in locating the stone but also owing to the fact that submandibular stones might be larger than those in the parotid. Indeed, the success of the lithotripsy relies significantly on the size of the stone itself: a stone larger than 8 mm has a less than 10% chance of passing through. Gland-preserving surgery is the last resort for submandibular stones

larger than 4 mm in diameter and for parotid stones where lithotripsy was unsuccessful [11].

Submandibular gland stones are more likely to form around the lingual nerve at the genu of the duct. To remove the stone, a long incision from the duct opening at the anterior of the floor of the mouth to the wisdom teeth is required. The duct can be traced to the gland's hilum and the stone by elevating the sublingual gland and turning it laterally. This treatment is safe and preserves the gland. For parotid stones, the incision should be extraoral in the preauricular region. An endoscope is inserted into the duct, guiding the surgeon to the stone. The chances of damage to the facial nerve are lowered when the parotid gland is dissected as little as possible [11].

Neoplasms of Salivary Gland

Benign

Benign salivary gland neoplasms are often asymptomatic, painless, slow-growing neck or parotid masses. Lymphatic malformations, hemangiomas, and pleomorphic adenomas are the most often observed salivary gland neoplasms in children. However, salivary gland tumors in children have a tendency to be malignant (over 50% of children). For adults, pleomorphic adenoma is most common [12]. Diagnosis must be made with the help of fine-needle aspiration biopsy and ultrasonography, CT, or MRI. Some tumors, notably pleomorphic adenomas, are at risk of malignant change over time; hence, they are routinely surgically removed. To confirm the diagnosis and reduce morbidity and death, salivary tumors should be entirely removed [13].

Malignant

Cancer of the salivary gland is uncommon; indeed, population-based research found that of all salivary gland tumors, only 16% were malignant [14]. Thus, the majority of parotid gland neoplasms are benign, but small salivary gland tumors, as well as sublingual and submandibular salivary gland tumors, have higher chances of being malignant [15], but differentiating the malignant neoplasm from one that is benign may be impossible without a biopsy. Both forms of salivary gland tumors commonly manifest as a painless lump in the gland. However, signs of malignancy include fixation of the tumor to the skin or underlying tissue, facial paresis, palpable neck lymphadenopathy, and pain.

Patients should have their parotid gland examined when they present with nonacute facial paralysis, and an otolaryngologist should be consulted immediately if a mass is found. The most prevalent histologic forms of malignant salivary gland tumors are the mucoepidermoid and adenoid cystic carcinomas [16]. Face or scalp squamous cell carcinoma can manifest less frequently with metastases to the parotid gland. Because most salivary gland cancers are treated surgically, quick referral is advised when one is suspected.

Systemic Diseases

Systemic disorders affect the salivary glands because they are secretory glands that are part of the GI system. Sjögren syndrome and Mikulicz disease are the most commonly mentioned diseases; xerostomia will be the primary presenting symptom. Sjögren syndrome is an autoimmune disease whose main symptoms include dry mouth and eyes. According to research, the female-to-male ratio ranges from 20:1 to 9:1. Rendering the condition more common in Caucasian women. While it can appear at any age, the average age of occurrence is between 40 and 50 years old [17]. In the United States, the occurrence of primary Sjögren syndrome is estimated to be between 2 and 10 per 10,000 people. A lip biopsy that shows lymphocytes around the salivary glands is frequently used to properly diagnose the condition. Sialochemistry, Rose Bengal dye, sialography, and Schirmer are considered other acceptable tests [18]. The goal of dental treatment in this scenario should focus on alleviating symptoms, which is achieved by proper oral hygiene, flüoride treatments, and the use of saliva replacements.

Conclusion

Salivary gland disorders can have a major influence on oral health and overal well-being, and they include a wide spectrum of problems caused by blockages, infections, tumors, or autoimmune diseases. These highlight the importance of salivary glands in properly maintaining oral hygiene and in promoting and aiding digestion. Prompt diagnosis and treatment are critical for avoiding complications and preserving the quality of life for people affected by these conditions. Medical research and technological advancements continue improving our understanding of salivary gland problems, resulting in more accurate diagnostic procedures and novel treatment approaches. Comprehensive care requires multidisciplinary teamwork among healthcare providers such as dentists, otolaryngologists, and oral and maxillofacial surgeons.

Medical assistance should be sought out as fast as possible for patients who experience symptoms such as swelling or pain in the salivary gland and dry mouth to identify and treat the underlying cause. Lifestyle changes, medications, and surgical treatments (in some cases) should be used in order to ease symptoms and improve the overall prognosis. However, a holistic approach that incorporates both the physical and emotional well-being of the patient is also vital. Supportive care, patient education, and continuous research efforts will all help to enhance outcomes and quality of life for those impacted by these disorders.

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References

1. Peel RZ, Gnepp DR. Diseases of the salivary glands. In Barnes L (ed): Surgical Pathology of the Head and Neck, vol 1. New York, Marcel Dekker; 1985. pp. 355-61, 1988. pp. 535-52.
2. Ibid, 780; Saunders, Hirata, Jaques, "Salivary glands," 59.
3. Dow KH, Hilderley LJ. Nursing Care in Radiation Oncology, 110; Tortora, Anagnostakos, Principles of Anatomy and Physiology, fifth ed, 598.
4. Epker BN. Obstructive and inflammatory diseases of the major salivary glands. Oral Surg Oral Med Oral Pathol. 1972;33(1):2-27.
5. Escudier MP, McGurk M. Symptomatic sialoadenitis and sialolithiasis in the English population, an estimate of the cost of hospital treatment. Br Dent J. 1999;186(9):463-6.
6. Ngu RK, Brown JE, Whaites EJ, Drage NA, Ng SY, Makdissi J. Salivary duct strictures: nature and incidence in benign salivary obstruction. Dentomaxillofac Radiol. 2007;36(2):63-7.
7. Osailan SM, Proctor GB, Carpenter GH, Paterson KL, McGurk M. Recovery of rat submandibular salivary gland function following removal of obstruction: a sialometrical and sialochemical study. Int J Exp Pathol. 2006;87(6):411-23.
8. Makdissi J, Escudier MP, Brown JE, Osailan S, Drage N, McGurk M. Glandular function after intraoral removal of salivary calculi from the hilum of the submandibular gland. Br J Oral Maxillofac Surg. 2004;42(6):538-41.
9. Rogers DJ, Drage NA. Ultrasound-guided basket retrieval of a submandibular duct stone in a child. J Pediatr Surg. 2006;41(10):1780-2.
10. Zenk J, Constantinidis J, Al-Kadah B, Iro H. Transoral removal of submandibular stones. Arch Otolaryngol Head Neck Surg. 2001;127(4):432-6.
11. Combes J, Karavidas K, McGurk M. Intraoral removal of proximal submandibular stones – an alternative to sialadenectomy? Int J Oral Maxillofac Surg. 2009;38(8):813-6.
12. Califano J, Eisele DW. Benign salivary gland neoplasms. Otolaryngol Clin North Am. 1999;32(5):861-73.
13. National Comprehensive Cancer Network. NCCN guidelines: head and neck cancers. Available from: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#site (subscription required). Accessed January 14, 2014.
14. Pinkston JA, Cole P. Incidence rates of salivary gland tumors: results from a population-based study. Otolaryngol Head Neck Surg. 1999;120(6):834-40.
15. Hanna EY, Suen JY. Malignant tumors of the salivary glands. In: Myers EN, Suen JY, Myers JN, Hanna EY, eds. Cancer of the Head and Neck. 4th ed. Philadelphia, Pa.: Saunders; 2003:475-510.
16. Sun EC, Curtis R, Melbye M, Goedert JJ. Salivary gland cancer in the United States. Cancer Epidemiol Biomarkers Prev. 1999;8(12):1095-100.
17. Patel R, Shahane A. The epidemiology of Sjo¨ gren's syndrome. Clin Epidemiol. 2014;6:247-55.
18. Krishnamurth S, Vasudeva SB, Vijayasarathy S. Salivary gland disorders: a comprehensive review. World J Stomatol. 2015;4(2):56-71.