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REVIEW

Management of salivary flow in head and neck cancer patients — A systematic review

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Summary Altered salivary flow is frequently observed as a result of head and neck cancer (HNC) treatment. Decreased salivation or xerostomia consequent to radiation therapy is the most frequently observed complication resulting in patient discomfort, tooth decay, periodontal disease, and dysphagia. Excessive salivary flow or sialorrhea can be equally troublesome to the patient and their caregivers. It is caused by tumor or treatment-related dysphagia, or due to altered anatomy from oncologic resections of the upper aerodigestive tract, especially the middle third of the mandible. Post-operative sialoceles and fistulas are other manifestations of abnormal salivary flow which interfere with wound healing. The management of excessive salivary flow in HNC patients is a less frequently discussed subject in medical literature. Complications related to salivary flow can cause increased morbidity and occasionally mortality related to HNC treatment. Consequently, the management of excessive salivary flow in the post-operative setting and for palliation has a great impact on overall outcome of surgical intervention and quality of life for the patient. Excessive salivary flow can be treated with aggressive wound care, pharmacologic inhibition, radiation, or surgery. A review of the literature focused on the management of excessive salivary flow in HNC patients is presented.

Introduction

In the setting of a normal mucosal barrier, saliva is beneficial for oral health. It maintains a hypotonic environment which assists with the sensation of taste, and regulates the pH and ionic composition within the oral cavity necessary for appropriate function of salivary proteins. Salivary amylase cleaves α1,4-glycosidic linkages to break down starches, and may bind streptococci to promote their clearance from the oral cavity.[1] Other proteins such as lysozyme, lactoferrin, peroxidase, and secretory IgA are also beneficial

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for prevention of periodontal disease, candidiasis, and dental caries.[2] In addition, the viscosity of saliva assists with swallowing by lubricating the food bolus during the oral phase of deglutition.

The treatment of HNC frequently affects the quantity and quality of salivary flow. The most frequent treatment-related salivary complication is impaired salivary function consequent to either definitive or adjuvant radiation. The resulting xerostomia and thick salivary secretions increase the risk of oral and dental disease and also adversely impact the overall quality of life.[3] A less frequent complication of HNC treatment is excessive salivation. Excessive salivation often occurs as a manifestation of a dysfunctional swallowing mechanism either due to anatomical alterations of the oral cavity preventing lip closure, such as resection of the lips or anterior third of the mandible, and due to obstructive tumors located in the proximal aerodigestive tract. Injury to the pharyngeal innervation by tumor involvement, surgery, or radiation also results in swallowing dysfunction which can manifest as sialorrhea.[4] Excessive salivation manifests as salivary incontinence that leads to soiling of clothing, offensive odors, and excoriation of the skin, and consequently loss of self-esteem, social isolation, and a decreased overall quality of life.[5]

In general, the presence of saliva is not desired near a surgical reconstruction due to its potential to cause wound breakdown which results in salivary fistulas and infections. This is validated by the fact that saliva is known to reduce the tensile strength of vicryl and chromic sutures used for closure of surgical wounds in as few as seven days.[6] Salivary fistula occurs in approximately 3%[7,8] of patients undergoing microvascular free flap reconstruction of the head and neck, but this risk increases to 10—25% if a surgical resection involves the larynx or the pharynx.[9] Studies have shown that radiotherapy, chemotherapy, malnutrition, poor surgical technique, infection, vascular compromise, residual cancer, and hypothyroidism are some of the other risk factors for post-operative salivary fistula.[10]

Salivary fistula has the potential to cause wound infection, which has been implicated as a cause for free flap failure.[11] However, the exact role played by saliva in microvascular free flap failure is somewhat controversial, as Huang et al. found that salivary fistulas were not strongly associated with free flap failure in head and neck reconstruction. Their inferences were based on results from a prospective laboratory study in rats and a retrospective analysis of 558 cases of microvascular flap reconstruction.[12] Although the overall success rate of free tissue transfer is 94—97%,[13—16] the rate of successful salvage reconstruction is lower, ranging from 28% to 87.5%.[13,14,17] In a surgical bed contaminated with bacteria and saliva, repeat operations and graft failures can leave large tissue defects with dangerously scant coverage of the great vessels of the neck. This results in an increased risk of arterial rupture.

Salivary complications may be particularly challenging when related to trauma or surgery of the parotid gland. Trauma patients with lacerations to the skin above the parotid may develop a sialocele or salivary fistula from either injury to the parotid gland or ducts.[18] Superficial parotidectomy performed electively for resection of parotid masses has similar risks, as the remnant parotid tissue may continue to produce saliva.

Measures to decrease saliva production have the potential to eliminate or improve the aforementioned problems encountered in the treatment of HNC patients. A focused review of the literature on available methods for managing excessive salivary flow is presented in this manuscript.

Literature review

Control of salivary flow can be achieved by creating a controlled fistula in an effort to direct saliva away from important structures or surgical repair sites. This approach using conservative wound care measures is a validated means of controlling salivary fistulas in the post-operative setting (Table 1). Optimizing swallowing function through oral prosthetic devices or swallowing exercises is also vital to the management of sialorrhea. Alternatively, total salivary production can be reduced by systemically administered pharmaceuticals, locally injected medications, external beam radiation, and surgery on the salivary glands or ducts (Table 2). The reduction in the amount of saliva production can be useful both pre and post-operatively, as well as in the palliative care setting to improve treatment outcomes and quality of life in patients suffering from saliva-related complications.

Conservative measures

Perhaps the simplest method of controlling saliva is diverting its flow away from important structures. Lateralization of pharyngo-cutaneous fistulas after laryngectomy involves incising the skin flap in a lateral position and placing a penrose drain in the wound in order to divert saliva away from the great vessels. Pressure dressings are then applied to prevent fluid from accumulating beneath the skin flap. Another alternative is simply leaving in bulb suction drains placed intraoperatively until salivary flow diminishes. Bastian and Park found both these techniques to be equivalent in terms of complications and time for fistula closure. However, management of salivary fistulas with suction drain was superior due to simplified wound care, reduced patient discomfort, and decreased overall cost.[10] Even in complex reconstructions using free tissue transfer, conservative methods such as bedside wound debridement and aggressive wound care is successful in resolving 81% of salivary fistulas occurring less than 30 days after surgery. Late salivary fistu-

Table 1 Measures for controlling saliva

Intraoperative methods
Bulb suction drains
Fibrin glue
Post-operative methods
Frequent dressing changes
Lateralization with penrose drain
Bedside wound debridement
Pressure dressings
Needle aspiration of sialocele
Fibrin glue
Prosthetics