INTRODUCTION

Radiation therapy is a primary or adjuvant treatment in the majority of cases of head and neck squamous cell carcinoma (HNSCC) and often results in salivary gland dysfunction. Radiation therapy causes acute salivary gland inflammation followed by chronic fibrosis and atrophy leading to greatly reduced salivary output. The lack of saliva results in a clinical syndrome of severe dry mouth known as xerostomia which has been shown to occur in 94-100% of patients receiving radiation therapy. Patient quality of life is significantly reduced secondary to painful mucous membranes, difficulty swallowing, and loss of taste, among others.

In an effort to spare a salivary gland from radiation fibrosis, Jha and Seikaly introduced the novel surgical technique of submandibular salivary gland transfer (SMT) in 2001. The procedure physically moves the submandibular gland from its natural location in the contralateral, uninvolved submandibular space to a more anterior location in the submental space. Once in the submental space, the gland can be shielded from the radiation beam, preserving its function.

To date, the only patients benefiting from submandibular gland transfer are patients undergoing surgery as part of their cancer treatment. Currently, over 50% of patients with head and neck cancer are treated by radiation with or without chemotherapy and therefore have not been considered candidates for SMT. The present study reviews our institutional experience with SMT, and specifically examines the safety and effectiveness of the procedure in several patients who received SMT prior to radiation and chemotherapy.

METHODS AND MATERIALS

**Design:** Retrospective case series of 12 patients undergoing SMT as part of their H&N cancer treatment.

**Data collected:** Age, Race, Sex, Site, Stage, Treatment, Xerostomia, Complications, Recurrence, Follow-up.

**Inclusion Criteria:**
1. Biopsy proven SCC of the oropharynx or hypopharynx
2. Clinical and radiographic absence of disease in the contralateral neck
3. Planned primary or adjuvant radiation therapy
4. Obtained informed consent

**Jha and Seikaly Method for SMT:**
1. Superselective neck dissection of contralateral neck, frozen for any suspicious nodes, if positive for cancer, abort the SMT and complete the neck dissection.
2. Free the SMG from surrounding tissue, leaving it pedicled on facial artery, facial vein, and the submandibular ganglion.
3. Clamp facial artery proximally to insure adequate retrograde arterial flow to the gland.
4. Divide facial artery and vein and cut the mylohyoid muscle—allows anterior repositioning of the gland to the submental space.
5. Secure in new position with sutures and place radiopaque wire around periphery of gland for identification in radiation planning.

RESULTS

A total of 12 patients underwent SMT between March 2006 and April 2008. Four women and eight men with a mean age of 60 (45-77) presented with stage III (4/12, 25%) and stage IVa (8/12, 75%) disease. Three patients underwent SMT transfer prior to chemoradiation therapy, while 9 (75%) underwent transfers at the time of surgical resection followed by radiation. Of those undergoing surgery, 5 (55%) received radiation therapy with concomitant chemo while 4 (44%) received radiation alone. Of the 12 SMG transfers, 9 were left-sided and 3 were right-sided.

Postoperatively, 2/12 (16%) patients developed seromas that were drained in clinic without long term sequelae, and no patients developed wound infections. Recurrence was noted in 3/12 (25%) after an average f/u time of 178 days, but none were at the site of the SMG transfer. 10/12 (84%) had no complaints of xerostomia when specifically asked about this side-effect, whereas 2 patients endorsed mild symptoms of xerostomia. Overall mean follow-up time was 323 days (median 288).

DISCUSSION

Submandibular gland transfer has been shown to be effective in decreasing the rates and severity of xerostomia. Studies have shown no or minimal complaints of xerostomia in 71%-88% of patients undergoing SMT prior to receiving radiation therapy compared to rates of 17% to 28% in patients not undergoing SMT.1,2,3,4. Additionally, SMT has shown significantly better stimulated and unstimulated salivary output compared to non-transfer groups5,6.

Other strategies employed to prevent xerostomia include supportive measures, Amifostine, and Pilocarpine. Supportive measures include frequent hydration, sugar free gums/candy, and moisturizers. These require frequent use and are minimally helpful in relieving xerostomia symptoms. Amifostine is a pharmacologic agent used prior to XRT to decrease fibrosis of the gland. It provides little benefit and has significant expense and GI side effects. Pilocarpine is a cholinergic agonist used to stimulate salivation, but is largely ineffective.

Another promising method created was intensity modulated radiation therapy (IMRT). This employs a novel radiation delivery strategy to shield one parotid gland contralateral to the tumor. It has been shown to give 50% improvement in stimulated salivary output, but fails to improve xerostomia symptoms.

While SMG transfer appears to be effective in preventing xerostomia, it has thus far been used only in patients undergoing surgery followed by adjuvant radiation. This procedure could also help those who undergo chemoradiation therapy as primary treatment. For this to be feasible, it would need to involve minimal morbidity and allow for rapid recovery so as not to delay treatment.

CONCLUSIONS

Submandibular gland transfer is a feasible, safe, and seemingly successful option in preventing xerostomia in patients undergoing surgery or chemoradiation as primary treatment of H&N carcinoma. 10/12 (84%) patients treated with SMT denied symptoms of xerostomia when specifically asked about this side-effect, whereas 2 patients endorsed mild symptoms of xerostomia. Overall mean follow-up time was 323 days (median 288).

REFERENCES