Treatment of postparotidectomy Frey syndrome with the interposition of temporalis fascia and sternocleidomastoid flaps

Xiao-Ming Dai, MD, PhD,[a] Hua Liu, MD, PhD,[b] Jia He, MD,[c] Min-Song Tu, MD,[d] Li-Fu Yu, MD,[e] and Liu Liu, MD, PhD[f]

Objectives. This study was performed to evaluate the effectiveness of overlapping the temporalis fascia flaps (TFFs) and the sternocleidomastoid muscle flaps (SCMFs) as physical barriers to treat established Frey syndrome and concavity after parotidectomy.

Study Design. We retrospectively reviewed 17 patients who underwent corrective procedures with simultaneous TFF and SCMF interposition for the treatment of Frey syndrome. The affected areas of the cheek skin were identified with starch-iodine tests. The facial contours of the patients were classified as bilaterally symmetric (BS), with a slightly shallow (SS) contour on the surgical side, or with a conspicuously shallow (CS) contour on the surgical side.

Results. The sample was followed up for a mean of 22 months. The average area of gustatory-sweating positive skin was reduced from 12.80 to 1.32 square centimeters postoperatively. The facial asymmetry secondary to parotidectomy was greatly improved.

Conclusions. The authors concluded that this technique was efficacious in ameliorating Frey syndrome and facial concavity secondary to parotidectomy. (Oral Surg Oral Med Oral Pathol Oral Radiol 2015;119:514-521)

The term "Frey syndrome" was created to describe a disorder that is characterized by profuse sweating that is often accompanied by vasodilation in the area innervated by the auriculotemporal nerve. It is thought that aberrant reinnervation of eccrine sweat glands and vessels in the face by parasympathetic fibers, which were originally secretomotor inputs to the parotid gland, is a factor in the etiology of Frey syndrome.[1] Frey syndrome typically develops as a sequela of parotidectomy. The reported postoperative incidence of Frey syndrome varies from 2% to 100%.[2-5] Gustatory sweating is extremely disruptive in the life of an afflicted individual and needs to be treated.

A wide range of nonsurgical and surgical treatments of variable effectiveness are available for treating Frey syndrome. Unfortunately, there is still no treatment of choice for this morbidity. A potential strategy for the therapy of this syndrome is the placement of a physical barrier between the cheek skin and the parotid bed. Some patients have been reported to experience complete relief from gustatory sweating and contour deformities following the interposition of autologous or xenogeneous materials between the skin flap and the parotid bed.[6-11] Sternocleidomastoid muscle flaps (SCMFs) have exhibited controversial effectiveness in the prevention of Frey syndrome,[12,13] but, together with temporalis fascia flaps (TFFs), SCMFs offer multiple-layer physical barriers and sufficient tissue volume to alleviate established gustatory sweating and cosmetic defects.

The purpose of the present study was to treat Frey syndrome and repair retromandibular depression via the re-elevation of the cheek flap and the interposition of TFF and SCMF.

Statement of Clinical Relevance

Re-elevation of the cheek flap and interposition of the temporalis fascia flap (TFF) and graft and the sternocleidomastoid muscle flap (SCMF) comprised a potential strategy for treatment of established Frey syndrome and reconstruction of retromandibular deformity secondary to parotidectomy.

This study was supported by the Applied Basic Research of Yunnan Province (Associated Special Program of Kunming Medical University, No. 2010 CD187 and No. 2013 FB147).

[a]Associate professor, Department of Plastic Surgery, Division of Maxillofacial Surgery, First Affiliated Hospital, Kunming Medical University, Yunnan Province, China.

[b]Associate professor, Department of Oral and Maxillofacial Surgery, Fourth Affiliated Hospital, Kunming Medical University, Kunming City, Yunnan Province, China.

[c]Attending doctor, Department of Plastic Surgery, First Affiliated Hospital, Kunming Medical University, Kunming City, Yunnan Province, China.

[d]Attending doctor, Department of Plastic Surgery, Division of maxillofacial surgery, First Affiliated Hospital, Kunming Medical University, Kunming City, Yunnan Province, China.

[e]Attending doctor, Department of Plastic Surgery, Division of maxillofacial surgery, the First Affiliated Hospital, Kunming Medical University, Kunming City, Yunnan Province, China.

[f]Professor, Department of Plastic Surgery, First Affiliated Hospital, Kunming Medical University, Kunming City, Yunnan Province, China.

Received for publication Oct 30, 2014; returned for revision Dec 9, 2014; accepted for publication Dec 19, 2014.

2212-4403/$ - see front matter

http://dx.doi.org/10.1016/j.oooo.2014.12.025

MATERIALS AND METHODS

The study was approved by, and performed in compliance with, the Helsinki Declaration and the guidelines of the Institutional Review Board for human patients of Kunming University of Medical Science. We retrospectively reviewed the medical records of 17 patients, who accepted surgical intervention in our department between August 2008 and May 2012. Patients with gustatory sweating after primary parotid surgery, with or without the recurrence of benign lesions, were included in this study. The patients were invited to participate in interviews preoperatively and every 6 months postoperatively. In these interviews, all patients were examined by three investigators (a plastic surgeon and two head and neck specialists). These investigators had not participated in the surgical procedures. The investigators inspected each patient and independently graded the patients' outcomes in the following five aspects: (1) function of the seventh cranial nerve (FSCN), (2) function of the great auricular nerve, (3) upper cervical and retromandibular contours, (4) the area of skin affected by gustatory sweating, and (5) the presence or absence of flushing and fever. Facial nerve functions were accessed with House-Brackmann grades. The starch-iodine test[2] was performed as an objective measure of the presence or absence of gustatory sweating. In cases of sweating caused by emotional and thermal stimuli, the patients were calmed with a brief explanation of the coming test. Next, the following steps were performed in a room where the temperature was controlled with an air conditioner. Tincture of iodine (3.5%) was placed on the upper cervical and preauricular portions of the patient's face and allowed to dry. The coated areas were then dusted with starch powder, and lemon-flavored sweets were given as sialogogues. If the patient sweated only on the operative side, the skin turned blue, which was accepted as a "positive" result. The boundary of the affected area that deeply colored blue-purple was outlined on the patients' cheek and then copied onto a soft and translucent plastic film. The area of affected skin was quantified with a grid with a resolution of at least one square millimeter (Figure 1). Estimates of elevated skin temperature were collected on the basis of the patients' subjective complaints. The presence or absence of skin redness was observed in full natural light, and the non-operated side was used as the control. Differences in bilateral vertical distance were used to evaluate the patients' contours. The patients were seated with their heads in the neutral position. The inferior border of the ear lobe, the apogee of the mastoid process, and the cheek constituted the plane. The vertical distance from the intersection point of the ear lobe and cheek to the plane was recorded. The patients were categorized into three groups based on the differences between the bilateral vertical distances, that is, less than 0.5 cm, less than 1 cm, and more than 1 cm. Similarly, the upper cervical and retromandibular contours of the patients were classified as bilaterally symmetric (BS), slightly shallow (SS), and conspicuously shallow (CS) contours (Figure 2).

After successful general anesthesia, the patient was placed in the supine position. The head was turned to the maximum contralateral extent. A standard tragal incision along the border of tragus, which did not reach the tragal incisure and extended upward to the cranial border of tragus, was made. Inferiorly, the incision curved around the ear lobe, with preservation of the natural sulcus between it and the cheek, then extended directly into the auriculomastoid groove to the occipital hair, and finally turned posteriorly and parallel to the hairline for approximately 10 cm (Figure 3). The mastoid skin flap was first raised anteroinferiorly from the surface of sternocleidomastoid muscle (SCM). The great auricular nerve (GAN) was preserved per the following protocol. The ear lobe was typically employed as sign of the location of one of the main branches of the GAN. Next, the trunk of GAN was dissected upstream between the flap and the SCM to the level at which the GAN emerged from the posterior border of the SCM. The deep posterior branch was freed from the SCM and the parotid gland, drawn backward from the surgical field, and preserved if the eradication of the tumor was not compromised.

The preauricular flap was prepared just above the level of the facial nerve. In cases of recurrence of benign tumors, the dissection of the facial nerve was essential. It was very difficult to identify the trunks of the seventh cranial nerves because of the presence of hyperplastic scars from the primary operations. Instead, initial dissection from the main branches—typically the zygomatic, temporal, and buccal branches—was preferred. Once the dissection of the facial nerve was completed, the parotidectomy was continued with the standard technique. The dissection of the preauricular flap was extended approximately 1 cm beyond the boundary of gustatory sweating−affected skin (GSAS).

After the parotidectomy procedure, an incision was made in the mastoid portion of the SCM along the rostral−caudal axis, and the muscle was split into vertical halves. This incision descended to the depth of the transverse raphe and was maintained above the level of the posterior belly of the digastric muscle to avoid injury to the accessory nerve and extended inferiorly to the level at which the GAN emerged from the posterior border of the SCM. Next, the incision turned vertical and forward to the anterior border of this muscle. The muscle flap was dissected from the converging angle of the rostral−caudal incision and the horizontal incision. The distal end of the flap was first elevated, and the