



Gastro-omental free flap for reconstruction of tongue defects

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ABSTRACT

Objectives: The purpose of this paper is to report the technique and outcomes of the use of gastro-omental free flap reconstruction in glossectomy defects.

Materials and Methods: This is a prospective case series of 9 patients of tongue squamous cell carcinoma, who underwent either subtotal or partial glossectomy and reconstruction with gastro-omental free flap. The flap anatomy, surgical technique and the outcomes including the swallowing and speech are presented.

Results: Five patients underwent partial glossectomy and 4 had sub-total glossectomy. The median age was 43 years; and the median follow up was 11.4 months. Laparoscopic harvest was done in 8 patients. There was one flap loss. Seven patients underwent postoperative radiotherapy. Functional evaluation was done in 5 patients who were disease free. Four could tolerate soft diet orally, one patient was on liquid to pureed diet. Speech was intelligible in 4. None of the patients had any complications related to laparotomy or laparoscopy.

Conclusion: Gastro-omental flap provided a secretory mucosal surface and was beneficial in the saliva depleted patients post radiotherapy. The laparoscopic harvest of this flap has minimized donor site morbidity. One patient had a flap loss. Two patients reported superficial ulcerations on the surface, one of them had to undergo surgical debulking to correct it while the other healed with conservative measures. Speech and swallowing outcomes of the reconstructed tongue was good, especially in patients with partial glossectomy. The reconstructed gastric mucosal flaps tolerated the adjuvant radiation well.

Introduction

Surgery is an integral part of the management of oral tongue carcinoma either alone or in combination with adjuvant radiotherapy or chemoradiotherapy [1]. Resection of carcinoma of tongue usually entails a wide resection of the tumor with adequate margins, which can amount to a partial, sub-total or a total glossectomy. Microvascular reconstructive surgery has made a profound impact on improving the outcomes in the management of tongue cancer [2]. Adjuvant radiotherapy in advanced carcinoma of tongue can lead to xerostomia and fibrosis that seriously affects the patient's quality of life by directly interfering with swallowing and articulation [2,3]. Skin-lined flaps are a standard reconstruction option for large tongue defects. The disadvantages of these flaps include a lack of mobility, sensation and their lack of secretions. Panje et al. have used gastro-omental free flap in head and neck reconstruction [4]. They have stated that tissue characteristics of the transplanted material were like those of the removed

pharyngeal tissue [4,5]. The safety of gastric mucosa in the oral cavity and the pharynx has been established in literature since a long time [5,6]. To overcome deficits of current methods of using skin-lined flaps, we have previously reported the use of composite free gastro omental and dynamic gracilis flap in reconstructing total glossectomy defect [2]. The purpose of this paper is to report the technique and outcomes of the use of gastro-omental free flap reconstruction in glossectomy defects.

Materials and methods

This is a prospective case series of 9 patients of tongue squamous cell carcinoma. The study period was between August 2005 and June 2016. Informed consent was obtained from all patients after counselling on reconstructive alternatives. The study has an approval from the institutional ethics and scientific committee. The patients underwent either subtotal or partial glossectomy and reconstruction with gastro-omental free flap. The term 'partial glossectomy' is used to describe the

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defects of the tongue, that amounted to more than one-third to less than two-third of the volume of the total tongue. The term ‘subtotal glossectomy’ is used to describe the defects more than two-third of the total volume. Such defects usually had a unilateral remnant of the base of the tongue. This volume measurement was not exactly objective, but based on the visual evaluation of the tongue lesion, the defect and the total volume of the tongue by reconstructive surgeon. All patients had pre-operative evaluation by the gastro intestinal surgeon and an ultra sound scan of the abdomen. The flap anatomy, surgical technique and the outcomes are being reported. Functional evaluation of the flap was done with regards to swallowing and speech.

The patients with reconstructed tongue were assessed with Modified Barium Swallow for swallowing. For evaluation of speech, Hirose’s scoring system for speech ability was adopted for its simplicity of assessment [1,7,8]. Two groups consisting of the patient’s relatives and other non-related subjects from the same geographical area speaking the same language were involved in the speech analysis. Both the groups assessed patient’s speech independently for intelligibility and scores were given on an ascending scale for increasing intelligibility.

Flap anatomy

A part of the greater curvature of the stomach with omentum was harvested as free tissue flap. The greater curvature of the stomach receives its vascular supply from the right and left gastroepiploic arteries and veins. The arterial systems provide an extensive network to the gastric mucosa and greater omentum. These vessels are situated on the inferior aspect of the greater curvature. Of the two-gastroepiploic arteries, the right one is usually dominant in calibre (between 1.5 and 3 mm) and length (up to 20 cm), thereby serving as pedicle for the gastro omental flap. The right gastroepiploic artery arises from the gastro-duodenal artery, which is a branch of the common hepatic artery [7,9]. The left gastroepiploic artery has a slightly smaller diameter, from 1.2 to 2.9 mm. There is a variability in the pattern of branch of the omental arteries, but five main types are identified which are important surgically if lengthening or division of the pedicle is needed [9]. Majority of gastric parietal cells are situated within the body of the stomach and there are substantially fewer parietal cells in the mucosa of the greater curvature. The harvested stomach is denervated from the vagus nerve, like a post vagotomy status with reduced acid secretion [7].

Surgical technique of harvesting the flap

The gastro-omental free flap is harvested as a composite flap, comprising of a section of great curvature of the stomach together with a portion of the greater omentum based on the right gastroepiploic vessels [6]. The flap was harvested by a supraumbilical midline laparotomy approach in the one patient. In the subsequent 8 patients, the flap was harvested by laparoscopic technique. The gastro intestinal surgeons performed the harvest of the flap. In the laparotomy approach, after separating and mobilizing the stomach with the omentum from the gastrocolic ligament, the right gastroepiploic artery and vein were defined and the desired amount of omentum was harvested with the vascular pedicle. The left gastroepiploic artery and vein were cut and ligated. The right gastroepiploic artery and vein were then dissected back to their origin from the gastroduodenal artery and vein by serially ligating the corporeal vessels along the distal aspect of the greater curvature. A pedicle length of up to 30 cm may be achieved, allowing remote microvascular anastomosis from the defect site [2,5]. Proximal and distal gastrotomies were designed along the greater curvature of the stomach to obtain the desired portion of stomach to reconstruct the primary tongue and mucosal defect in the recipient area [6]. After harvesting the flap via the midline laparotomy approach, the stomach was closed with anastomotic stapler.

In the laparoscopic approach, a gastrointestinal anastomosis –

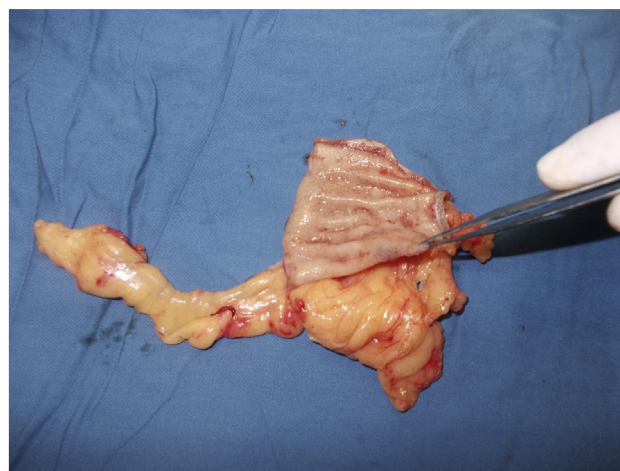


Fig. 1. The harvested stomach was inverted with gastric mucosa forming the tongue surface.

stapling device is used to make the first division along the proximal greater curvature of the stomach. It is then redirected to make a second division based on the size of the gastric patch desired [5]. The gastrointestinal stapling device is useful in the harvest of the flap and in the simultaneous closure of the gastric defect. The dimensions of the harvested gastric mucosa are usually ranged between 6 and 8 in breadth to 8–12 cm in length [5]. The mean pedicle length was 8 cm. The average ischemia time for hemiglossectomy reconstruction was 110 min. Dividing the greater curvature too close to the pylorus is avoided because; delayed gastric outlet obstruction can occur due to postoperative edema around the pylorus.

The harvested stomach was inverted with gastric mucosa forming the tongue surface and the omentum sandwiched between the stomach mucosa providing further bulk to the reconstructed tongue (Fig. 1). The right gastro epiploic vessels were most often anastomosed to the facial artery and a tributary of the internal jugular vein. Stomach mucosa was sutured to the remnant of the tongue and to the remaining floor of mouth mucosa for a watertight closure for a partial glossectomy defect (Fig. 2). If the omentum is not desired, dividing and controlling the omental vessels can be performed to remove the omentum [5]. In patients who had partial glossectomy, a nasogastric tube was introduced to provided nutrition during the immediate and early post-operative period. The laparoscopic port incisions were closed primarily (Fig. 3).

In the initial three patients where a larger size of the gastric mucosa was harvested, a feeding jejunostomy (FJ) tube was inserted during either the laparoscopic or laparotomy harvest of the gastro – omental flap, thereby allowing early postoperative jejunal feeding and simultaneous gastric decompression thus minimizing the duration of postoperative ileus. FJ feeding could be discontinued once the patient was started on oral diet, within a week. The FJ was removed only after 3 weeks to avoid jejunostomy related complications. Fj was done in initial 3 cases anticipating complications, which would preclude an early oral intake. But this practice was discontinued as we gained experience.

Results

There were 5 men and 4 women; Five patients underwent partial glossectomy and 4 had sub-total glossectomy. The median age was 43 years (range, 21–70 years); and the median follow up was 11.4 months (range, 4.9–41.4 months). Among the nine patients, one patient with partial glossectomy, had flap compromise during the second postoperative day and was re-explored. The flap was found to be non-viable on table and was debrided. There was an undue separation of the pedicle from the flap tissue, during laparoscopic dissection and

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