



Infrahyoid Myofasciocutaneous Flap for Reconstruction of Tongue Defects: Our Experience and Perspective

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Introduction

The reconstruction of head and neck defects, due to trauma, tumour resection or other conditions begins with a careful assessment of the patient and the defect. Ideally, a successful reconstructive procedure is one that restores form and re-establishes function [swallowing and speech].

Although speech and swallowing will not be affected significantly with small and medium resection, however, large defects cause severe swallowing problems and speech impairments requiring reconstruction.

At present, many different surgical concepts for reconstruction after tumour resection are in common use. Regional plastic surgery offers a variety of options for reconstruction of the defects to achieve optimal results for each patient.

Free flaps have often been used as a last resort reconstructive option in the head and neck area. They are currently the favoured method for reconstruction of defects in selected patients [1–3]. But free flaps require a dedicated expertise and instrumentation.

In the last decade, a new reconstructive technique for the tongue, based on an infrahyoid fasciomyocutaneous pedicled flap, has been documented. Clairmont and Conley [4] in 1977 and Weerda [5] in 1978 reconstructed the trachea using a myocutaneous island flap derived from the infrahyoid musculature. In 1986, Wang reported a modification of this technique to repair defects in the mouth and the tongue, with good results described [6–8]. In this paper, we describe our experience and the advantages of using this surgical technique for

tongue reconstruction after ablation surgery for oral cancer, and report the functional outcomes in our patients.

Material and Methods

From October 2016 to February 2018, nine patients, four men and five women (Table 1), underwent infrahyoid flap reconstruction after cancer ablation and neck dissection, in a single-stage procedure. The ages of the patients ranged from 29 to 54 years, with median age of 41.5 years. The series included squamous cell carcinomas (SCC) arising from the anterior two thirds of the tongue, staged according to the 7th edition of the TNM classification established by the UICC/AJCC [11]. All the reconstructions were performed by the first author.

In this series, infrahyoid flap reconstruction was chosen as an alternative to FRFF reconstruction since our team does not have a microvascular reconstruction surgeon or instrumentation. Selection criteria were a defect estimated as small or medium size or the presence of relative general contraindications to a microvascular free flap reconstruction. In the harvest of the flap, the technical modifications suggested by Dolivet et al. [10] were used in all cases with an extra technical change. In this series, to increase venous drainage towards the median cervical fascia, a portion of the superficial cervical fascia is included in the flap creating actually a new infrahyoid fascio-myocutaneous flap (IHFMCFF).

The dimensions of the skin paddle ranged from a minimum of 4–5 cm in length and 2.5–3 cm in width for reconstruction of the tongue. None of the patients had received radiotherapy before surgery.

All patients underwent extended supraomohyoid neck dissection (all N0 upon diagnosis). In selecting our patients, the criteria were a defect estimated as medium to large defects where primary closure to left for secondary intention would have compromised the cosmetic and function, although free flap stands as a prime option since we do not have microvascular surgeon/technical expertise. We innovated with this flap

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Table 1 Patient characteristics

| | Subsite | TNM | Tumour surgery | Nodal surgery | IHFMCf size | Adjuvant therapy |
|---|---------|--------|---------------------|---------------|-------------|------------------|
| 1 | AOT | T2N0M0 | Wide local excision | SND I–III | 5 × 3.5 cm | NO |
| 2 | MOT | T2N0M0 | Wide local excision | SND I–III | 4 × 3 cm | NO |
| 3 | AOT | T2N1M0 | Wide local excision | MRND I–V | 5 × 3.5 cm | CT-RT |
| 4 | MOT | T2N1M0 | Wide local excision | MRND I–V | 5 × 3.5 cm | CT-RT |
| 5 | MOT | T3N0M0 | Hemiglossectomy | SND I–IV | 5 × 3 cm | RT |
| 6 | AOT | T2N1M0 | Wide local excision | MRND I–V | 4 × 2.5 cm | CT-RT |
| 7 | MOT | T3N0M0 | Hemiglossectomy | SND I–IV | 4.5 × 3 cm | RT |
| 8 | AOT | T3N0M0 | Hemiglossectomy | SND I–IV | 4 × 2.5 cm | RT |
| 9 | AOT | T2N1M0 | Wide local excision | MRND I–V | 4 × 3 cm | NO |

AOT anterior one third of the tongue, *MOT* middle one third of the tongue

for reconstruction or the presence of relative general contraindications to a microvascular free flap reconstruction, i.e. systemic vascular insufficiency and poor general conditions. All the flaps were harvested from the same side of the neck as the primary tumour during extended supraomohyoid neck dissection.

Technique

Flap preparation began distally, cutting (after ligation) the anterior jugular vein, the sternohyoid and sternothyroid muscles just above the suprasternal notch, and the intermediate tendon of the omohyoid muscle. Cutting the ramus of C3 from the inferior root of the ansa cervicalis when transferring the flap upward was unavoidable [3]. The flap was then separated carefully from the proper capsule of the thyroid gland, sparing the branches of the ansa cervicalis in contact with the internal jugular vein. At the upper pole of the thyroid gland, the posterior branch of the superior thyroid artery was cut and ligated, leaving the main trunk of the thyroid artery attached to the flap. The sternothyroid muscle was then detached from the thyroid cartilage and the cricothyroid artery cut and ligated and kept with the flap. The external branch of the superior laryngeal nerve was spared, and the hyoid insertions of the sternohyoid and omohyoid muscles were divided from the hyoid bone. The flap with the free skin and its pedicle formed by the superior thyroid vessels and nerves from the ansa cervicalis were then transferred upward for reconstruction. The size of the skin paddle ranged from 2.5 and 5.0 cm to 5.0 and 8.0 cm. (Fig. 1).

After preparing the flap and performing the neck dissection, the tumour was resected and haemostasis achieved. The skin paddle was paramedian in all cases, with size varying according to the area to be reconstructed, and the mobilised infrahyoid fascio-myocutaneous flap (IHFMCf) was tunnelled through the defect of the resected area in the tongue

and the floor of the mouth in a manner that the caudal part of flap is oriented towards the tip of the tongue and the cephalic portion towards base of the tongue.

Anatomic results were evaluated at the time of discharge and 6 months after surgery by clinical observation. Functional results were evaluated by clinical assessment of swallowing at the time of discharge and at 3 and 6 months after surgery taking into account Wang's criteria [6]. Motor innervation was preserved and tracheostomy was performed in all cases.

Subjective functional assessment was done by taking history of difficulty in swallowing and mobility of the tongue at the time of discharge and after adjuvant RT by clinical observation. After RT, swallowing was slightly impaired, mainly due to xerostomia, when compared with immediate postoperative results. However, all patients remained able to eat a normal diet.

Results

In this series of 9 cases, all the flaps reached the recipient area without extensive vascular pedicle stretching, even in the posterior part of anterior two-third tongue reconstruction. The rectangular shape of the skin paddle matched perfectly with the shape of the resections that resulted mostly oval or rectangular (Fig. 1). No total flap necrosis was experienced. Except one case of distal portion of skin paddle necrosed reconstructions which healed timely and without wound complications. Also, the healing process at the donor site was excellent in every case, with good aesthetic results.

In this series, good functional results were achieved; all patients were decannulated, and the nasogastric feeding tube was removed with restoration of oral intake by 7–10 days in all cases. In every case, the flap withstood adjuvant treatments without any local complication. We experienced no flap fibrosis, and only one patient experienced hair growth in the skin paddle.

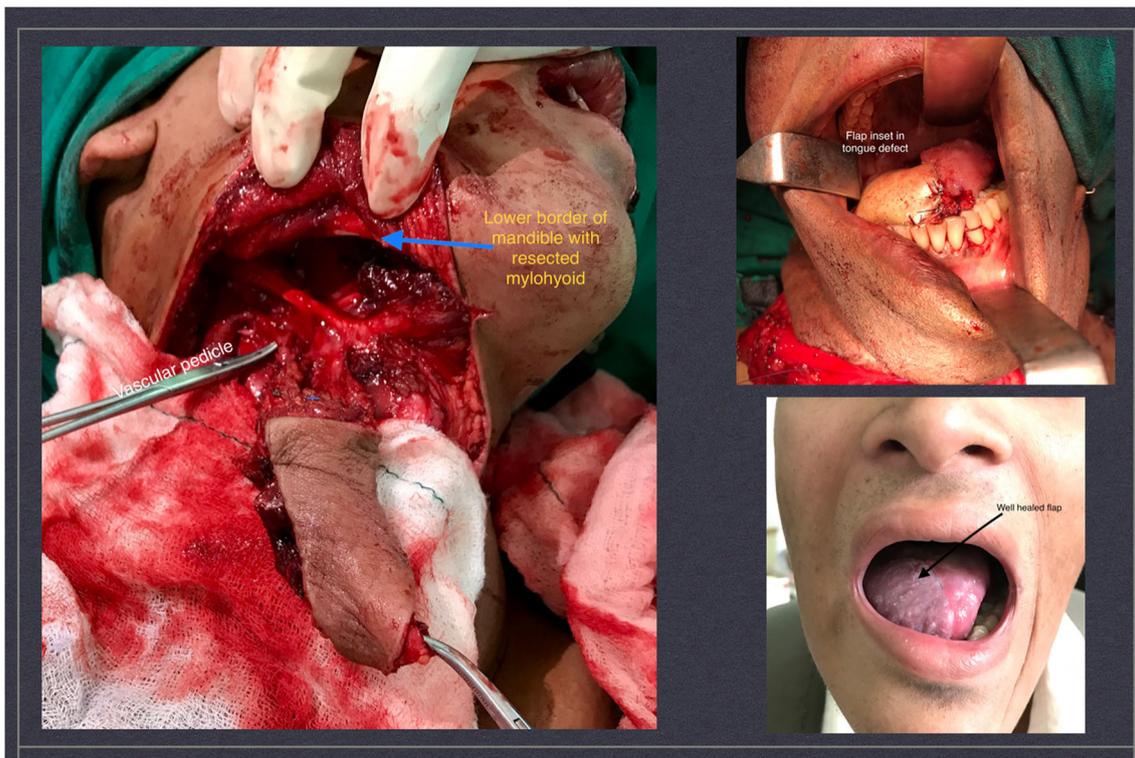


Fig. 1 Intraop and post operative photos

Discussion

In this series, we included nine patients with defects resulting from cancer of tongue, who underwent infrahyoid flap reconstruction as an alternative to free radial forearm flap. The series includes nine squamous cell carcinomas arising from the anterior two thirds of the tongue, five females and four males of median age 41.5 years. The harvesting of the flap was done based on the technical modifications recently suggested by Dolivet et al. which were used in all cases.

The defect after ablative surgery for head and neck cancer was earlier used to be repaired traditionally by a spit thickness graft, forehead flap and delto-pectoral flap, but recently, because of the development in the use of the free flap and myocutaneous flap, the traditional flaps have been replaced in many circumstances, particularly by myocutaneous flaps because the latter has many advantages over traditional flaps [9]. Surgeons are increasingly using the pectoralis major, trapezius, sternomastoid and latissimus dorsi myocutaneous flaps for head and neck reconstruction, the pectoralis major flap being used most frequently. But their common shortcoming is being bulky and they cannot be thinned, so they are suitable only for repairing very large defects. Free flap has excellent advantages, but it is time consuming and requires skilled microsurgical experience and specialised instrumentation.

IHMCF is a new versatile, reliable, and convenient myocutaneous flap, suitable for repairing the defects in and

around the oral cavity, particularly the tongue, even in aged and debilitated patients. In all our cases, the excision of the lesion and repair of the defect were done in one sitting. The IHMCF is a reliable flap, easy and quick to prepare, reducing the time of surgery. This is of great advantage, especially in the elderly population, in whom long surgical procedures are not tolerated. Furthermore, microvascular anastomosis is not required. Another advantage is that the colour match is very good since the donor site is from the head and neck region and usually hairless. The donor site can be primary closed avoiding skin grafting or scars beyond the head and neck area thus avoiding significant cosmetic and functional sequelae in the donor area. The majority of widespread myocutaneous flaps, for head and neck reconstruction (e.g. pectoralis major, trapezius, and latissimus dorsi), are quite bulky. On the contrary, IHMCF suits the recipient area very well, because it is approximately 2 cm thick. In our opinion, the aesthetic result, achievable with a skin-graft reconstruction is not as good as with the IHMCF. Finally, local rotation skin flaps are often not large enough to close a defect following WLE. Of nine patients we reconstructed with IHMC flap, none had total flap necrosis whereas one case presented with distal flap got necrosis and eventually healed with secondary intention and acceptable scar. Apart from this, all reconstructions healed quickly without wound complications and with good functional results. The healing process in the donor site was excellent in all.

The main disadvantage of IHMCF is that it can be planned in c No and c N1 preoperatively, since preservation of the

thyroid pedicle and internal jugular vein is mandatory. In clinically and radiologically N0 patients, the preparation of the IHMCF does not interfere with the oncological radicality of the ipsilateral neck dissection. In cases with positive nodes, with extracapsular spread at level II, the internal jugular vein may have to be ligated above the superior thyroid pedicle [10].

Contraindications for the use of IHMCF are presence of pathologic nodes at level III or IV, N3 neck disease, previous radiotherapy and previous thyroid surgery.

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