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Infrahyoid Flap: Case Series of A Robust & Reliable Flap

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Abstract

Infrahyoid myocutaneous flap is based on the superior thyroid vessels is an easy and reliable altern free flaps for reconstruction of moderate defects of the oral cavity. Venous insufficiency is one of th for flap failure. We have successfully used this flap in a series of five cases with no flap failure. Thi highlights the significance of this robust and reliable flap.

Key words: *INFRAHYOID FLAP, SUPERIOR THYROID VEIN, FREE FLAP*

Introduction

The first report of using the infrahyoid system of muscles as a pedicled flap for reconstruction came from Clairmont and Conley in 1977 **[**1**]**. The myocutaneous infrahyoid flap (IHF), as we know it today, was first used by Wang and Shen in 1980 for defect reconstruction after the surgical treatment of tongue cancer **[**2**]**. It is an excellent surrogate for the reconstruction of moderate defects following resection of the cancers involving the oral cavity.

IHF has a composite structure that is vascularized by the superior thyroid artery and vein pedicle, is innervated by the deep branches of ansa cervicalis and includes the upper parts of the sternohyoid, sternothyroid and omohyoid muscles **[**3, 4**]**. While the size of the skin island on the flap can be adjusted according to the dimensions of the defect, a maximum of 9 cm length and 5 cm width is reported **[**4**]**.

When used with regard to its restrictions and contraindications, IHF is a simple reconstruction technique that preserves swallowing and speech functions and brings high patient satisfaction **[**4, 5**]**. This study aims to highlight the advantages of the infrahyoid flap for oral defect reconstruction following resection.

Methodology

Records of five patients who were diagnosed with squamous cell carcinoma of the oral cavity, operated in the Department of Head and Neck Surgical Oncology, Malabar Cancer Centre, Thalassery during the months of January and February 2022 were reviewed retrospectively. In all cases, IHF was harvested after neck dissection as a superior thyroid pedicled flap and adapted to the recipient site after tumour resection and neck dissection.

Surgical Technique

The IHF was planned so that its medial edge fell along the midline, its lateral edge 3-5 cm away, its upper margin levelled with the hyoid bone and its lower margin fell on the suprasternal notch.

Flap elevation began from the notch after releasing the inferior attachments of the infrahyoid muscle group and was dissected up to the fascia of the thyroid gland. Branches of the Superior Thyroid Artery to the thyroid gland and cricothyroid muscle were identified and ligated. The flap was elevated up to the hyoid bone on the fascia of the thyroid gland and the laryngeal perichondrium; infrahyoid muscles were cut from the body of the hyoid bone and dissection was advanced laterally to expose the pedicle.

The flap was delivered to the recipient site through a defect in the floor of the mouth.

Results

The records of five patients who were diagnosed with squamous cell carcinoma of the oral cavity and who underwent tumour resection, neck dissection followed by reconstruction using IHF were studied.(Table 1.0)

S No.	Age/Sex	Diagnosis	T stage	N stage	Flap Size
1	40/F	Ca lower alveolus	T3	N0	5 x 3.5 cm
2	49/M	Ca tongue	T3	N1	7 x 4 cm
3	71/M	Ca floor of mouth	T3	N1	7 x 4 cm
4	43/M	Ca tongue	T3	N0	8 x 3.5 cm
5	55/M	Ca lower alveolus	T2	N1	7 x 4 cm

Table 1.0 Selective Neck Dissection (I-III) was done in the 2 cases that were N0, and Modified Radical Neck Dissection was done in the cases that were N1.

All cases had a favourable postoperative period, with no flap related issues. They were discharged once their neck drains were removed. Nasogastric tube was removed once their oral feeding status was ensured.

Figure Set 1.0 (IHF for Ca lower alveolus)

Fig 1.1 Ulceroindurated lesion Right lower alveolus

Fig 1.2 Marking of flap

Fig 1.3 IHF harvested

Fig 1.4 Wound closure

Fig 1.5 After flap inset

Figure Set 2.0 (IHF for Ca Tongue)

Fig 2.1 Ulceroindurated lesion lateral border of tongue

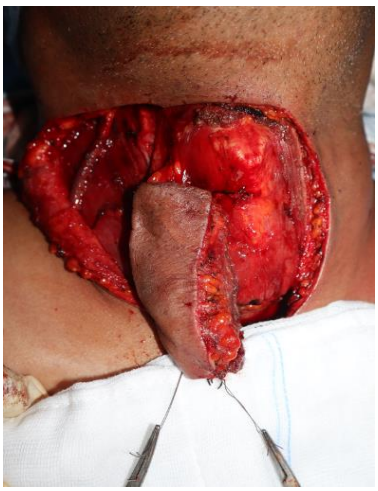

Fig 2.2 IHF harvested

Fig 2.3 After flap inset

Fig 2.4 Wound closure

Discussion

The defects following resection of oral cancer can be reconstructed using locoregional or microvascular flaps. In our country, due to the limited availability of resources (microscope, microvascular instruments etc.), expertise and the time restriction to surgically treat the enormous number of oral malignancies; microvascular reconstruction is not a modality used frequently. Hence locoregional flaps play a very important role.

IHF is a reliable and conveniently harvested myocutaneous flap, suitable for repairing the defects in the oral cavity, particularly the tongue, even in aged and debilitated patients.**[**6**]** The procedure does not prolong surgical time or require multiple additional incisions.

A specific patient age range hasn't been mentioned by the authors in their large case series in literature for the IHF. Since microvascular surgery is a complex and time consuming procedure for the elderly, they have advocated that IHF can be suitably used in this age group.**[**6,7**]**

As stipulated by Wang et al, the first to describe this surgical technique, the length in defects of the buccal region could be upto 14 cm. However, a width exceeding 4.5cm could render primary closing of the donor site difficult. In a study by Manikandan et al in 2020, the maximum flap dimension was 9 × 4 cm and average flap dimension was 6 × 4 cm. In our study, mean length and width of the flaps used for defect reconstruction were 6.8 cm and 3.8 cm respectively.

Deganello reported a series of 40 cases with no total flap loss and with 1 case of superficial skin necrosis. In their 2009 study Richard et al reported that out of 276 patients, 22 developed partial skin necrosis, 2 developed complete skin necrosis. In our experience none had any flap related issues.

Flap failure occurs usually as a result of venous insufficiency. Many authors have modified surgical techniques to improve the survival of the skin paddle **[**3,4,7**]**. The overall survival rate of IHF is 100% when using vein preservation strategies as laid out by Khoi et al in their modified surgical techniques **[**8**]**. They preserved a minor venous tributary to the internal jugular vein, below the superior thyroid vein, and the communicating vein to the external jugular vein whenever possible. Another approach to augment venous drainage of the IHF, described by Xiaoming et al appears to be effective for decreasing risk of flap necrosis **[**9**]**. They used 3D reconstruction of the anterior jugular vein to assess the venous drainage and designed the flap accordingly. The cranial portion of the anterior jugular vein was identified and preserved during the dissection. Of the 14 patients operated by Xiaoming and team, total flap necrosis occurred in

one patient and marginal skin paddle necrosis occurred in one patient. No flap complications occurred in the other 12 patients.

To avoid venous insufficiency, while harvesting the IHF we did not skeletonise the superior thyroid vein as it is fragile and prone to traction injury during flap manipulation. Also, we didn't disturb the soft tissue that lies interposed between the posterior belly of digastric and the flap that houses minor venous interconnections.

A drawback of this flap was the short arc of rotation and restriction of flap in reaching and repairing defects of the buccal mucosa, hard palate and base of tongue. IHF could be easily advanced to defects of anterior tongue, floor of mouth and lower alveolar ridge.

Also, the vertical incision of IHF harvest produces a scar against the natural creases of the neck, but we have found out that with proper physiotherapy it hardly causes any contracture or movement restriction in the neck and the wound heals well without an unsightly scar. In a modified technique described by Richard et al, a horizontal design was adopted. Of the 276 cases studied, no patient presented with total flap necrosis. They suggest that the reliability of the IHF is not compromised by the horizontal design of the skin paddle. Further, it results in a better cosmetic scar **[**10**]**.

The contraindications of infrahyoid flap include previous thyroid surgery or neck dissection, N3 neck metastasis, and positive lymph nodes at level III–IV. It is inadvisable to plan this flap in cases that require a radical neck dissection; because preserving the venous pedicle would be a difficult task.

Conclusion

The Infrahyoid flap is a reliable option for medium sized defects of the oral cavity, primarily tongue and floor of mouth. If harvested properly, it obviates the need for microvascular flaps that is a boon for multiple scenarios that we face on a daily basis where locally advanced oral cancers are on the rise and advanced facilities are in limitation.

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