

# Microvascular Free Flaps Reconstruction of Composite Resection Defects

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**Abstract:** ***Introduction:** Buccal mucosa is a major sub site for oral squamous cell carcinoma (SCC) in the Indian subcontinent. The gold standard management of Buccal cancer is Composite resection which creates sometimes large defects. Reconstructive options for Composite resection defects are regional flaps to loco regional flaps to micro vascular free flaps. Currently, micro vascular free tissue transfer is considered as ideal choice for oral cavity reconstruction. This prospective study describes the outcome of Microvascular free flaps reconstruction of Composite resection defects. **Materials and Methods:** The current prospective study was conducted in the Department of Surgical Oncology at tertiary health care centre. Staging work up done with CECT Scan, X ray chest. Procedure was performed as Composite resection as per standard protocol. Outcome of the surgery with complications, cosmetic and functional outcomes were noted. **Results:** Total number of Buccal cancer included in our study is 140 and all patients underwent reconstruction by Pedicled (80) or Microvascular flaps (60). In our study, Majority 27 patients (45.0%) underwent radial free forearm flap followed by ALT flap. Cosmetic outcome and Functional outcome are better with all Microvascular flap. **Conclusion:** Reconstruction of Composite resection defects are challenging due to their complex three dimensional natures. For large complex defects, Micro vascular free flap provides better Cosmetic and Functional outcome.*

**Keywords:** Micro vascular flap, composite resection

## 1. Introduction

Buccal mucosa is a major sub site for oral squamous cell carcinoma (SCC) in the Indian subcontinent, and these tumors are known for recurrence even following adequate treatment [1, 2].

Indian Oral cancer is among the top three types of cancers in India [3]. In India, 20 per 100000 populations are affected by oral cancer which accounts for about 30% of all types of cancer [4]. Over 5 people in India die every hour everyday because of oral cancer (5).

The gold standard management of Buccal cancer is Composite resection (Wide local excision + Manibulectomy + Neck dissection) which creates sometimes large defects. Due to their complex three dimensional natures, defects resulting from surgical ablation constitute major functional and esthetic reconstructive challenges (6, 7)

Composite resection defect reconstruction has improved with the better knowledge and techniques. It is a surgical challenge to perform reconstruction as structure; function and esthetics have to be restored (8)

Reconstructive options for Composite resection defects are regional flaps to loco regional flaps to micro vascular free flaps. Currently, micro vascular free tissue transfer is considered as ideal choice for oral cavity reconstruction. Various Micro vascular free flap of choice for Buccal mucosa reconstruction are radial free forearm flap, antero lateral thigh flap, fibula flap based on defects.

The characteristics of an ideal free flap for head and neck reconstruction include Pliable, Consistent, large and long pedicle, Possibility of variable size and thickness, harvesting the flap can be consistent and can be done by reconstructive surgeon in the same time of tumor excision and Minimal donor site morbidity. Disadvantages of free flap are failure (12, 13). However, free flap transfer cannot be used for all

patients at every institute since it requires special techniques and equipment's for microsurgery (7, 9 and 10).

Since it was first described by Song et al in 1982, the radial forearm free flap has become a workhorse flap in head and neck reconstruction (11)

Antero lateral thigh flaps commonly used for large oral cavity defects. Blood supply of the flap is musculocutaneous and septocutaneous perforators of the descending branch of the lateral circumflex femoral artery and its venae comitantes.

Segmental or Hemi Mandibular defects are closed by free fibula flap or radial free flap along with wedge of radius bone. The fibula free flap provides a long, strong segment of bone for use in reconstructive surgery. It can be harvested as a purely osseous flap or can include a large fasciocutaneous component if needed. To date, no other flap is capable of providing such a long segment of bone. Blood supply of the flap is Peroneal vessels.

This prospective study describes the outcome of Microvascular free flaps reconstruction of Composite resection defects.

## 2. Materials and Methods

The current prospective study was conducted in the Department of Surgical Oncology at tertiary health care centre from the January 2014 to September 2017. Each patient was informed and consent was taken to participate in the study.

### *Inclusion criteria*

Patient eligible for the analysis were those underwent composite resection with an immediate reconstruction with use of free radial forearm flap, antero lateral thigh flap and free fibula flap

**Exclusion criteria**

- 1) Patient underwent primary closure, skin graft after resection
- 2) Pedicled flap reconstruction
- 3) Patient underwent Neoadjuvant chemotherapy
- 4) Metastatic disease

Detailed clinical history and examination of the patients were recorded. Staging work up done with CECT Scan, X ray chest.

Procedure was performed are wide local excision of primary with Manibulectomy (Marginal, Segmental or Hemi) with neck dissection as per standard protocol. Reconstruction was made with free radial forearm flap, antero lateral thigh flap and free fibula flap based on defects

Outcome of the surgery with complications, cosmetic and functional outcomes were noted. A complication of the procedure divides into early and late. Early complications are Hematoma, Seroma, and wound infection, wound dehiscence, drooling of saliva, Oro cutaneous fistula. Late complications are Trismus, shoulder dysfunction and Parasthesia of the neck.

Cosmetic outcome are divided into excellent, satisfied and fair. Functional outcome are divided into Excellent, satisfied and fair.

Recurrences are divided into local, systemic and both

Data was compiled in MS Excel and checked for its completeness and correctness. Then it was analyzed.

**3. Results**

Total number of Buccal cancer included in our study is 140 and all patients underwent reconstruction by Pedicled (80) or Microvascular flaps (60). 32 patients (53.3%) belong to 40 - 50years and male predominance (Table 1).

All patients are squamous cell carcinoma with majority are grade 3 (50.0%).29 patients (48.3%) are stage 4 (T4a or N2) group and 28 patients (46.6%) are tumour size more than 4cm (Table2).

In our study, Majority 27 patients (45.0%) underwent radial free forearm flap followed by ALT flap. 15 patients (25.0%) underwent free fibula flap (Table3).

Major site of reconstruction are mucosa with Mandible (41.7%) followed by mucosa, mandible and skin (25.0%) (Table3).

Early complications like Hematoma, Seroma, wound infection, wound dehiscence, Drooling of saliva, Oro cutaneous fistula are less common in Micro vascular flap. Late complications like Trismus, shoulder dysfunction and Parasthesia of the neck less common Microvascular flap (Table4)

Cosmetic outcome and Functional outcome are better with all Microvascular flap (Table 5,6)

**Table 1: Patients Characteristics**

<b>a. Age</b>		
	Number	Percentage (%)
<40yrs	10	16.7%
40-50yrs	32	53.3%
>50yrs	18	30.0%

**b. Sex**

Male	38	63.3%
Female	22	36.7%

**Table 2: Tumor Characteristics**

**a. Tumour size**

	Number	Percentage
< 2cm	10	16.7%
2-4cm	22	36.7%
> 4cm	28	46.6%

**c. Grades**

Grade1	10	16.7%
Grade2	20	33.3%
Grade3	30	50.0%

**d. Stage**

Stage 1	09	15.0%
Stage2	09	15.0%
Stage3	13	21.7%
Stage 4	29	48.3%

**Table 3: Reconstruction Characteristics**

**a. Type of reconstruction**

	Number	Percentage
C. Radial free forearm flap	27	45.0%
D.ALT flap	18	30.0%
E. Free fibula flap	15	25.0%

**b. Site of reconstruction**

Only mucosa	11	18.3%
Mucosa + bone	25	41.7%
Mucosa + skin	09	15.0%
Mucosa + skin + bone	15	25.0%

**Table 4: Post Operative Complications:**

**a. Early**

	Free Radial forearm flap	ALT flap	Free fibula flap
Hematoma(11)	04	05	02
Infection(08)	02	05	01
Wound dehiscence(04)	02	01	01
Seroma(28)	14	07	07
Drooling of saliva(15)	05	05	05
Partial flap loss(06)	02	03	01
Total flap loss(02)	01	01	00
Oro cutaneous fistula(03)	01	01	01
<b>b. Late</b>			
Trismus(04)	01	02	01
Parasthesia of neck(06)	02	02	02
Shoulder dysfunction(02)	01	00	01

**Table 5: Cosmesis**

	Free Radial forearm flap	ALT flap	Free fibula flap
Excellent (19)	13	03	03
Satisfied(34)	11	12	11
Fair (07)	03	03	01

**Table 6: Functional Outcome**

	Free Radial forearm flap	ALT flap	Free fibula flap
Excellent (17)	10	02	05
Satisfied(34)	14	12	08
Fair(09)	03	04	02

#### 4. Discussion

In India, the incidence of oral cavity cancers, is still one of the highest in the world because tobacco products are easily available and the lack of awareness in the community [3]. The Composite resection produce complex defects which are difficult to reconstruct. Reconstructive options are Autologous Pedicled or free flap. Each flap has few advantages and disadvantages.

Radial forearm free flap has become a workhorse flap in head and neck reconstruction (14). Advantages is it provides a skin paddle that is thin, reliable, pliable, and predominantly hairless. Its harvest is safe and consistent (15). Potential donor site complications are Donor site not hidden, cosmetic, Tendon exposure, Fracture of the radius at bone harvest site, Sensory loss in distribution of the superficial radial nerve, Restricted forearm function. Vascular compromise of the hand Potential donor site complications have led some centers to shift toward the Anterolateral thigh flap in recent years (16).

The anterolateral thigh flap is likely the most widely used perforator flap for head and neck reconstruction. Advantages are this flap provides a long, large vascular pedicle, this flap can provide a huge amount of skin, muscle, and fascia with little donor site morbidity, It can be used as a sensate or a flow-through flap (17, 18). The anterolateral thigh free flap can technically be combined with iliac bone (31). Disadvantages and potential complications are second-stage thinning, This concept was proposed by Kimura under the operating microscope (micro dissection) (20). This technique is accompanied by an unacceptably high rate of flap failure (21). Patients may experience fatigue and weakness when climbing and descending stairs. Use of split-thickness skin graft (STSG) at the donor site may be complicated by decreased range of motion at the hip and knee joints as a result of adhesion between the skin graft and the underlying muscle (22). Hyperesthesia, anesthesia, numbness, and decreased tolerance to cold may occur in the distribution of the medial branch of the lateral cutaneous nerve of the thigh that is usually sacrificed to protect the perforator (23,24).

Microvascular free fibula flap consists of the fibula bone and associated soft tissue paddle (25). Advantages are as much as 25 cm of fibula bone can be harvested; Extensive periosteal vascular support allows multiple osteotomies for aesthetic and functional reconstruction of the mandible. This flap can reconstruct angle-to-angle Mandibular defects. Disadvantages are soft tissue component of the flap is limited. The poor arc of rotation of the skin island relative to the bone and its unpredictable vascularity are factors in this limitation. Patients with severe peripheral vascular disease may not be candidates for flap harvest if the lower limb vasculature is involved (26,27). A study by Glastonbury et al indicated that in fibular free flaps, Periosteal ossification of the vascular pedicle is a relatively common occurrence,

having been found in 16 of 32 patients (50%) as soon as 1 month after reconstructive surgery (28).

Early complications like Hematoma, Seroma, Wound infection, wound dehiscence, Drooling of saliva, Oro cutaneous fistula are less common in Micro vascular flap than PMMC flap. Late complications like Trismus, shoulder dysfunction and Parasthesia of the neck more common with PMMC flap than Micro vascular flap

No Valid tools to assess aesthetic and functional outcomes after reconstruction of oral cavity defects. Several studies report aesthetic and functional outcomes, in the form of an assessment by the patient, by the surgeon, or by an independent Professional. Some authors use questionnaires, whereas others use photographs to assess aesthetic outcomes.. We used assessment by patient and two surgeons. Majority of the patient were satisfied. Cosmetic outcome and Functional outcome are better with all Micro vascular flaps.

#### 5. Conclusion

Reconstruction of Composite resection defects are challenging due to their complex three dimensional natures. For large complex defects, Micro vascular free flap provides better Cosmetic and Functional outcome.

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