



OUTCOME OF INDIAN ORAL CANCER SURGICAL ABLATION DEFECTS RECONSTRUCTION BY VARIOUS FLAPS

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ABSTRACT

Introduction: Lower Gingivo Buccal Sulcus (GBS) is a major sub site for oral squamous cell carcinoma (SCC) in the Indian subcontinent. The gold standard management of Lower GBS cancer is surgical ablation which creates sometimes large defects. Currently, micro vascular free tissue transfer is considered as ideal choice for oral cavity reconstruction. This prospective study describes the outcome of Indian oral cancer surgical ablation defects reconstruction by various flaps.

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

Results: Total number of Lower GBS cancer included in our study is 130 and all patients underwent reconstruction by various flaps. 78 patients (60%) belong to 40 -50years and male predominance. In our study, Majority (56.9%) underwent PMMC flap reconstruction followed by radial free forearm flap (21.5%). Cosmetic outcome and Functional outcome are better with Micro vascular flap than PMMC flap. Among the recurrences, Local recurrences are common (8.5%).

Conclusion: Reconstruction of Lower Gingivo Buccal cancer post surgical ablation defects are challenging due to their complex three dimensional natures. For large complex defects, Micro vascular free flap provides better Cosmetic and Functional outcome compare to PMMC flap.

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INTRODUCTION

Lower Gingivo Buccal Sulcus (GBS) is a major sub site for oral squamous cell carcinoma (SCC) in the Indian subcontinent, and these tumors are known to recur loco regionally 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 Lower GBS cancer is surgical ablation 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) Lower GBS 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 Lower GBS defects are regional flaps to loco regional flaps to micro vascular free flaps.

Various Pedicled based loco regional flaps commonly used are delto pectoral flap, PMMC (Pectoralis Major Myo Cutaneous) flap, Naso labial flap, forehead flap (6, 9) The pectoralis major myo cutaneous flap is a work horse flap and commonly used flap for oral cavity reconstruction. PMMC flap was first described by Stephen Ariyan in 1979 (8,10,11,12,13)This flap easily accepts the challenge of reconstruction in extensive intra and extra oral defect (8,14,15,16) . To avoid the bulkiness associated with the flap the pectoralis major may be used as a muscle flap with or without skin grafting (17,18).

The first reported use of the Naso labial flap for the closure of an oral cavity defect by trans buccal transfer was by Theirsch [19] The skin of the Naso labial fold is nourished by the supero labial and Alar branches of the facial artery. It is commonly used for small defects in the lip, Buccal mucosa, floor of the mouth (20)

Currently, micro vascular free tissue transfer is considered as ideal choice for oral cavity reconstruction. 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 (23, 24). However, free flap transfer cannot be used for all patients at every institute since it requires special techniques and equipment's for microsurgery (7,13,21). Various Micro vascular free flap of choice for oral cavity reconstruction are radial forearm, antero lateral thigh flap, fibula flap based on defects. 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 (22) Antero lateral thigh flaps commonly used for large oral cavity defects. Mandibular defects are closed by free fibula flap or radial free flap along with wedge of radius bone. This prospective study describes the outcome of Indian oral cancer surgical ablation defects reconstruction by various flaps.

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 June 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 PMMC flap, Naso labial flap, free radial forearm flap, antero lateral thigh flap and free fibula flap

Exclusion criteria

1. Patient underwent primary closure, skin graft after resection
2. Patient underwent Neoadjuvant chemotherapy
3. 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 PMMC flap, Naso labial flap, free radial forearm flap, antero lateral thigh flap and free fibula flap based on defects. Full aseptic precautions were made during the procedure.

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.

RESULTS

Total number of Lower GBS cancer included in our study is 130 and all patients underwent reconstruction by various flaps. 78 patients (60%) belong to 40 -50years and male predominance (Table 1).

Table 1 Patients Characteristics

a.Age			
	Number	Percentage(%)	
<40yrs	22	16.9%	
40-50yrs	78	60.0%	
>50yrs	30	23.1%	
b.Sex			
	Male	90	69.2%
	Female	40	30.8%

All patients are squamous cell carcinoma with majority are grade 2 (60%). 71 patients (54.6%) are stage 4 (T4a or N2) group and 78 patients (60%) are tumour size more than 4cm (Table2).

Table 2 Tumor Characteristics

a.Tumour size		
	Number	Percentage
< 2cm	10	07.7%
2-4cm	42	32.3%
> 4cm	78	60.0%
c.Grades		
Grade1	19	14.6%
Grade2	78	60.0%
Grade3	33	25.4%
d.Stage		
Stage 1	08	06.2%
Stage2	20	15.4%
Stage3	31	23.8%
Stage 4	71	54.6%

In our study, Majority (56.9%) underwent PMMC flap reconstruction followed by radial free forearm flap (21.5%). Only 11 patients (8.5%) underwent free fibula flap (Table 3).

Table 3 Reconstruction Characteristics

a.Type of Reconstruction		
	Number	Percentage
A.PMMC Flap	74	56.9%
B. Naso labial flap	09	06.9%
C. Radial free forearm flap	28	21.5%
D.ALT flap	08	06.2%
E. Free fibula flap	11	08.5%
b. Site of reconstruction		
Only mucosa	11	08.5%
Mucosa + bone	75	57.7%
Mucosa + skin	09	06.9%
Mucosa + skin + bone	35	26.9%

Major site of reconstruction are mucosa with Mandible (57.7%) followed by mucosa, mandible and skin (26.9%) (Table3).

Table 4 Post Operative Complications

a. Early					
	PMMC flap	Nasolabial flap	Free Radial forearm flap	ALT flap	Free fibula flap
Hematoma(11)	08	00	01	01	01
Infection(08)	06	00	01	01	00
Wound dehiscence(15)	11	01	01	01	01
Seroma(28)	21	02	01	02	02
Drooling of saliva(22)	15	01	02	02	02
Partial flap loss(24)	17	01	02	03	01
Total flap loss(02)	01	00	01	00	00
Oro cutaneous fistula(09)	06	00	01	01	01
b. Late					
Trismus(09)	07	00	01	00	01
Parasthesia of neck(16)	11	00	02	02	01
Shoulder dysfunction(16)	16	00	00	00	00

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 Microvascular flap (Table4)

Cosmetic outcome and Functional outcome are better with Microvascular flap than PMMC flap(Table 5,6) Among the recurrences, 11 patients (8.5%) had local recurrence,5 patients(3.8%) had systemic (Lung) recurrence and 2 patients(1.5%)both local recurrence and systemic recurrence(Table7)

Table 5 Cosmesis

	PMMC flap	Nasolabial flap	Free Radial forearm flap	ALT flap	Free fibula flap
Excellent (34)	12	01	15	02	04
Satisfied(67)	40	06	10	05	06
Fair (29)	22	02	03	01	01

Table 6 Functional Outcome

	PMMC flap	Nasolabial flap	Free Radial forearm flap	ALT flap	Free fibula flap
Excellent (27)	10	01	10	01	05
Satisfied(73)	40	06	16	06	05
Fair(30)	24	02	02	01	01

Table 7 Recurrence

	Number	%
Local only	11	08.5%
Systemic only	05	03.8%
Local + Systemic	02	01.5%

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 gold standard management of Lower GBD tumours produce complex defects which are difficult to reconstruct. Reconstructive options are Autologous Pedicled or free flap. Each flap has few advantages and disadvantages.

In PMMC flap, advantages are it offers one-stage reconstruction, Patient's position need not be changed, it provides large cutaneous island that can be used for large defects, The muscular part covers neck structures protecting the carotid artery. Disadvantages are can conceal recurrences .In women, the flap might include breast tissue, which may lead to breast asymmetry ,In males, hirsute chest skin is placed intraorally, loss of muscle function in arm adduction and/or rotation, overweight patients the flap is bulky, which leads to postoperative contour deformities (25).

Radial forearm free flap has become a workhorse flap in head and neck reconstruction(26). Advantages are It provides a skin paddle that is thin, reliable, pliable, and predominantly hairless. Its harvest is safe and consistent(27). 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 (28).

The anterolateral thigh flap is likely the most widely used perforator flap for head and neck reconstruction. It is based on the descending branch of the lateral circumflex femoral artery. 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 (29, 30). 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)(32). This technique is accompanied by an unacceptably high rate of flap failure(33).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(34).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 (35, 36).

Microvascular free fibula flap consists of the fibula bone and associated soft tissue paddle. Its blood supply comes from the endosteal and periosteal branches of the peroneal artery (37). 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 (38, 39).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 (40).

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 Micro vascular flap than PMMC flap may be due to bulk of the flap, loss of shoulder function

Lower GBS cancers are loco regional disease. Most of the recurrence occurs in the primary site. Among the recurrences, 8.5% had local recurrence, 3.8% had systemic (Lung) recurrence and 1.5% both local recurrence and systemic recurrence in our study

CONCLUSION

Reconstruction of Lower Gingivo Buccal cancer post surgical ablation defects are challenging due to their complex three dimensional natures. For large complex defects, Micro

vascular free flap provides better Cosmetic and Functional outcome compare to PMMC flap.

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