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RECONSTRUCTION- A PUZZLE!!!

Head & Neck Oncology

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ABSTRACT

AIM: The reconstructive surgeon has to restore defect with best aesthetic and function. In recent times the high success rate of free flap has made the large defect reconstruction a possibility. The aim is to assess and evaluate the clinical outcomes in patients undergoing free flap and local flap reconstruction.

METHODS: This was a retrospective study of 53 patients undergoing reconstructions with free flaps (31) and local flap (22) from June 2015 to June 2017. Types of free flap performed were Anterolateral Thigh, Radial Forearm and Fibula. Types of Local/pedicle flap performed were Pectoralis Major Myocutaneous flap, Deltopectoral flap, Nasolabial flap, forehead and scalp flap. Patient data was collected and analyzed for flap survival, complication, operative time, functional and oncological outcomes.

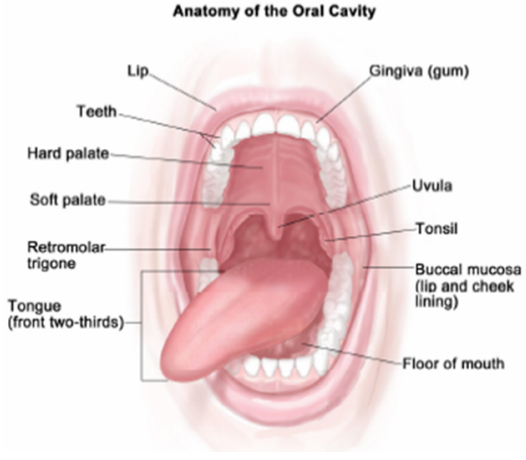
RESULTS: The patients included 35 males and 17 females, with a mean age of 42 years. The most common tumor location was the Buccal mucosa. The majority of the diagnosed tumors were Squamous cell carcinoma. Overall flap success rate for free flap was 88% and for local flap/pedicle flap was 100%. Venous thrombosis was the most common cause for re-exploration in free flaps. The most common complication was oro-cutaneous fistula in both local/pedicle and free flaps. The average operating time for free flap was 7hr 30mins (simultaneously harvesting the graft) and for local flap was 5hr 50mins. The most important advantages with free flap are replacement of bone tissue and reconstruction of large defects. Middle third mandibular resection has no better substitute than free fibula graft.

CONCLUSION: Free flap is a reliable, feasible and easy method in reconstruction of large defect with good aesthetic and functional outcome. Local flap is effective in smaller defects but cannot replace bony tissue.

KEYWORDS

INTRODUCTION:

Reconstruction is a big challenge in maxillofacial region. It requires meticulous planning and expertise. It includes a variety of structures: skin, mucosa, soft tissue, and bone (Figure-1). In addition, defects in one specific functional unit can affect adjacent structures. The need for reconstruction arises to maintain and restore Integrity, Function & Form. Reconstruction provides coverage to the vital vessels in the neck and restores the intraoral seal and gives acceptable aesthetic appearance to the face[1].



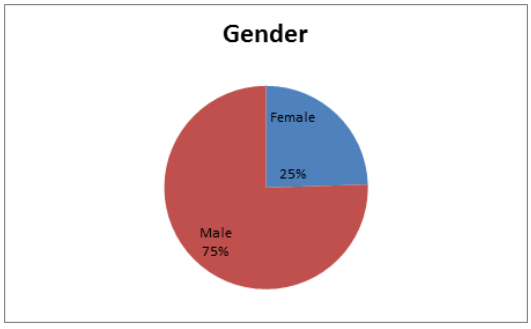
(Figure-1)

Three decades ago majority of defects were closed with local tissue and random skin flaps. However, in last three decades there has been a paradigm shift and major advances in oncology therapy - multimodality therapy, conservative surgeries and modifications in neck dissection. Last 2 decades have focused in improving the function and reconstructive outcome. Baker & Panje (1976) were the one to perform 1st free flap in Head & Neck cancer resection (Groin pedicled on the circumflex iliac artery)[2&7].

The study aims to assess and evaluate the clinical outcomes in patients undergoing free flap and local/pedicle flap reconstruction.

PATIENTS & METHODS:

This was a retrospective study of 53 patients undergoing reconstructions after oncologic resection with free flaps (31) and local/pedicle flap (22) from June 2015 to June 2017. There were 40 (75.6%) males and 13 (24.5%) females among the participants (Graph-1). Types of free flap performed were Free Anterolateral Thigh (FALT), Free Radial Forearm Flap (FRAF) and Free Fibula Flap (FF). Types of local/pedicle flap performed were Pectoralis Major Myocutaneous flap (PMMC), Deltopectoral flap (DP), Nasolabial flap (NLF), Forehead (F) and Scalp flap (SF). Size of defect >5cm was considered as Large defect. Patients with medical co-morbidities were included. Patients with small intraoral defects reconstructed with Buccal fat pad and who had recurrence were excluded. Patient data was collected and statistically analyzed with SPSS version 18 software for flap survival, complication, operative time, functional and oncological outcomes. The minimum follow up period was 1 year.



(Graph-1)

RESULTS:

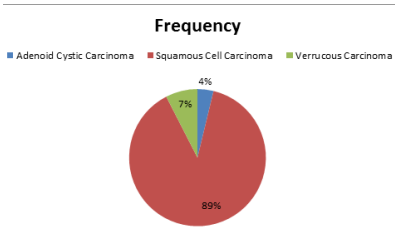
The mean age of participants was 47.3 ± 13.270 years. The mean age was more among males compared to females but this difference was not significant statistically. So, age distribution was comparable and hence sample was homogenous with respect to age and sex (Table-1).

(Table-1)

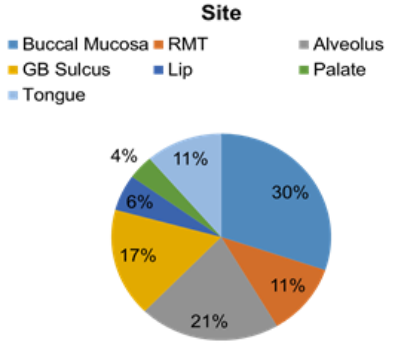
Variable	N	Minimum	Maximum	Mean	SD
Age (years)	53	30	84	47.3	13.270

Variable	Gender	N	Mean	SD	t	df	P value
Age (years)	Female	13	46.5	9.623	-0.26	51	0.796; Not significant
	Male	40	47.6	14.352			

Among the participants, the most common diagnosis was squamous cell carcinoma (88.7%). (Graph-2) The most common tumor location was buccal mucosa (15; 28.3%). (Graph-3)

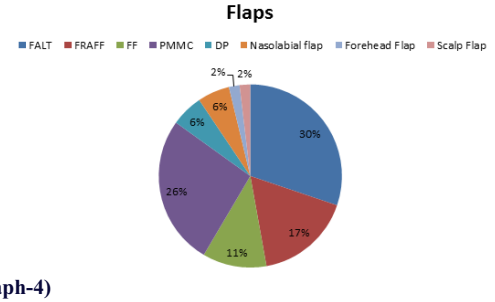


(Graph-2)



(Graph-3)

The free flap was performed in 31 (58.5%) and pedicle/local flap was performed in 22 (41.5%) patients. The most common free flap performed was FALT (30%) and most common local/pedicle flap performed was PMMC (26%). (Graph-4)



(Graph-4)

The mean operative time was 6.57 ± 1.576 hours. When operative time (hours) was compared among flap reconstruction types, it was found that the mean operative time was more (7.56±1.099) in free flap as compared to pedicle/local flap (5.17±0.963) reconstruction procedure. And this difference found was highly significant statistically. So, free flap operative time was significantly longer as compared to pedicle/local flap reconstruction (Table-2).

(Table-2)

	Type of flap	N	Mean	SD	t	df	P value
Operative time (hours)	Free	31	7.56	1.099	8.20	51	< 0.001; Highly significant
	Pedicle/local	22	5.17	0.963			

Variable	N	Minimum	Maximum	Mean	SD
Operative time	53	3.15	10.05	6.57	1.576

The most common procedure performed was Right posterior segmental mandibulectomy (22.6%) and the least common was Left lateral segmental mandibulectomy (1.9%) and wide excision with marginal mandibulectomy (1.9%) (Table-3).

(Table-3)

Procedure	Frequency
Bite Excision	4 (7.5%)
Hemiglossectomy	6 (11.3%)
Left Lateral Segmental Mandibulectomy	1 (1.9%)
Left Posterior Segmental Mandibulectomy	6 (11.3%)
Left Upper Alveolectomy with Wide Excision	3 (5.7%)
Maxillectomy/Hemimaxillectomy	2 (3.8%)
Middle 3rdMandibulectomy	6 (11.3%)
Right Lateral Segmental Mandibulectomy	2 (3.8%)
Right Posterior Segmental Mandibulectomy	12 (22.6%)
Wide Excision	10 (18.9%)
Wide Excision with Marginal Mandibulectomy	1 (1.9%)
Total	53

The most common complication was oro-cutaneous fistula (7.5%) in both local/pedicle and free flaps. The other complications seen were infection (1.9%), venous thrombosis (3.8%) and wound dehiscence (3.8%). 83% patient had no complications. Venous thrombosis was the most common cause for re-exploration in free flaps. (Chi-Square ($\chi 2$)= 0.04; P value= 0.845) The complication results are statistically insignificant.

The functional outcome is found to be better and statistically significant with free flap and when free flaps are used in reconstruction of larger defects (Table-4).

(Table-4)

Type of flap * Defect Chi-Square ($\chi 2$)= 7.14; df= 1; P value= 0.008, Significant			Defect		Total
			Large	Small	
Type of flap	Free	Count	20	11	31
		% within Type of flap	64.5%	35.5%	100.0%
	Pedicle	Count	6	16	22
		% within Type of flap	27.3%	72.7%	100.0%
Total		Count	26	27	53
		% within Type of flap	49.1%	50.9%	100.0%

DISCUSSION:

International Agency for Research on Cancer (IARC) for oral cancer report over 3,00,000 diagnosed cases, and the annual mortality of about 1,45,000 death. The numbers of cases are also rising in our country. Most of the cases reported are in stage 3 & stage 4 which requires wider excision and more complex reconstruction. (Figure-2)

In our study we found more males than females suffered from oral cancer. Cesar et al. (2015) showed similar results in his review[6]. Patients from all age group (with or without medically compromised) were offered reconstruction options including free flap. Jeffrey et al. also did not advocate withholding reconstruction in patients with high medical risk[3]. The mean age calculated was 47years. National Cancer institute SEER program reports greatest increase in incidence rates occurs between the 30-54 year old group and the 55-69 year old group. The most common site of occurrence was buccal mucosa. P. Yadav

(2013) also quoted buccal mucosa as the most common site[1]. However, Yum Sub Lim et al.(2013) reported tongue as the most common site[9].

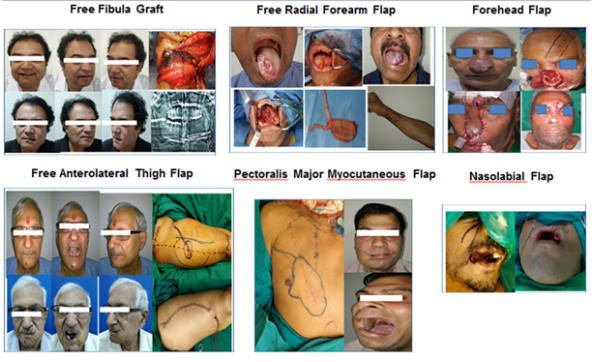


(Figure-2)

In our study more number of cases were reconstructed with free flap than local/pedicled flap. FALT was the most common free flap and PMMC was the most common pedicle flap. All middle 3rd defects were reconstructed with Free Fibula flap as it gave better contour and functional output. Local/Pedicle flaps are Quick and easy to harvest, Minimal donor site morbidity and Require one surgical team. However, sometimes they can be really bulky; can also cause Downward Pull of Flap and Atrophy. There is limited Arc of Rotation. Free Flap allows Two team approach, Improved vascularity and wound healing, Potential for sensory and motor innervation, Permits use of osseointegrated implants and has a Wide variety of available tissue types . However, Free flaps are Technically demanding and has Increased operating room time[1-9].

In our study we noted that Free flaps had more operative time but better functional outcomes in larger defects with composite tissue lost with minimum post-operative complications. Chim et al. (2010) and A. Baliarsing (2013) reported increased operative time but better functional outcome with free flap compared to pedicle/local flap but suggested the use of local/pedicle flap in co-morbid conditions. However, it is seen that with the increase in number of reconstruction cases with free flap has gradually decreased the operating time. The complications encountered were Infection, Oro-cutaneous Fistula, Venous Thrombosis & Wound Dehiscence which were similar to as reported by Joshua et al. (2016) and Jeffrey et al. (2004) in their studies [3&5].

Advent of 3D planning and possibility of placement of osseointegrated dental implant has made free fibula graft the choice for maxillo-mandibular reconstruction. Free Scapular flap is gaining popularity in west and east for maxillo-mandibular reconstruction. FRAF is the best choice of flap for tongue and small buccal mucosa defects. FALT is the best option for large buccal mucosa defect[7]. In selected cases PMMC flap is also preferred. (Figure-3)



(Figure-3)

CONCLUSION:

Scientific advancements in technique and armamentarium has made Free flap a reliable, feasible and easy method in reconstruction of large defect with better quality of life, good aesthetic and functional outcome. Local flap is effective but cannot replace bony tissue in the defects.

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