www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v6i3.86

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

The Outcome of Failed Flaps in Reconstruction of Head and Neck Malignancy Resections: what is the Next Reconstruction Option?

Authors
Sunilkumar Mallanaik[1], Arun Holenarasipur Narasannaiah[2], Mohan Kakola[3], Santhoshkumar TB[4]
[1]Senior Resident, Department of Plastic Surgery, Bangalore Medical College and Research Centre, Bangalore, Karnataka
[2]Assistant Professor, Department of Surgical Oncology, Bangalore Medical College and Research Centre, Bangalore, Karnataka
[3]Professor and Head of the Department, Department of Plastic Surgery, Mysore Medical College and Research Institute, Mysore, Karnataka
[4]Postgraduate, Department of General Surgery, Mysore Medical College and Research Institute, Mysore, Karnataka
Corresponding Author
Dr Sunilkumar Mallanaik
Senior Resident, Department of Plastic Surgery, Bangalore Medical College and Research Centre, Bangalore, Karnataka, India
Email: *ssunilkumar87q@gmail.com*, Mobile No: +91-9481652424

Abstract
Background: *The Free Flaps are the "workhorse" in the Reconstruction of Head and Neck Malignancy Composite Resections. Use of free flaps has less clarified and the failure of free flap remains undermined.*
Materials and Methods: *This is a retrospective analysis of the cause and outcome of failed free flaps (and pedicled flap transfers performed at tertiary hospital) for head and neck tumours done at a tertiary care center. The consecutive cases of Head Neck Reconstructions done from Dec 2015 to Dec 2016 were taken for the study.*
Results: *Over the past 1 year (2015-16), there are 33 head and neck reconstructions were performed, 20 by free-tissue transfers and 13 pedicle flaps for head and neck tumours. About 6 flaps failures (18% total plus partial failure rate) were encountered of which four free flap failures and 2 pedicled flap partial failures were noted. Among them one PMMC and one Deltopectoral, were debrided and later Secondary Skin grafting done.*
Conclusion: *In conclusion, Tissue transfer is more effective in the head and neck region tissue. Second flap surgery is not much effective in the head and neck region.*
Keyword: *Free flap surgery, reconstruction, head and neck tumours, pedicle flaps.*

Introduction

The field of head and neck reconstructive surgery is rapidly growing. Most of the advances made in the past 10 years are secondary to increased use of microvascular free flaps[1]. Several flaps like the anterolateral thigh, fibula osteocutaneous and

suprafascial radial forearm fascio-cutaneous free flaps have emerged as workhorse flaps for reconstructing a wide variety of defect due to familiarity of the anatomy of these flaps and their reliability and versatility. Preserving function, including speech and swallowing, and restoring appearance are the goals in every reconstruction and not just limited to wound closure without exposure of vital structures. Free flap success rates nowadays routinely exceed 95% or more [1–3]. Minimizing flap donor site morbidity is also an important consideration. Because of the high rate of recurrence as well as long-term complications following major head and neck resections and reconstructions, preservation of recipient vessel options and flap donor sites should also be a consideration. In this study, reconstruction of mid-facial, mandibular and oral cavity resections will be reviewed and its failure rates and their management and expected outcomes discussed.

Materials and Methods

Study settings

This was a retrospective observational study conducted at a tertiary care hospital in Bengaluru in the period of Dec 2015 to Dec 2016.

Inclusion criteria

- All cases of head and neck malignancies which required reconstruction in the past year (2015-16)

Exclusion criteria

- Diabetes
- Peripheral arterial disease like atherosclerosis,

Procedure

The demographic data of the patients were recorded. The type of malignancy and reconstruction required were also recorded. The number of failures of flaps (total/ partial) was noted and the method used to redo the defect or failed flap were recorded.

Statistical Analysis

The data was analysed using SPSS software v21 for Windows using appropriate statistical tests as necessary.

Results

A total of 33 patients with head and neck malignancies underwent reconstructions following oncosurgical resection procedures. The mean age of this group was 51.17 years (25-85yr) out of which 12 were males and 21 were females (ratio 1.75). 26 patients had carcinoma of buccal cavity, 4 had carcinoma tongue, 1 carcinoma lip, 1 carcinoma maxilla and 1 ameloblastoma of mandible. 27 of these cases underwent segmental mandibulectomy with modified radical neck dissection, 4 subtotal glossectomy, 1 total maxillectomy and one wide local excision with supraomohyoid neck dissection. Of these 33 cases, 20 were reconstructed by free-tissue transfers and 13 pedicle flaps for head and neck tumours. The free flaps which were used are 14 free fibular osseocutaneous flaps, 3 radial forearm free flaps and 3 anterolateral thigh flaps. The pedicled flaps which were used are 10 pectoralis major myocutaneous flap, 2 deltopectoral flaps and one superior labial artery based abbe-estlander flap. A total of 6 failures (18% total plus partial failure rate) were encountered. There were four free flap failures. Among the pedicle flaps there were two partial failures, out of which one was PMMC and the other was Deltopectoral. These were debrided and later grafted once granulated. Evaluation of the cases revealed that one of three following approaches to managing the failure (1) a second free-tissue transfer (2) a regional flap transfer (3) conservative management with debridement, wound care and closure by secondary intention, whether by local flaps or skin grafting. In the head and neck region, 2 second free flaps (33%) and 2 regional flaps (33%) were transferred to salvage the reconstruction, whereas conservative management was undertaken in the pedicled flap failures (33%). The average time elapsed between the failure and second free-tissue transfer was 5 days in the head and neck region. In a total of 2 second free-tissue transfers, there was only one failure.

Table-1: Demographic data

Demographic data	Number
Mean age (Years) (MEAN±SD)	51.17±0.34
Male	12
Female	21
Total cases	33

Table-2: Types of head and neck malignancies

Types of head and neck malignancies	Number	Percentage (%)
Carcinoma buccal cavity	26	39.39
Carcinoma tongue	4	6.06
Carcinoma maxilla	1	1.52
Carcinoma lip	1	1.52
Ameloblastoma of mandible	1	1.52
Segmental mandibulectomy	27	40.91
Total maxillectomy	1	1.52
Subtotal glossectomy	4	6.06
Wide local excision	1	1.52
Total	**66**	**100.00**

Table-3: Types of reconstructive procedures

Types of reconstructive procedures	Number	Percentage (%)
Number of free tissue transfer	20	30.30
Number of pedicled flaps	13	19.70
Pedicled Pectoralis major myocutaneous flap	10	15.15
Pedicled Abbe-estlander flap	1	1.52
Pedicled Deltopectoral flap	2	3.03
Free fibular osseocutaneous flap	14	21.21
Anterolateral thigh free flap	3	4.55
Radial forearm free flap	3	4.55
Total	**66**	**100.00**

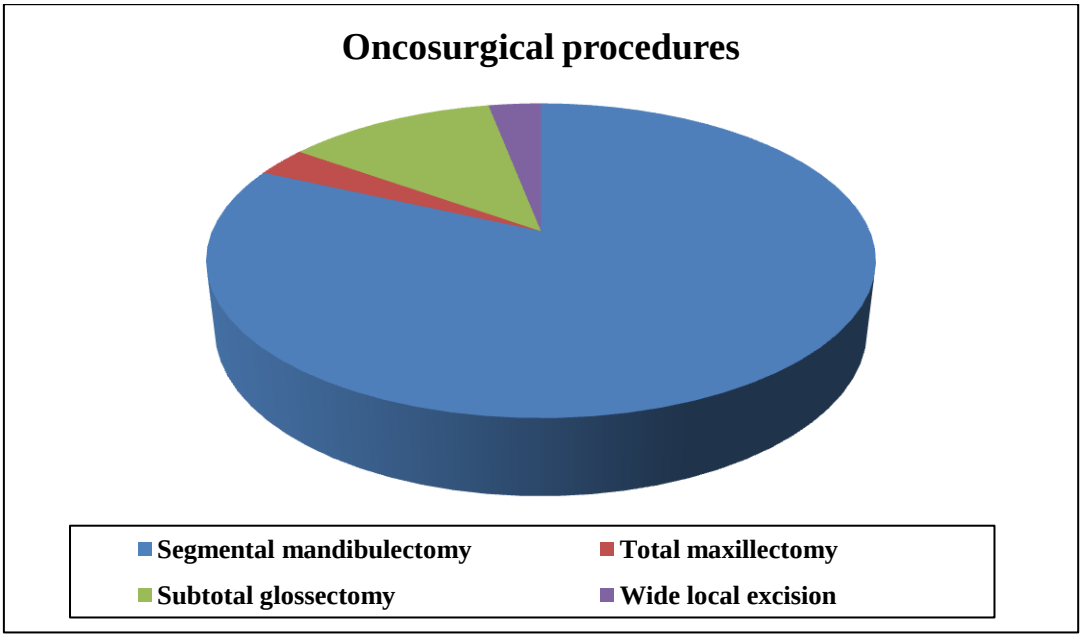
Table-4: Flap failures and their management

Flap failures and their management	Number	Percentage (%)
Total no. of flap failures	6	25.00
Total flap loss	4	16.67
Partial flap loss	2	8.33
Free flap failures	4	16.67
Pedicled flap failures	2	8.33
Second free tissue transfer	2	8.33
Regional flap transfer	2	8.33
Conservative debridement and flap/SSG	2	8.33
Total	**24**	**100.00**

Table-5: Diagnosis and flap complications with secondary management

Diagnosis	n	Procedure	Flap complication	Secondary management
Carcinoma buccal cavity	26	Composite resection (wide local excision with hemi mandibulectomy) with modified radical neck dissection + pedicled PMMC flap cover	Flap necrosis	Debridement + Deltopectoral flap cover
			Flap necrosis	Debridement
		Composite resection (wide local excision with hemi mandibulectomy) with modified radical neck dissection + Free radial forearm flap cover		
		Composite resection (wide local excision with hemi mandibulectomy) with modified radical neck dissection + Free fibular flap cover		
Carcinoma tongue	4	Composite resection with marginal mandibulectomy with subtotal glossectomy with modified radical neck dissection + ALT free flap cover	Flap necrosis	Debridement +PMMC flap cover + SSG
		Wide local excision with mandibulectomy with supraomohyoid neck dissection + Free radial forearm free flap		
Carcinoma maxilla	1	Total maxillectomy with modified radical neck dissection + free fibular flap cover	Venous congesion	Redo done with venous anastomosis
Carcinoma lip	1	Wide local excision with supraomohyoid neck dissection + Superior Abbe-Estlander flap reconstruction		
Ameloblastoma	1	Segmental mandibulectomy with bilateral selective neck dissection + Free fibular flap cover		

Pie chart-1: Distribution of patients based on oncosurgical procedures



Bar diagram-1: Distribution of patients based on flaps

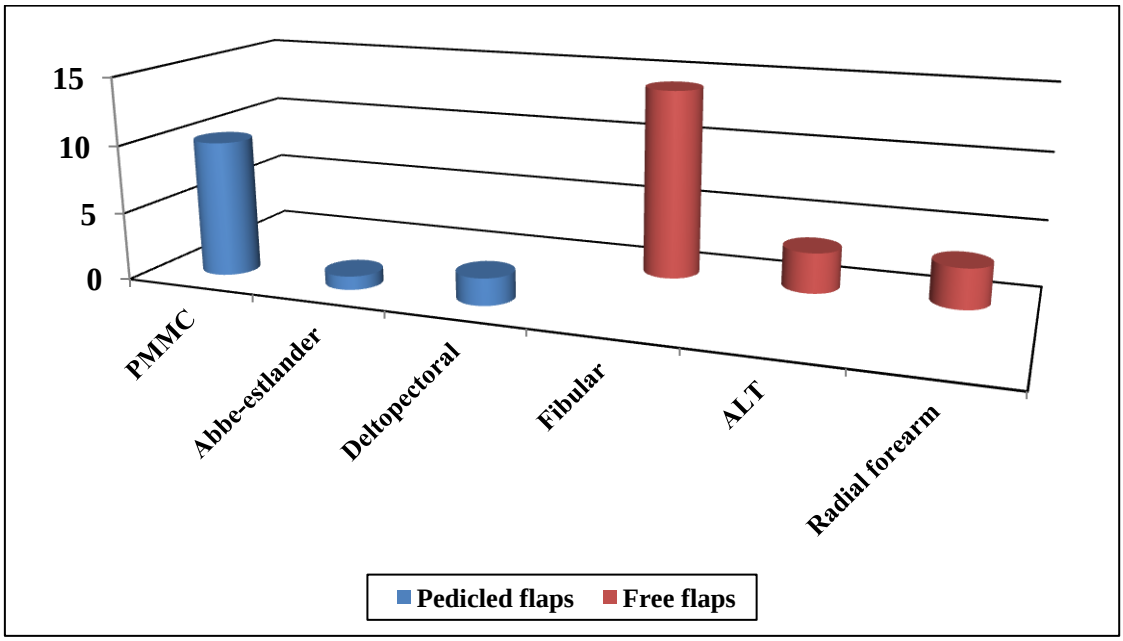
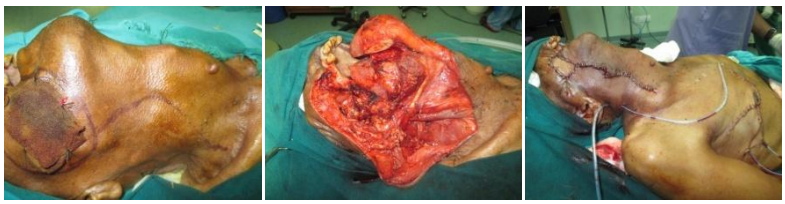


Image-1: Oral surgery

Image-2: Oral surgery



Discussion

The rehabilitation of function is a critical element in effective head and neck cancer surgery. Reconstruction at the time of surgery is perhaps the most important part of rehabilitation. Whenever oncologically possible, preservation of the hypoglossal, lingual and mental nerves should be attempted. Adhering to general principles of surgery which like gentle tissue handling, hemostasis, obliteration of dead space are also critical along with preoperative antiseptic preparation and antibiotic prophylaxis.[4,5]. Free tissue transfer techniques like bone flaps from the fibula, iliac crest and scapula and soft tissue from the radial forearm, lateral arm, trapezius, rectus abdominis allow the excellent reconstruction of the mandible, skin, and mucosa of the oral cavity. Adequate reconstruction of the mandibular arch and soft tissues of the tongue and floor of mouth significantly improves functionality and will benefit from speech therapy.[6]

Complications can be minimized by appropriate pre anesthetic evaluation. Since the majority of oral cancer patients are elderly, many will have significant co-morbidities which need assessment, diagnosis or intervention prior to, or after, surgery.[7] The most common complications after oral surgery are wound related. The excellent blood supply to the oral cavity helps to ensure good healing of soft tissues and to resolve infection. Careful surgical technique can help to minimize complications. Closure under tension should be avoided and closure of muscle and mucosa by separate suture layers should be performed. Oral wounds heal best when closed by primary intention[8]. Postoperative management by aggressive oral irrigation should begin on the first day of the surgery either with normal saline or normal saline and sodium bicarbonate solution in hanging irrigation bags or via compressed air-sprayer.[8, 9]

The majority of wound complications will heal with aggressive cleansing and infection control. Management of co-morbidities, such as diabetes mellitus, malnutrition and hypothyroidism, in order to maximize wound healing is critical. Poor healing or a persistent oral cutaneous fistula may result from the presence of a foreign body such as implant, non-absorbable suture, sequestered bone or recurrent tumor which must be ruled out by biopsy in any non-healing wound after oral cancer surgery. The frequency, complexity and duration of wound complications are greater in the irradiated patient[9]. Five-year survival rates for early (T1 and T2) oral cancers are reported to be in the 70 to 90% range.[9] In resectable stage III and stage IV tumors with N0 or N1 disease, 5-year survival has been increased to the 50 to 60% range by the aggressive addition of postoperative radiation therapy. Functional outcomes for surgery for early oral cancers is excellent and is rare for patients to suffer significant loss of speech and swallowing function after surgical resection for T1 or T2 lesions. Even large T2 lesions of the tongue rehabilitate extremely well due to the plasticity of the tongue as well as its good blood supply, copious sensory innervation and the presence of intact musculature.[10, 11]

There are various studies comparing different methods of reconstruction for head and neck malignancy resections but very few studies which dictate the management options for failed flaps after reconstruction. In the current study, one third of failed flaps were managed conservatively by debridement or split skin graft, another third by regional flap transfers and another third by free flap transfers.

Conclusion

In the head and neck region a second free tissue transfer is a relatively more useful and convenient procedure for the treatment of flap failure. Tissue transfer is more effective in the head and neck region it is simple also. Second flap surgery is not much effective in the head and neck region. Further evaluation of each method is to be done by prospective studies or randomized control trials

Conflict of interest: Nil

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