

Versatile Grafts and Flaps in Reconstruction of Oral and Maxillofacial Postsurgical Defects

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ABSTRACT

Ablative surgery for head and neck tumors is associated with significant disfigurement and loss of function. The main aim of the surgeon is to provide functional ability and esthetics of the patient. Type and extent of tissue loss from surgery relates to loss of soft tissue and bone. Reconstructions of jaw and mouth defects represent a challenge to the surgeon and are most commonly indicated in patients with oral squamous cell carcinoma.⁴ Primary closure and the restoration of form, cosmetics and function are the goals of reconstructive surgery. Various techniques have been practiced, including grafts, local flaps, regional flaps and free vascularized flaps even with diverse options, each one has its inherent advantages and shortcomings.

This article highlights our experiences with various reconstructive options, best possible reconstructive method to be followed to minimize morbidity of the patient.

Keywords: Postsurgical defects, Tumors, Reconstruction.

INTRODUCTION

Successful reconstruction after ablative surgery requires careful preoperative assessment and treatment plan. Important considerations include tumor stage and prognosis, patient age, sex and functional status, available reconstructive donor sites, and the psychosocial make-up of the patient. The aim of reconstruction is to maintain facial form, contour of the patient (i.e. esthetics) and functional ability (i.e. mastication and deglutition).⁴ All the above objectives are possible if proper reconstruction of bone and soft tissues are done.

PATIENTS AND METHODS

We have reviewed 12 cases, of which nine cases are reported as squamous cell carcinoma of oral cavity and a case of ameloblastoma, pleomorphic adenoma and ossifying fibroma, which has been reported to our department.

Primary Closure (Figs 1 to 6)

A 48-year-old female patient reported to our department with squamous cell carcinoma of left lower gingivobuccal sulcus. The patient has undergone wide excision with modified radical neck dissection and primary closure is done. The advantages are greater availability of skin in elderly patients and quicker healing. The disadvantages are post-traumatic scar, esthetically patient is compromised.



Fig. 1: Retromolar mandible and buccal carcinoma

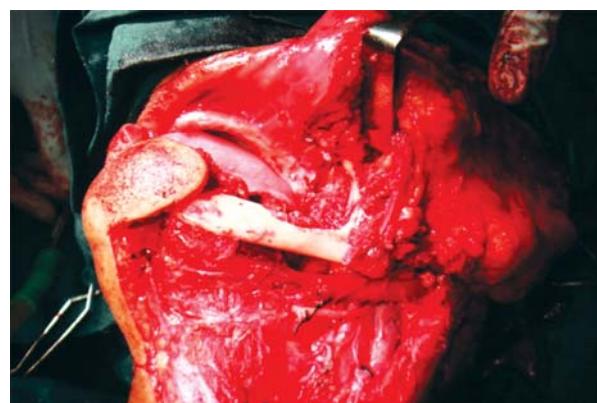


Fig. 2: Defect following marginal rim resection and neck dissection



Fig. 3: Primary closure left buccal carcinoma defect



Fig. 6: Healed defect (1 month postoperative)

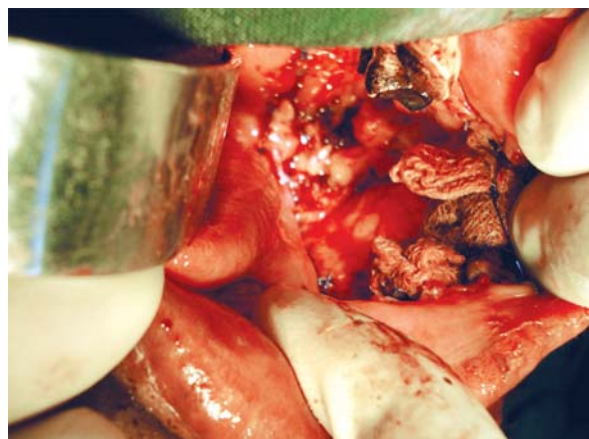


Fig. 4: Left buccal carcinoma intraoral resection defect



Fig. 5: Intraoral closure

Split Thickness Skin Graft

A 58-year-old female patient reported squamous cell carcinoma of right upper gingivobuccal sulcus (GBS) and has been reconstructed with split thickness skin graft. The

advantages are it can be taken under less favorable condition. The disadvantages are the graft shrinks considerably, chance of abnormal pigmentation, highly susceptible to trauma and chance of formation of fistula.

Buccal Fat Pad

A 45-year-old female patient with squamous cell carcinoma of left lower GBS reported to our department. She has undergone wide excision along with supraomohyoid neck dissection. The advantages of buccal fat pad are rapid re-epithelialization, rich vascular supply, less donor site skin scars. Disadvantages are it is prone to dehiscence.

Nasolabial Flap (Figs 7 to 10)

A 56-year-old female patient reported to our department with squamous cell carcinoma of left lower anterior alveolus. In this case, marginal mandibulectomy (MRND) has been done and reconstruction is done with nasolabial flap. The advantages of this flap are large amount of tissue and good cosmetic result following closure of the donor site. The disadvantages are hair growth from the flap in patients who do not receive radiotherapy and the flap pedicle must crossover the occlusal table of dentate patients.

Sternocleidomastoid Flap (Figs 11 to 17)

A 56-year-old male patient reported to our department with squamous cell carcinoma of right lower GBS. The patients underwent wide excision with marginal mandibulectomy and reconstruction is done with sternocleidomastoid muscle flap. The advantages are proximity of recipient site, one stage procedure, total flap loss is rare, good color match, sufficient bulk.

Pectoralis Major Myocutaneous Flap (Figs 18 to 20)

It is known as Work Horse of reconstruction.

Three cases of squamous cell carcinoma have been operated in our institution and reconstruction is done with



Fig. 7: Anterior mandibular alveolar carcinoma



Fig. 10: Closure following nasolabial flap reconstruction

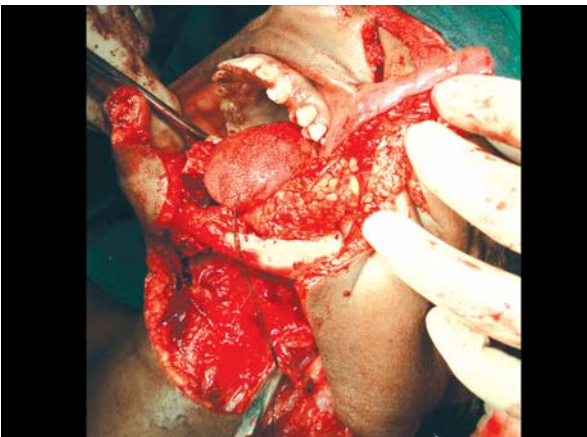


Fig. 8: Defect following resection of mandibular alveolar carcinoma



Fig. 11: Retromolar carcinoma



Fig. 9: Nasolabial flap rotated into oral defect

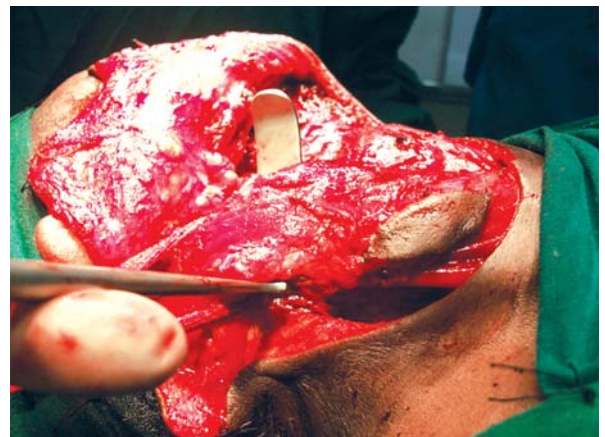


Fig. 12: Sternomastoid flap with skin island

pectoralis major myocutaneous flap. The advantages are it provides generous portion of skin, soft tissues, muscle and bone, has consistent blood supply, arc of rotation is more

than 20 cm, it has sufficient bulk, good functional/cosmetic results, donor site can be closed primarily and it provides hairless area. The disadvantages are the flap is too bulky,

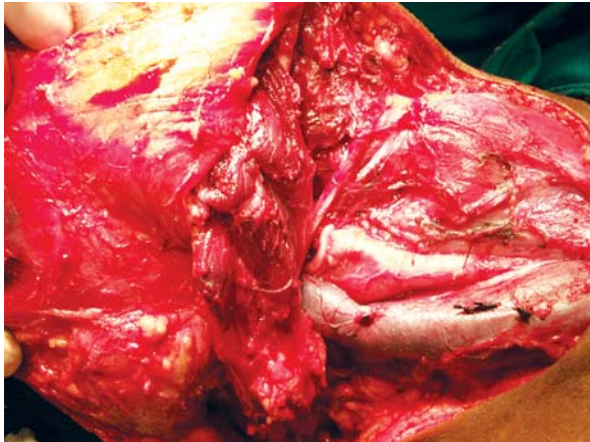


Fig. 13: Sternomastoid flap rotated into oral defect



Fig. 16: Sternomastoid flap to cover reconstruction plate



Fig. 14: Intraoral view of inset sternomastoid flap

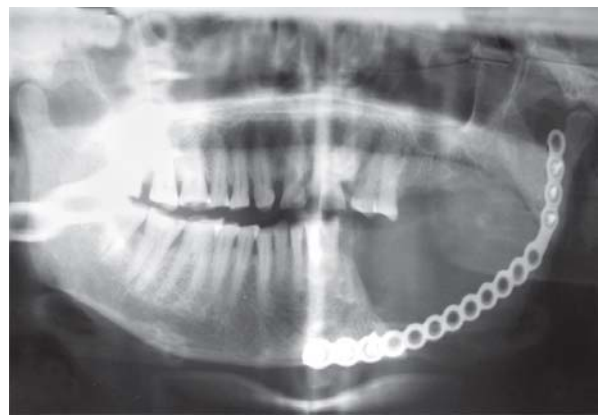


Fig. 17: OPG of reconstruction plate following segmental resection



Fig. 15: Four weeks postoperative view of sternomastoid flap reconstruction



Fig. 18: Mandible carcinoma—segmental resection and neck dissection defect

loss of muscle noticeable in male, distortion of symmetry in females, difficulty to identify the vascular pedicle.

Fibula Free Flap (Figs 21 to 23)

A 39-year-old male patient reported to our department with a swelling in lower anterior mandibular region. The patient

has been diagnosed as ameloblastoma after routine investigations and radiographs. Resection of ameloblastoma is done and reconstruction is done with fibula free flap. The advantages are uniform width and length (20-25 cm).⁵ It has ability to incorporate skin or muscle component with the flap. Disadvantages are chance of flap loss by thrombosis.



Fig. 19: Pectoralis major pedicled flap raised



Fig. 22: Fibula flap raised



Fig. 20: Pectoralis major flap rotated into defect



Fig. 23: Fibula flap osteotomized and fixed to residual mandible

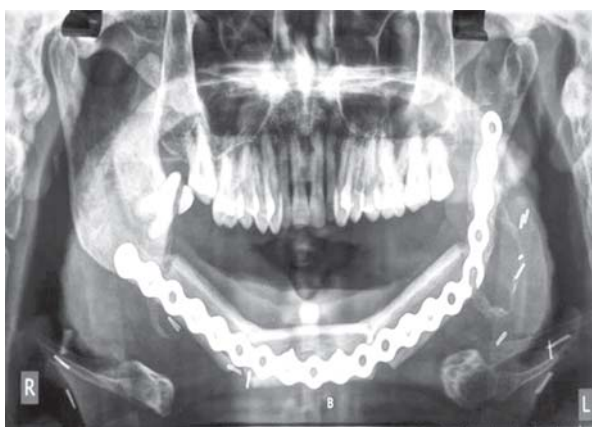


Fig. 21: OPG of mandible reconstructed with fibula flap

Iliac Crest Free Flap

A 18-year-old female patient reported to our department with swelling of right lower face region. OPG reveals well-defined radiolucency on right body of mandible. Biopsy suggests ossifying fibroma. In this case, segmental

mandibulectomy (SND) is done and reconstruction done with iliac crest free flap. The advantages are only vascularized bone used extensively with simultaneous or delayed endosteal dental implant placement. Disadvantages are perforation of abdominal viscus, herniation of intra-abdominal contents.

Temporalis Myocutaneous Flap

A 26-year-old male reported to our department with a swelling of left palate. FNAC confirms pleomorphic adenoma of hard palate. Excision is done and reconstruction done with temporalis myocutaneous flap. The advantages are it is highly vascular, pliable and durable. The disadvantages are frontal branch weakness of facial nerve as the nerve travels in temporoparietal fascia. Secondary alopecia due to damage of hair follicles for superficial dissection.

Radial Forearm Flap (Figs 24 and 25)

A 45-year-old male patient reported to our department with squamous cell carcinoma of lower gingivobuccal sulcus



Fig. 24: Bipaddled radial forearm flap raised





Fig. 25: Reconstruction of extensive buccal carcinoma defect with bipaddled radial forearm

near the angle of mouth which perforates through the skin. In this case, modified radical neck dissection is done along with wide excision and the defect is reconstructed with radial forearm flap. The advantages of this flap are its versatility, long pedicle (12-15 cm), easy to raise, reliable, thin pliable and often hairless skin.⁶ The disadvantages are donor site defects are visible and usually needs skin graft for the defect.

DISCUSSION







Mathes in 1982 was the first person to describe a systematic approach in reconstruction of head and neck. However, his description of reconstruction ladder was focused towards

closure of the defect. There was no consideration for esthetics and function. With the evolution of reconstructive techniques and the focus of life in cancer treatment, the esthetic and functional outcome has become an important criteria in selecting a reconstruction (Table 1). At present, pectoralis major myocutaneous flap described by Aryan (1978) is still the “Work Horse” for most head and neck reconstruction.¹ However, free flap reconstruction is becoming more popular and available. Kroll et al (1997) demonstrated that the morbidity for free flaps reconstruction was lower than pectoralis major myocutaneous flap resulting in shorter hospital stay and cost benefits.²

Table 1: Summary of cases with respective reconstruction and results				
Patient	Diagnosis	Surgery	Reconstruction	Results/Complications
	Squamous cell carcinoma of left lower GBS	Wide excision with MRND	Primary closure	Good
	Squamous cell carcinoma of right upper GBS	Subtotal maxillectomy	Split thickness skin graft	Partial loss of skin graft

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	Squamous cell carcinoma of left lower GBS	Wide excision with SND	Buccal fat pad	Good
	Squamous cell carcinoma of lower anterior alveolus	Wide excision and <i>en bloc</i> resection with MRND	Nasolabial flap	Good
	Pleomorphic adenoma	Excision/maxillectomy	Temporalis muscle flaps	Oronasal fistula which closed spontaneously with healing plate
	Squamous cell carcinoma of right lower GBS	Wide excision + marginal mandibulectomy with MRND	Sternocleidomastoid muscle flap	Good
	Squamous cell carcinoma of left lower GBS	Segmental mandibulectomy with selective neck dissection	Self locking titanium plates + sternocleidomastoid muscle flap	Good
	Squamous cell carcinoma of left lower GBS	Hemimandibulectomy with functional neck dissection	Pectoralis major myocutaneous flap	Neck fistula requiring secondary revision

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	Squamous cell carcinoma of right retromolar region	Hemimandibulectomy with MRND	Pectoralis major myocutaneous flap	Good
	Squamous cell carcinoma of left lower GBS	Wide excision with radical neck dissection	Pectoralis major myocutaneous flap	Good
	Squamous cell carcinoma of left lower GBS which perforates through skin	Wide excision with MRND	Radial forearm flap	Good
	Ameloblastoma	Resection of ameloblastoma	Fibula free flap	Good
	Cemento ossifying fibroma	Segmental resection	Iliac crest graft	Failure due to infection- bone graft removed leaving reconstruction plate

Pompeis (1998) also showed the functional superiority of radial forearm flap over pectoralis major myocutaneous flap.³ Particularly in mandibular reconstruction, the vascularized fibula has shown to be far superior to free

corticocancellous bone, specially when postoperative radiotherapy is necessary.

In our experience, depending on the size of defect and patient's functional needs, the whole range of reconstructive

options can be used reliably. However, the split thickness skin grafts and free corticocancellous bone had a lower success than others.

CONCLUSION

Head and neck reconstruction is an extremely demanding process that needs continuous improvements and refinements. Methods available in reconstructing defects depends on size of the defect, patient's compliance, anatomical and pathological factors. Versatile methods available for reconstruction—starting from grafts, local flaps to microvascular flaps which enhance the quality of life of the patient.

Introduction of microvascular free flap reconstruction (1959) enhances the function and esthetics of patient. Evolution of technique and technology enhanced the reliability of free tissue transfer and it has become a valuable tool for reconstruction. In recent years, free flaps have become the work horse in head and neck reconstruction.

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