



SOFT TISSUE FLAPS FOR ORAL AND MAXILLOFACIAL REGION: A PILOT STUDY

Surgery

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ABSTRACT

INTRODUCTION: Soft tissue flaps designed from different body parts are used to reconstruct the soft tissue defects in oral and maxillofacial region. These flaps can provide soft tissue blanket thereby attempting to restore function and aesthetics both.

AIMS: To study the feasibility of locoregional and distant flaps in various soft tissue defects of oral and maxillofacial region.

MATERIAL AND METHODS: 24 patients needing soft tissue reconstruction in oral and maxillofacial region either after trauma or tumor resection were included in the study. Soft tissue defects less than 2 x 1 cm of its greatest dimension, soft tissue defects having skin loss only and treated by skin grafts, children below 13 years of age, defects that were treated by free flaps and those requiring radiotherapy in reconstruction region were excluded from the study.

RESULTS: In our study mean age of the patient was 43.07 years. Bone loss was observed in 8 cases (33.3%). Haematoma was present upto one week postoperatively in one each case of deltopectoral, lateral forehead, pectoralis major and scalp flap. Incidence of scarring was higher in pectoralis major flaps. Unacceptable scarring was present in 4 cases (80%). There was no donor site morbidity present at the end of study period.

CONCLUSIONS: 1. Locoregional flaps are convenient to use for reconstruction in oral and maxillofacial region. 2. Forehead flap is a good choice for reconstruction after tumor resection. 3. Scalp flap is suitable in temporal bone region. 4. Split skin grafts are excellent choice for donor side closure. 5. Radial forearm and pectoris major flaps appeared good for anterior mandible and floor of the mouth reconstruction. 6. No specific indication of these flaps could be determined from this study.

KEYWORDS

INTRODUCTION

Soft tissue loss from the oral and maxillofacial region is the common incident in trauma due to gunshot injuries and/or road traffic accidents, large areas of tissue can become avulsed and lost, leaving unsightly wounds. The size, depth and position of extensive tissue destruction and avulsion often prevent primary repair without excessive tissue tension. Aggressive attempts at primary closure of large facial defects may cause derangement and distortion of structure and function, which may ultimately produce tissue necrosis and dehiscence with compromised function. Sometimes tumour in the oral and maxillofacial region also needs a lot of soft tissue resection during surgery, leaving the patient in a compromised esthetics and functional state. The key to repair is to minimize the final defect while preserving function and aesthetics.

Soft tissue flaps designed from different body parts are used to reconstruct the soft tissue defects in oral and maxillofacial region. These flaps can provide soft tissue blanket thereby attempting to restore function and aesthetics both. These flaps are *classified* according to the method of movement (i.e. locoregional or distant); according to blood supply, such as axial or random pattern; and according to the composition of the flap, such as cutaneous, myocutaneous, osseomyocutaneous or fasciomyocutaneous.

AIMS AND OBJECTIVES

The present study was undertaken with the following aims and objectives.

1. To study the feasibility of locoregional and distant flaps in various soft tissue defects of oral and maxillofacial region.
2. To lay down the specific indications of those flaps, if possible.

REVIEW OF LITERATURE

Flap is a piece of skin and subcutaneous tissue nourished by arteries & veins that enter it at its base, or pedicle (Plastic Surgery). The word *flap* is now used to refer to a variety of reconstructive technique using skin and other tissues. Early period of flap culminated in 1950's. Susruta (700 BC) used the first pedicled flap. Kanghiara Family (1440) used the pedicled forehead flap for rhinoplasty. Modern plastic surgical technique of flap transfer are attributed to Gillies & Filatov, who described the tubed pedicle (1917-20).

Free tissue transfer become a major feature development with McLean and Buncke (1972) and Antia & Buch (1971) carrying out the first

human free flap transfers to be reported in the English literature in 1971. The application of axial or arterial flaps were modified by Esser (Haiseker, 1983) and Webster (1937), applied to the torso by Bakamjian (1965), and mastered by Mc Gregor and Jackson (1972). As reviewed by Haeseker (1983), Esser devised numerous arterial and island flaps to reconstruct and multitude of war casualties.

For oral and maxillofacial region we can use distant flaps, locoregional flaps and free flaps. Pectoralis major myocutaneous flap, trapezius, latissimus dorsi, sternomastoid myocutaneous flap, radial artery forearm and deltopectoral flap are commonly used.

MATERIAL AND METHODS

The present study included 24 patients attending the Outpatient Department of Oral and Maxillofacial Surgery, Faculty of Dental Sciences, CSM Medical University, Lucknow and also from Department of Plastic Surgery and Department of Surgical Oncology, CSM Medical University, Lucknow. The patients needing soft tissue reconstruction in oral and maxillofacial region either after trauma or tumor resection in oral and maxillofacial region were *included* in the study. The patients were included in the study irrespective of age, sex or socioeconomic status.

The following patients were *excluded* from the study:

1. Soft tissue defects less than 2 x 1 cm of its greatest dimension.
2. Soft tissue defects having skin loss only and were treated by skin grafts.
3. Children below 13 years of age.
4. Defects that were treated by free flaps.
5. Those requiring radiotherapy in reconstruction region.

All the patients were thoroughly examined, systemically and locally and detailed history of the patients was recorded in standardized format. Patients were evaluated on the basis of clinical interpretation. Routine blood, blood sugar and urine investigations were done. The time elapsed between trauma and definitive treatment was noted. If there is time gap between trauma and reconstruction then healing takes place by secondary intention. It leads to scar formation. In those cases length and width of the scar and/or defect was measured to determine the flap size.

Following types of compound flaps were used:

Locoregional flaps: Forehead flap, Sternomastoid myocutaneous flap and Scalp flap Distant Flaps

Distant Flaps: Pectoralis major myocutaneous flap and Deltopectoral flap and Radial forearm fasciocutaneous flap

postoperatively. Arc of rotation was taken into consideration during surgical procedure. Flaps were sutured with 4-0 catgut and 5-0 nylon suture material. Donor site defects were closed either primarily or by split skin grafting.

Flaps were used as: Direct flaps, Tube flaps and Island flaps
In case of tubed flaps, bridge segment was divided on 215t day

OBSERVATION AND RESULTS

TABLE I : Incidence of Bone Loss

Bone Loss	Flap Name						Total
	Deltopectoral	Lateral Forehead	Pectoralis Major	Radial Forearm	Scalp Flap	Sternomastoid	
No Bone loss	2	8	3	0	3	0	16
Bone loss of 2 cm	0	2	0	0	0	0	2
Bone loss of 2.5 cm	0	1	1	1	0	0	3
Bone loss of 3 cm	0	1	1	0	0	1	3
Total	2	12	5	1	3	1	24

TABLE II : Region Involved

	Flap Name						Total
	Deltopectoral (n=2)	Lateral forehead (n=12)	Pectoralis major (n=5)	Radial Forearm (n=1)	Scalp Flap (n=3)	Sternomastoid (n-1)	
Angle of mouth	1		1				2
Floor of mouth and/or Anterior Mandible			1	1			2
Body and Angle of Mandible		6	1			1	8
Buccal mucosa		1					1
Cheek & angle of mouth	1	4	2				7
Lateral canthus eye & lower eyelid		1					1
Temporal bone					3		3
	2	12	5	1	3	1	24

TABLE III : Pain Score At Recipient Site

Period	Pain Score	Flap Name						Total
		Deltopectoral	Lateral Forehead	Pectoralis Major	Radial Forearm	Scalp Flap	Sternomastoid	
1 Day	0	-	-	-	-	-	-	-
	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	3	2	12	5	1	3	1	24
3 Day	0	-	-	-	-	-	-	-
	1	-	-	-	-	-	-	-
	2	2	11	5	1	3	1	23
	3	-	1	-	-	-	-	1
1 Wk	0	-	2	-	-	-	-	1
	1	2	6	5	1	3	1	18
	2	-	4	-	-	-	-	4
	3	-	-	-	-	-	-	-
3 Wk	0	2	6	5	1	3	1	20
	1	-	4	-	-	-	-	4
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-
3 Mth	0	2	12	5	1	3	1	24
	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-
6 Mth	0	2	12	5	1	3	1	24
	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-

TABLE IV : Incidence of Haematoma at Recipient Site (N=24)

Period	Number of Recipients with Haematoma						Total
	Deltopectoral (n=2)	Lateral forehead (n=12)	Pectoralis major (n=5)	Radial Forearm (n=1)	Scalp Flap (n=3)	Sternomastoid (n-1)	
1 Day	-	-	-	-	1	-	1
3 Day	1	-	-	-	-	-	1
1 Week	1	1	1	-	1	-	4
3 Week	-	-	-	-	-	-	-
3 Month	-	-	-	-	-	-	-
6 Month	-	-	-	-	-	-	-

TABLE V : Incidence Of Loss Of Flap At Recipient Site (N=24)

Period	Score	Loss of Flap Score						Total
		Deltopectoral (n=2)	Lateral forehead (n=12)	Pectoralis major (n=5)	Radial Forearm (n=1)	Scalp Flap (n=3)	Sterno mastoid (n-1)	
1 Day	0	2	12	5	1	3	1	24
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0

3 Day	0	2	11	5	1	3	1	23
	1	0	1	0	0	0	0	1
	2	0	0	0	0	0	0	0
1 Week	0	2	11	3	1	3	1	21
	1	0	0	1	2	0	0	3
	2	0	0	0	0	0	0	0
3 Week	0	2	11	2	1	3	1	20
	1	0	1	1	0	0	0	2
	2	0	0	2	0	0	0	2
3 Month	0	2	12	3	1	3	1	22
	1	0	0	0	0	0	0	0
	2	0	0	2	0	0	0	2
6 Month	0	2	12	3	1	3	1	22
	1	0	0	0	0	0	0	0
	2	0	0	2	0	0	0	2

TABLE VI : Incidence Of Infection At Recipient Site (N=24)

Period	Score	Infection Score						Total
		Deltpectoral (n=2)	Lateral Forehead (n=12)	Pectoralis Major (n=5)	Radial Forearm (n=1)	Scalp Flap (n=3)	Sterno mastoid (n=1)	
1 Day	0	2	12	5	1	3	1	24
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0
3 Day	0	2	11	5	1	3	1	23
	1	0	1	0	0	0	0	1
	2	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0
1 Wk	0	2	10	2	0	3	1	18
	1	0	1	3	1	0	0	5
	2	0	1	0	0	0	0	1
	3	0	0	0	0	0	0	0
3 Wk	0	2	12	3	1	2	1	21
	1	0	0	0	0	1	0	1
	2	0	0	2	0	0	0	2
	3	0	0	0	0	0	0	0
3 Mth	0	2	12	4	1	3	1	23
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	0	0	1	0	0	0	1
6 Mth	0	2	12	5	1	3	1	24
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0

DISCUSSION

In our study *mean age* of the patient was 43.07 years. This is in close correlation with the findings of Narayana (1970) who reported mean age of 44.2 years. Out of 24 cases, 21 (87.5%) were male and 12.5% cases were female in our study. These findings are similar to the findings of Schusterman et al. (1991)

In our study *bone loss* was observed in 8 cases (33.3%). This finding had similarity with the finding of McCraw et al. (1979). In our study, *types of flaps* used for these soft tissue defects with bone loss were lateral forehead, pectoralis major, radial forearm and sternomastoid flaps. These findings are comparable with the findings of McCrew (1979), Souter et al. (1983), Ariyan (1979) and McGregor (1989). We can use both locoregional and distant flaps for lining defects. Flaps those were used in our study were >40 sq. cm size in majority cases (62.5%) and lateral forehead flap was used most commonly (73.3%)

In our study *haematoma* was present upto one week postoperatively in one each case of deltopectoral, lateral forehead, pectoralis major and scalp flap. This was due to absence of suction drain. This finding is in consonance with findings of McGregor (1989). In our study all the flaps had *vascularity* at the end of the study period because all the flaps were based on particular artery and good pedicle design.

In our study incidence of *scarring* was higher in pectoralis major flaps. Unacceptable scarring was present in 4 cases (80%). This was due to underlying wound contraction which leads to elevation of center and depression of the flap edges.

In our study deltopectoral flap, radial forearm flap, scalp flap and sternomastoid flaps were all *aesthetically* acceptable at the end of the study period. At the end of the study period, *functional movements*

were compromised in two cases of pectoralis major myocutaneous flaps due to bulkiness of the flap which affects the patient functions in oral cavity and presence of pus discharge in oral cavity due to infection and fistula formation. These findings are in close correlation with the findings of Boyd et al. (1994) and Ariyan (1979).

In our study there was no *donor site morbidity* present at the end of study period because the cases whose primary closure was done were closed without tension; together with the use of drain. In our study we used lateral forehead flap for the intraoral reconstruction, lateral canthus and lower eyelid region, cheek and body of mandible region. This is in correlation with the study of McGregor (1963). In our study for anterior mandible and floor of the mouth defects, we used radial forearm and pectoralis major myocutaneous flaps. This is similar with the findings of Ariyan (1979), Soutar and Mac Gregor (1983). For angle of mouth we used deltopectoral flap for reconstruction, because thin, elastic skin provide adequate movements to that region. The same have also been used by Mc Gregor and Jacson (1970) in their study.

CONCLUSIONS

1. Locoregional flaps are convenient to use for reconstruction in oral and maxillofacial region.
2. Forehead flap is a good choice for reconstruction in oral and maxillofacial region after tumor resection.
3. Scalp flap is suitable for soft tissue reconstruction in temporal bone region.
4. Split skin grafts are excellent choice for donor side closure.
5. Sternocleidomastoid flap is useful for providing good skin colour and contouring for posterior mandible region.
6. Radial forearm and pectoralis major flaps appeared good for anterior mandible and floor of the mouth reconstruction.
7. No specific indication of these flaps could be determined from this study.

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