Outcome assessment of reconstruction of traumatic facial soft tissue defect with local flaps

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Abstract

Introduction: Traumatic facial soft tissue defect constantly contributes the highest incidence rate among the causes leading to defects. Facial defect reconstruction has many methods such as direct suture, full-thickness skin graft, complex graft, use of local and adjacent skin flaps, remote flap graft, and free flaps... The choice of treatment depends on the location, size, and characteristics of the injury.

Patients and methods: A prospective study was conducted on 32 patients with traumatic facial soft tissue who came to Odonto-Stomatology Center - Hue Central Hospital from 03/2021 to 10/2021.

Results: The results showed that there had 25 cases of sliding flap accounted for the highest rate (78.1%), followed by 4 cases of rotation flap (accounting for 12.5%). Postoperative follow-up and complications recorded 6 cases of postoperative hematoma, wound bleeding, suture rupture, flap necrosis, and wound infection, all of which contribute 3,1% of the total cases. When patients were discharged from the hospital, good treatment results could be observed in 27 cases, accounting for a high rate of 84.4%. After 3 months of discharge from the hospital, the outstanding functional results were witnessed in 29 patients, which accounted for 90.6%. After 3 months of discharge from the hospital, aesthetics achieved good results in 27 cases, accounting for 84.4 %.

Conclusion: The traumatic facial soft tissue defect reconstruction with local flaps is highly effective. Choosing the right type of flap for each facial anatomical structure helps bring about high aesthetics.

Keywords: Local flaps, facial plastic surgery, trauma facial soft tissue defect.

Introduction

Facial soft tissue defect due to trauma always accounts for the highest proportion of the reasons which caused facial soft tissue defects [1];[2]. Treatment of facial soft tissue caused by trauma has many methods. Facial soft tissue defects about 1-3cm in size are quite common, therefore, the aesthetical surgery method using local skin flaps has significantly contributed to rehabilitation, anatomical structure, aesthetics, and psychology of patients [3].

Dinesh Chaudhar (2020) performed facial defects cover with multiple local flaps on 92 patients and deducted that local flap was always prioritized compared to skin graft because it created a superior match in color and flap texture with surrounding organs [4]. To gain insight into which specific

conditions and characteristics of traumatic defects local flaps can be applied, we conduct this study with the following objectives: Describe the characteristics of local flap distribution and determine short-term results of treatment for traumatic facial soft tissue defects using local flaps.

Materials and methodology

Subject

32 patients with facial soft tissue defects caused by trauma were examined and treated at Odonto-Stomatology Center, Hue Central Hospital from 03/2021 to 10/2021.

Selection criteria: All patients with facial soft tissue defects caused by trauma were indicated for reconstructive surgery with local flaps. Regardless of age and gender, met with anesthesia or sedation requirements.

Exclusion criteria: Patients with systemic disease that are contraindicated against plastic surgery or effects on the wound healing process and those who did not show up for follow-up appointments.

Methodology

Its a descriptive, longitudinal, clinical intervention study.

Sample size: 32 patients, convenience sampling, qualified to the selection criteria.

Surgical materials: Electric scalpel; Surgical forceps; Hook; Scissors; Hemostatic instrument; Suture: Usually use less traumatized needle or surgical suture.

Summary of research steps:

Patients were admitted and recorded physical examination as well as classifying the defect which was determined by location, shape, and size. Wound first aid was provided, then processed to design the further local flap. Close the defect with a local flap. Postoperative care and follow-up.

Outcome assessment timeframe according to functions and aesthetical aspects: discharged; after 3 months: According to 3 criteria good, average, poor.

We used the assessment criteria of Nguyen Thanh Hai (2003) when the patient is discharged (7-10 days) and after 3 months [5].

Table 1: Assessment criteria after being discharged (7-10 days)

Criteria	Features
Good	Pink and warm flap, no wound bleeding, infection or burst surrounding the flap site as well as donor site needs to be well healed, no pulled skin or nerves damage.
Average	A cluster of purple spots or blisters on flap, bleeding around flap, the incision around flap might not heal properly. High tension on the flap site due to too tight closure, poor incision but no infection.
Poor	Severe bruise with a high risk of necrosis as the lack of blood supply. Wound dehiscence occurs on the flap side due to excessively tight closure with infection

Assessment criteria after 3 months according to functions and aesthetic aspects:

Table 2: Assessment criteria after 3 months

Criteria	Functions	Aesthetic aspects
Good	Eyes are closed completely as well as lips. Normal breathing function by nose. Neck movement such as flexion, extension, and rotation to the site works properly.	Scars of the flap and donor site are small and aesthetic appearance (<3mm) whereof the color should be matching as well as maintaining the mobility of skin at the reconstructive site without excessive tension or loosening.
Average	The eyes are closed with one part of the conjunctiva being open. The pursed lips are slightly pulled. Nose breathing, as well as movement of the neck (flexion, extension, and lateral rotation), is partially limited.	Scar is medium size, slightly firmer than surrounding tissue (> 3mm). Color of scar and flap was changed (light brown). There is a small fold scar
Poor	The eyes are closed with the conjunctiva is open. The pursed lips are extremely retracted with severe restriction of nose breathing capacity and movement of the neck for flexion, extension, and lateral rotation	Scar is hypertrophic, hard, keloid, adhesive and restricted mobility. The color of scar and flap was changed a lot (gray). There are many scars, folds, pulled surrounding tissues.

Date analyze and proceed

Study data was encrypted, input analyzed and processed using medical statistical algorithms and SPSS statistical program.

Study ethics

The study was conducted after the Scientific Council and the Medical Ethics Committee in Biomedical Research of Hue Central Hospital approved.

Result

Flap characteristics

(Table 3)

A sliding advancement flap (75%) was commonly used for most cases of defects. Rotation flap (15,6%) was used mostly in the cheek area (2/5 cases). Direct closure was primarily used in cheek and forehead area. Z-Plasty (3,1%) was used in cheek area. Sliding advancement flap accounted for 78,1%; rotation flap accounted for 12,5%. Direct closure accounted for 6,3%. Z –Plasty accounted for 3,1% (p<0,01). (Table 4)

Directly stitching closure accounts for 9,4% which was used mostly for defect ≤0,5cm in width, 6,3% for length ≤ 2cm. Sliding advancement and rotation flap was used for various sizes of defects. Z- PLASTY flap (3,1%) was used to close the defect with width from 1-1,5cm and length from 4,5-6cm.

Table 3: Flap types for each defect location (n=32)

Flap types / Defect area	Direct closure	Sliding advancement flap	Rotation flap	Z – PLASTY	Summary	p
Forehead	1	5	0	0	6	
Eyebrows	0	1	0	0	1	
Nose	0	1	0	0	1	
Cheeks	1	3	2	1	9	
Upper lip	0	5	1	0	6	
Lower lip	0	1	0	0	1	< 0,01
Chin	0	4	0	0	4	
Forehead-eyebrows	0	2	1	0	3	
Lower eyelid-cheeks	0	1	0	0	1	
Lips-cheeks	0	2	1	0	3	
Summary	2	25	4	1	32	
Ratio	6,3	78,1	12,5	3,1	100	

Table 4: Types of flap used based on defects width and length (n=32)

Size / Types of flap	Width (cm)					Length (cm)				
	≤ 0,5	1 – 1,5	2 – 2,5	≥ 3	Ratio (%)	≤ 2	2,5 – 4	4,5 – 6	≥ 6	Ratio (%)
Direct closure	2	1	0	0	9,4	1	1	0	0	6,3
Sliding Advancement flap	1	16	6	1	75	6	12	4	1	71,9
Rotation flap	0	1	2	1	12,5	2	1	3	0	18,7
Z-PLASTY	0	1	0	0	3,1	0	0	1	0	3,1
Summary	3	19	2	2	100	9	14	8	1	100

Treatment results of different periods

Table 5: Results when discharging and after 3 months (n=32)

Results	Discharge		After 3 months				P
			Functions		Aesthetic		
	Unit	Ratio %	Unit	Ratio %	Unit	Ratio %	
Good	27	84,4	29	90,6	27	84,4	
Average	4	12,5	3	9,4	4	12,5	< 0,01
poor	1	3,1	0	0	1	3,1	
Summary	32	100	32	100	32	100	-

Good results after discharge accounted for high ratio of 84,4%; Average results were 12,5%; only one patient with poor result (3,1%). The functions after being discharged for 3 months with good result accounted for 90,6%; Average results accounted for 9,4%. Aesthetic aspects after 3 months with good result accounted for 84,4%; Average results was in 12,5%; poor result in one case (3,1%) ($p<0.01$). Post-operative complications such as hematoma, bleeding, bursting suture, flap necrosis, infection, lip deformity accounted for 3,1%.

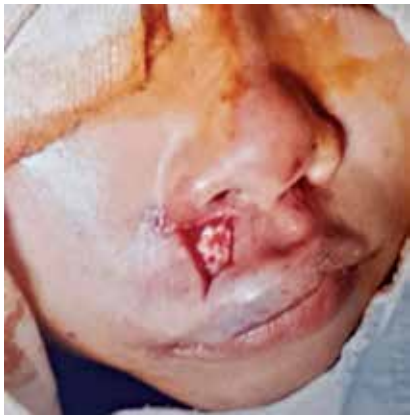

Figure A: Traumatic defect

Figure B: After repair of defect by rotation flap

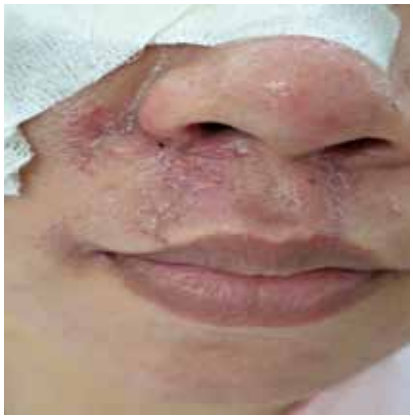

Figure C: After 7 days of suture removal

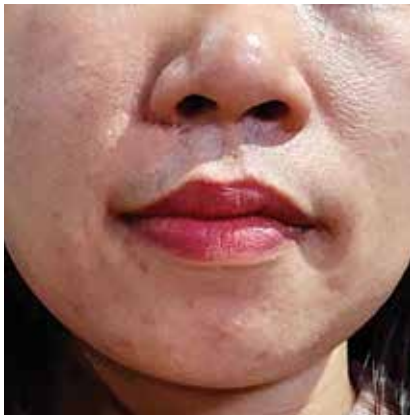

Figure D: Re-examination after 3 months

Discussion

Flap types distribution

Results showed sliding advancement flap accounted was the most common treatment (78,1%); followed by rotation flap, directly stitching closure with 12,5% and 6,3%, respectively. Only a single case using Z-Plasty, which is about 3,1%.

Cheek area: In our research, direct closure was mostly applied in the cheek area (4/6 cases). With small defects in the cheek area, directly stitching closure after dissection of the wound edge is optimal. However, distortion of the lower eyelid anatomical structure should be avoided. That is to say, the surgeon should also consider making incisions along the facelift line to reduce postoperative scar [6].

Forehead and eyebrows are: In our study, forehead defects were mostly closed by sliding advancement flap sharped H or A-T. The advantage of using an A – T sliding advancement flap to close the defect in the forehead area is that it can conceal a T-shaped scar at the hairline and a scar line in the crease between the eyebrows arch and forehead.

Lips area: Lips defects in our research were closed by sliding advancement flap for most 18 cases, two cases used rotation flap, and one case used direct stitching closure. Luong Thi Thuy Phuong (2005) reported 40 patients with facial soft tissue defect, of them, there were 17 cases of lip soft tissue defect were closed by nasolabial fold flap, accounting for the highest rate of 42,5% [7].

Nose area: In our research, there was one case with a defect in the nose area in which sliding advancement flap was used from cheek area to close. According to Dinesh Chaudhary (2020), nose area reconstruction is perplexing, thus, the best is that the scar should be aligned along the facelift line [4].

In our series, most of the flaps have 2,5-3cm in length and 1,5-2cm in width. We follow principles regarding flap size ratio to avoid flap retraction after plastic surgery, or prevention of flap size deficiency, without distorting vital anatomical structure on the face, limiting excessive tissue removal, avoiding unnecessary prolonged scar lines because of expected excessive flap size compare to the defects size. When designing a flap in the face area, the ratio of length and width reaches 1:1 and 2:1 is ideal, increasing in flap length is unnecessary. With rotation flap that is designed with a general basis of incision length is four times the width of defect, removal of the Burrow triangle shall be simple [9].

Treatment results in different periods

The result showed post-operative complications accounted for 18,7%. In particular, wound hematoma, bleeding, bursting suture, flap necrosis, and wound infection contributed 3,1%

The study of Nguyen Si Hoa, Pham Cao Kiem (2012) on 42 patients with head and facial soft tissue showed that postoperative complications were 14,53%, including lips deformity, necrosis of the proximal side, and inadequate good materials for repair [10].

In our research, good treatment results with a high percentage accounted for 84,4%; the average results were 12,5%; two cases with poor result accounted for 2,1%, that is one patient with lip defect that had surgical site infection occurred on the 5th day after surgery and wound healed well on the 14th day and a patient with large defect in lips-cheek area caused lips distortion.

Nguyen Van Dan and Do Van Tu (2020), evaluated postoperative 10 days of the local flap which showed: flap had good results, without complications about 93,8%; the flap mildly retracted after surgery with average results accounted for 6,2%; no cases of necrosis, flap infection [11].

In our series, functions after 3 months from discharge with good results accounted for 90,6%; the average were 9,4%. According to Nguyen Hong Ha report (2010) of 113 patients, good results were achieved with 95,6%; the average results were 4,4%; no poor result case were observed for one year after surgery [12]. Good results achieved by the author were higher and to explain this, it might be the monitoring period was longer than our research.

Regarding the aesthetical aspect, after 3 months, good results accounted for 84,4%; the average results were 12,5%; one case has poor results (3,1%). Nguyen Hong Ha (2010) recorded aesthetical assessment results for 6 – 54 months achieved good, average results accounted for 92%; poor resuts were 8% [12]. Research of Tran Xuan Phu (2012) showed aesthetical assessment results at 3 months: good 82,8%; Average 14% and poor results were 3,2% compares to 6 months, the results were: good 90,5%; Average 6,3%; poor 3,2% respectively [3]

Conclusion

The sliding advancement flap accounted for the highest ratio of 78,1% followed by the rotation flap which accounted for 12,5%. This type of flap was used in most of the defect locations. Directly stitching closure was used primarily in the cheek and forehead area, mostly used for defects with width ≤ 0,5cm. The sliding advancement flap was used mostly for every defect with a variety of widths and lengths.

Postoperative complications were recorded, typically, wound hematoma, bleeding, bursting suture, flap necrosis, and surgical site infection accounting for 3,1%. Good results after discharge were about 84,4%; average were 12,5%; Poor results in one case accounted for 3,1%.

The functional result after discharge for 3 months received good result accounting for 90,6%; average were 9,4%. In terms of aesthetical aspect, after discharge for 3 months, good results were about 84,4%; average were 12,5%; poor result accounted for 3,1%.

Conflict of interest: The authors declare that they have no conflict of interest.

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