Anterolateral Thigh Skin and Fascia in Facial Skin Defects with Trismus: Two Problems, One Solution

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Abstract

Keywords

- anterolateral thigh flap
- coronoid excision
- condylectomy
- vascularized fascia
- facial skin loss
- necrotizing infection

A case series of five patients with skin loss in the lateral face with trismus that followed delayed presentation following trauma, necrotizing infection, and radiation fibrosis was treated with coronoidectomy and condylar excision to effect adequate mouth opening; the anterolateral thigh flap was used for cover and the fascia was used as an interposition graft to prevent recurrence. Two patients with more than 9 years of follow-up had an average of 40 mm interincisal opening.

Introduction

Facial trauma involving the temporo-orbito-zygomatic region may have skin loss precluding primary repair; if the ensuing skin defect is not replaced, healing by secondary intention can lead to trismus.¹ The trismus that results is usually extra-articular. About 88% cases of pseudoankylosis are associated with trauma and it complicates up to 0.6% of undiagnosed zygomatic fractures.²

Cervicofacial necrotizing skin and soft tissue infections can be fatal (18–50%) and can result in extensive skin loss.³ Aggressive debridement is often a component of infection control and subsequent wound closure may require free flaps.⁴

Noma can cause extensive soft tissue losses and trismus; excision of fibrosis and flap replacement are combined with a graded approach to maximize mouth opening, setting the basis for rational application of postoperative physiotherapy.⁵

Trismus also may result from soft tissue fibrosis following radiation in head and neck malignancies; the associated

chronic radiation dermatitis causes risk of developing skin necrosis, when surgical intervention is needed for restoration of mouth opening.

Any of the conditions described above may present a “double trouble” of facial skin loss, real or apparent (following radiotherapy), and trismus.

We describe the application of free anterolateral thigh (ALT) flap in providing coverage and restitution of adequate mouth opening in patients with facial skin loss and trismus.

Materials and Methods

A total of five patients (between 2006 and 2017) presented with the common clinical problem of loss of skin or skin atrophy in the lateral part of the face (temporo-orbito-zygomatic region) and trismus, secondary to trauma, infection, and postoperative radiation.

Two patients had defects following delayed presentation of acute traumatic skin loss (with no primary surgical management) and two were following necrotizing facial

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infection; the fifth patient had surgery for an Ewing sarcoma temporal region and radiotherapy. One of the two patients following acute trauma had fractures of zygoma with loss of the lateral orbital wall.

There were 4 males and 1 female, age group ranging from 23 to 48 years (average, 36.2 years). Time to presentation for treatment was 1 week to 8 years with a mean of 25 months following the primary event. Preoperative interincisal distance was on average 11.4 mm (range: 10–15 mm; ► **Table 1**).

Technique

Nasotracheal intubation was done in four patients, and in one a tracheostomy (Case 5) was done.

Wound debridement and/or scar excision were done to recreate the actual defect. Coronoid excision and excision of the zygomatic arch were done in two patients. In the other three patients, additional excision of the condyle was also done to achieve acceptable mouth opening intraoperatively.

Also, 30 mm of interincisal opening was taken as the threshold of acceptable mouth opening.

ALT flap was harvested from donor thigh based on the skin defect size; the flap was harvested subfascially. Ipsilateral facial vessels and external jugular vein were dissected and used as recipient vessels. In one patient with postradiation trismus, there was no palpable pulse in the facial and

superior thyroid vessels, hence ipsilateral transverse cervical vessels were used.

After the vascular anastomosis, flap vascularity was checked and the fascia was dissected off from the flap at its distal end and interposed between the base of the skull and ramus of the mandible. Retraction of the interposed fascia was prevented by tagging the fascial edge to surrounding tissues using 4–0 absorbable sutures. Skin flap inset was completed as per the defect requirement. All the donor areas, except one, were skin grafted.

Patient were allowed mouth-opening exercises from fifth postoperative day in all but one patient; Heister's mouth screw was used intermittently to give graded mouth-opening therapy. This was advised to be continued for a period of 6 months at the time of discharge.

Results

Two patients with infection underwent a staged debridement followed by trismus release and flap cover (Cases 2 and 3); the gap between the procedures was 23 and 56 days.

Two patients needed excision of the coronoid with or without the zygomatic arch (Cases 1 and 2), and in the other three, further excision of the condyle was done to achieve a minimum of 30 mm mouth opening at the end of surgery.

All patients were reconstructed using free ALT flap with vascularized fascia; the average flap size was 12 × 8 cm and

Table 1 Case-wise details of presentation, defect size, mouth opening, and follow-up result

	Case 1	Case 2	Case 3	Case 4	Case 5
Cause	RTA	Necrotizing Infection	Necrotizing infection	RTA	Radiotherapy
Time lag to presentation	4 months	1 week	3 weeks	2 years	8 years
Preoperative mouth opening	10 mm	15 mm	10 mm	12 mm	10 mm
Primary treatment before referral	Only conservative treatment for wounds; no skeletal injuries	Diabetic with cutaneous zygomycosis; conservative treatment for wounds and antibiotic therapy; no skeletal injuries	Nondiabetic; nonspecific necrotizing infection managed with dressings and antibiotics	Right eye enucleation; right below-knee amputation and facial wound managed with dressings only	Left frontotemporal craniectomy for Ewing sarcoma followed by radiotherapy
Size and location of skin loss (cm)	15 × 10 right temporoparietal area	17 × 8 right temporal area and cheek	12 × 14 right temporofacial area	10 × 6 infraorbital and preauricular area	No actual skin loss; postradiation skin atrophy needed skin during closure
Ancillaries to achieve mouth opening	Right zygomatic arch excised	Right zygoma arch and coronoid process excision	Right zygoma arch, coronoid process excision, and condylectomy	Right coronoid excision and condylectomy	Left coronoidectomy and condylectomy
Postoperative mouth opening	30 mm	38 mm	35 mm	37 mm	35 mm
Follow-up duration	At 7 months with no further follow-up	11 years and on follow-up	At 5 months with no further follow-up	9 years and on follow-up	34 months and on follow-up
Mouth opening at follow-up	30 mm	44 mm	35 mm	40 mm	27 mm

Abbreviation: RTA, road traffic accident.

the average size of the vascularized fascia used as interposition graft was 5×3 cm.

One patient (Case 4) needed a small segment of the vastus lateralis muscle as filler for the cavity nature of the wound. Though there was a loss of the lateral wall of the orbit, this was not addressed with skeletal reconstruction. Free ALT flap with fascial extension was harvested along with a part of the vastus lateralis and used as filler for the anterolateral surface of the upper maxilla and the fascia for interposition in the temporomandibular joint area. Only after condylectomy, 37 mm of mouth opening was achieved intraoperatively (► Figs 1–3).

There were no re-explorations and all the flaps survived; there were two complications.

In one patient (Case 3), two-stage debridement followed by flap was done for sequel of necrotizing infection; facial nerve trunk had also necrosed; a 3 cm cheek mucosal defect was closed with local hinge flaps; coronoid and condylar excision following wound excision permitted more than 30 mm mouth opening. The necessity for fascial interposition restricted the skin flap inset in the superior temporal region,

leading to application of a split skin graft in the superior temporal region (► Figs. 4 and 5).

Two patients were lost to follow-up after 5 and 7 months; two came for follow-up between 9 and 11 years with mouth opening of 40 to 44 mm. All the patients who needed additional condylar excision had jaw deviation on mouth opening but with normal ability to occlude.

Only two of the five patients (Cases 2 and 5) reported for a second flap-thinning procedure between 4 and 7 months after surgery.

Discussion

Hill (1978)⁶ described eight cases of cancrum oris with soft tissue loss and mandibular ankylosis. Tube-pedicated flaps from neck and abdomen, with a delay, were used to cover the defects.

Fujioka et al⁷ reported a case of extra-articular ankylosis of the mandible following radiotherapy for maxillary cancer. Coronoidectomy and a free abdominal flap was used

Fig. 1 (A, B) Posttraumatic defect with mouth opening of 12 mm. (C, D) Three-dimensional computed tomography of face showing the extent of the bone defect (bold arrows) and the abnormal condylar head.

Fig. 2 (A) Postdebridement defect. (B) Intraoperative mouth opening of 37 mm following release. (C) Anterolateral thigh flap with (D) vastus lateralis muscle. (E) Flap inset using fascia for interpositional arthroplasty (a, flap; b, fascia; c, vastus lateralis).

Fig. 3 Follow-up at 9 years with mouth opening of 40 mm.

to treat ankylosis; the muscle filled the gap following coronoidectomy and the skin replaced the shortage of oral mucosa.

Geissler et al⁸ described a set of five patients with severe noma-related facial defects and trismus needing free flaps (radial forearm, 2; parascapular flap, 2; latissimus dorsi, 1); the authors used wedge osteotomy to create a large gap, and to prevent reankylosis a dermo-fatty or muscular tail of the

free flap was interposed into the gap. The degree of release was dictated by the ability to open the mouth adequately during surgery and not on preoperative imaging.

Though Fechner and Deschler¹ (2002) in a review article highlight the use of free flaps for coverage and restoration of skeletal continuity, in severe cranio-maxillofacial trauma, the regions of the face covered in this article excludes the lateral facial region. It is this very region where the lack of fascial flaps perfused by the superficial temporal vessels pushes for the use of free flaps.

Dang et al⁴ demonstrated that in select patients with extensive cervicofacial soft tissue defects after resolution of infection, early free-tissue transfer may be a safe and viable option. In their study, 2 out of 23 necrotizing fasciitis cases needed reconstruction using ALT free flaps.

Fascia lata is strong, pliable, and easily sutured to native tissues. It is homologous tissue with no risk of foreign body reaction.⁹

Seth et al¹⁰ demonstrated the use of free-tissue transfer of the ALT fascia lata to recreate the nasal lining. This flap provided a greater source of fascia than the radial forearm free flap.

Functional reconstruction of Achilles tendon injuries with combined soft tissue defects using a free composite ALT flap with vascularized fascia lata has been clinically validated by Houtmeyers et al¹¹ and Kuo et al.¹²

Our case series had to deal with delayed presentation, poor compliance to postoperative therapy, and the likelihood of default in follow-up.

Fig. 4 (A) Postnecrotizing infection and lateral facial defect with fistula (circle). (B) Preoperative mouth opening of 10 mm. (C) Right condyle before removal. (D) Mouth opening of 35 mm postcondylectomy.

Fig. 5 (A) Anterolateral thigh flap with vascularized fascia as an extension following anastomosis to facial vessels. (B) Fascia tucked in between glenoid and mandible. (C) Flap inset. (D) Adequate mouth opening at 5-month follow-up.

The condylar resection in three of five cases may appear to be “overkill” for what was largely an extra-articular cause; but in two of five cases following infection, resection of condyle permitted a further increase of 10 to 14 mm in mouth opening, than with coronoidectomy alone. The threshold of 30 mm during surgery was imperative to set the stage for postoperative therapy.

Rüegg et al¹³ used an aggressive approach for bilateral coronoid excision and free flap coverage (63 of 121 cases) to get statistically better results in noma-related trismus with facial defects; the mean difference in mouth opening was 8.7 mm with a p -value ≤ 0.0001 .

Twenty-one patients with bilateral coronoidectomy and free flaps (unilateral coronoidectomy with local or free flaps) had better mouth opening than the other groups at all times postoperatively.

Conclusion

The use of the ALT flap for skin coverage in defects of the temporo-orbito-zygomatic region may be needed for the sequelae of trauma and infection; the availability of vascularized fascia permits its use for interposition following release for the treatment of trismus in extra-articular ankylosis. Excision of the condyle should be considered if the mouth opening achieved by scar and coronoid excision is less than 30 mm. This allows unhindered therapy in the postoperative period and good maintenance of mouth opening in the long term regardless of patient compliance and follow-up. Deviation during attempted mouth opening without malocclusion is a side-effect to be kept in mind.

Conflict of Interest

None.

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