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LIMBERG FLAP FOR FOREHEAD RECONSTRUCTION: CASE REPORT
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SUMMARY

The Limberg flap, a versatile transposition flap defined by Professor Alexander Limberg, is used to cover adjacent defects. This case report presents the application of the Limberg flap for a forehead wound in a 3-month-old female bitten by an unknown animal. Initial wound care included irrigation, debridement, and antibiotic prophylaxis. The reconstruction, aimed at optimal cosmetic and functional outcomes, involved careful consideration of defect characteristics and patient factors.

INTRODUCTION

The Limberg flap is a simple yet effective transposition flap combining rotation and advancement to cover defects adjacent to its pedicle (1–4). This transposition flap relies on the skin's laxity near the defect. Adjacent tissues and facial anatomy can complicate flap placement. It is not ideal for patients with low body mass index or limited skin. A large defect is a relative contraindication.

The Limberg flap is used in areas like the eyelids, cheeks, nose, lips, and pilonidal disease. It is a random-pattern flap, with blood supply from the subdermal plexus (2,3).

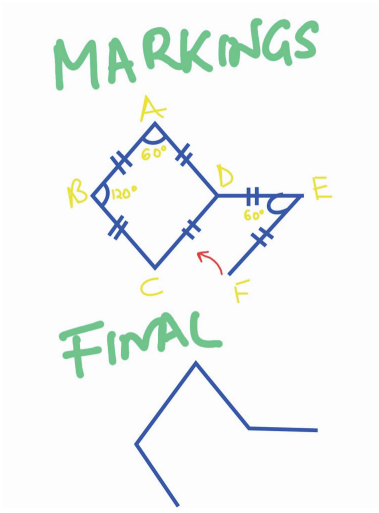

Figure 1: Markings.

The rhombus design comprises two equilateral triangles, with a line joining the two triangles extending out an equal length as the legs of the equilateral triangle; from extension at 60 degrees, we create another leg. The width of the flap is 60% of the length of the flap (Figure 1).

Curved lines allow closure with less tension; the Duformental and Webster are other modifications that use fewer tissues (2,3,5). We present a case of a non-cancerous forehead wound covered by the Limberg flap.

CASE PRESENTATION

We describe a 3-month-old female presenting with a forehead and nose bite from an unknown animal, arriving 4 hours post-incident. She had no significant medical history and was up to date on vaccinations per the Kenya Expanded Programme Immunisation (KEPI) guidelines. Her parents, a stay-at-home mother and a mechanic without formal health insurance, were absent during the incident.

On examination, a full-thickness forehead avulsion superior to the left eyebrow was noted, measuring about two by 3 cm with exposed bone but no necrotic tissues. The wound had well-defined edges that were not attached to the wound base, no peripheral tissue oedema or induration, and no associated fractures. The wound was cleansed and dressed daily with

mupirocin and hydrogel. Anti-rabies vaccination was initiated.

Haematological tests showed leucocytosis, neutrophilia, lymphocytosis, monocytosis, and anaemia. Treatment included IV flucloxacillin 150 mg QID, metronidazole 45 mg TDS, ceftriaxone 300 mg OD, and a 70 mLs of packed red blood cells transfusion, aiming for a haemoglobin level of 12 g/dL.

After resolving leucocytosis and anaemia, a transpositional flap for the forehead defect was planned. The wound measured two by one cm at surgery with granulation tissue and exposed bone (Figure 2).

Figure 2: Forehead wound.

Figure 3: Rhomboid-shaped defect.

We marked a rhombic skin area over the defect; the incisions extend through the full thickness of the skin and subcutaneous tissue (Figure 3). The flap is elevated in the loose areolar plane and transposed to cover the midline rhomboid defect. Deep absorbable sutures secured the flap over the defect, and then the skin was closed by interrupted non-absorbable sutures (Figure 4). We dressed the wound with paraffin tulles.

Figure 4: Skin closed in layers

Figure 5:Healed with sutures

The patient was discharged for follow-up in the plastic surgery clinic, with plans for possible nasal reconstruction at six months (Figure 5).

DISCUSSION

In Kenya, young adults are most at risk for maxillofacial soft tissue injuries, with domestic abuse being a significant cause. Animal bites, particularly from dogs, are less common but still notable (6). The median age of animal bite patients is 22 years, with a slight male predominance. Dogs were the biggest offenders, and most were stray. Most patients present after 48 hours (7).

Early wound management principles include irrigation, debridement, antibiotic prophylaxis, and appropriate closure timing (8). In this case, primary closure was delayed, reducing the infection risk.

Factors such as defect size, location, patient health, and surrounding tissue condition guided the reconstruction approach.

In children, dog bites account for most animal bites, with the craniofacial region being particularly vulnerable due to children's low stature, the propensity to crawl/play on the ground and exploratory behaviour, with most sequelae infections caused by Pasteurella multocida. Prevention strategies include vigilant oversight of interactions between children and animals, public education on responsible pet ownership, stricter animal control regulations, and improved reporting of bite incidents (8,9).

The defect's features (size, location, and depth) and patient factors (such as overall health and parental preferences) are crucial in guiding reconstruction. For this case, healing by secondary intention was not considered due to the introduction of bacteria by the bite. The surrounding tissues also influenced the reconstruction approach. With the eyebrow in proximity, the intention was to "hide" the scar along the suprabrow and avoid disrupting fixed aesthetic structures. Additionally, it was essential to avoid disruption of the facial nerve's frontal branch and ensure that sutures did not constrict blood flow to hair follicles.

The loss of pericranial tissue meant that a skin graft could not be supported by bone, necessitating a local flap. Local flaps provide a great colour and texture match, making them an excellent choice for facial defects (10). We aimed for excellent results with a Worthen, hatchet, or rhomboid flap. Due to the patient's young age and lack of rhytids, we avoided an advancement H flap and bilobed flaps to prevent noticeable scarring. Pedicled or free flaps were not considered due to the defect's small size.

The Limberg flap, known for its use in pilonidal sinus disease (3,4) and facial skin cancer excision wound coverage, is an ideal option for full-thickness defects.

The Limberg is known for pilonidal sinus disease (3,4) and facial skin cancer excision wound coverage (2,5). The flap places the longitudinal axis of the rhomboid parallel to the line of minimal skin tension. For full-thickness defects, it is a great option. Its simplicity, reliability, and versatility make it an essential tool in the armamentarium of reconstructive surgeons (2).

Given the limited literature on Limberg flap coverage for forehead reconstruction, this case offers evidence suggesting its potential application. We hope this serves as a nidus for large-scale randomized controlled trials and long-term follow-up studies to delineate efficacy and improve the Limberg flap forehead reconstructive surgery techniques as has been done for pilonidal disease (4). More importantly, the clinical epidemiological management and outcome patterns of animal bites in African children remain relatively unexplored.

CONCLUSION

The Limberg flap proves to be a valuable option for forehead reconstruction, as demonstrated by its successful use in this case. Early wound management, including irrigation, debridement, and antibiotic prophylaxis, is crucial, especially for animal bites. The flap's potential for forehead reconstruction warrants further investigation to enhance its utility in reconstructive surgery

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