P-ISSN: 2548-5962
E-ISSN: 2548-981X
https://ojs.unud.ac.id/index.php/jbn

CASE REPORT

Facial and Lip Reconstruction due to Animal Bite with Local Advancement Flap and Estlander Flap: A Case Series

Detritha Sarasmartha Putri[1], I Gusti Putu Hendra Sanjaya[2], Agus Roy Rusly Hariantana Hamid[2], Shita Diwyani Sudarsa[2], Astrinita Lestari Suyata[2], Gede Wara Samsarga[2]

[1]Resident of Plastic Surgery Reconstruction and Aesthetic Division, IGNG Ngoerah General Hospital, Denpasar, Bali
[2]Division of Plastic Surgery Reconstruction and Aesthetic, IGNG Ngoerah General Hospital, Denpasar, Bali

*Corresponding author: detrithamartha@gmail.com

ABSTRACT

Aim: to present a consecutive series of patients with facial and lip injuries secondary to animal bites who underwent reconstruction using local advancement flaps and Estlander flaps. **Case:** This case series reports three patients with facial and lip defects following dog bites: a 41-year-old female with an open degloving wound up to 10 x 3 cm involving the right upper and lower eyelids with partial loss of upper lateral cartilage and inner lining of nasal mucosa and complete loss of lower lateral cartilage managed with local advancement flap followed by planned alarplasty and rhinoplasty; a 23-year-old male with a full-thickness defect at the lateral one-third of the upper lip with 5 x 1.5 cm soft tissue loss; and a 7-year-old girl with a full-thickness defect at the lateral one-third of the upper lip with 3 x 1 cm soft tissue loss, both managed with Estlander flap. All surgeries went uneventful without significant complications, and three-months follow-up showed viable flaps with satisfactory aesthetic and functional outcomes in all patients. **Conclusion:** Estlander flap can be used for primary lip reconstruction, defects at the oral commissure, and reconstruction of defects ranging from one-third to two-thirds of the lip, including the corner of the mouth, making it an excellent alternative for preserving facial aesthetics and function in facial and lip injuries caused by dog bites.

Keywords: Dog Bites, Facial Injuries, Estlander flap, Local flaps.
DOI: https://doi.org/10.24843/JBN.2026.v10.i01.p04

INTRODUCTION

Animal bites represent a significant public health concern globally, with an estimated 4.5 million of dog bites and 400,000 cat bites incidents occurring annually in the United States alone.[1] While bites from domesticated animals such as dogs and cats are more common, encounters with wild animals can result in severe injuries, particularly to the face and lips.[2] These injuries can lead to tissue loss, lacerations, avulsions, and deformities that may compromise facial aesthetics, oral competence, speech, and swallowing.[3] Animal bites, particularly those affecting the facial and lip regions, pose unique challenges in terms of reconstruction due to the complex anatomy and functional importance of these areas. Facial and lip injuries resulting from animal bites often require meticulous surgical techniques to restore both aesthetic appearance and functional integrity.[4,5]

The reconstruction of facial and lip defects following animal bites requires a thorough understanding of facial anatomy, wound healing principles, and surgical techniques.[6] Local tissue rearrangement using advancement flaps and regional flaps such as the Estlander flap offers reliable options for repairing soft tissue defects in these areas.[7] Local advancement flaps utilize adjacent healthy tissue to cover the defect while preserving vascular supply and minimizing donor site morbidity.[8] The Estlander flap, a

transposition flap based on the principle of replacing like with like, provides an effective means of reconstructing larger defects involving the lip and adjacent facial regions.[9]

In this case series, we present a consecutive series of patients with facial and lip injuries secondary to animal bites who underwent reconstruction using local advancement flaps and Estlander flaps. We describe the surgical techniques employed, postoperative outcomes, and aesthetic and functional results achieved in each case. By sharing our experience and outcomes, we aim to contribute to the body of knowledge regarding reconstructive options for facial and lip injuries caused by animal bites and highlight the effectiveness of local advancement flaps and Estlander flaps in this context.

CASE REPORT

We presented three cases of facial and lip injuries due to dog bites who underwent reconstruction in our hospital (Table 1). All of the dogs were pets who have been vaccinated. One case is male while the other two cases are female. The age range is from 7 to 41 years old. One case was treated using local advancement flaps because the injury located at eyelid while the other two were treated with Estlander flaps because the injuries were located at the lip. All patients were given rabies vaccine, ceftriaxone antibiotics, human tetanus immunoglobulin, and paracetamol and ketorolac as analgesic.

Table 1. Clinical characteristics, reconstructive techniques, and 3-month outcomes of facial and lip injuries due to dog bites.

Case number	Sex	Age (years)	Diagnosis	Flap	3-months outcomes
1	F	41	Open degloving wound sized up to 10 x 3 cm at right upper and lower eyelid, partial loss of upper lateral cartilage and inner lining of nasal mucosa, and complete loss of lower lateral cartilage	Local advancement flap	The flaps were still viable and the patients were satisfied
2	M	23	Full thickness defect at lateral one-third of upper lip with soft tissue loss size 5 x 1.5 cm	Estlander myomucosal flap	The flaps were still viable and the patients were satisfied
3	F	7	Full thickness defect at lateral one-third of upper lip with soft tissue loss size 3 x 1 cm	Abbe-Estlander flap	The flaps were still viable and the patients were satisfied

F female, M male

Case 1

The first case is a 41-year-old female presented with open wounds on the upper and lower right eyelids, cheeks and nose after being bitten by the patient's pet dog 2.5 hours before admission. The patient was feeding the dog when suddenly she was bitten. There was a history of bleeding from nose. The patient's dog has been vaccinated. There was no history of systemic disease or allergy. The patient was diagnosed with open degloving wound sized up to 10 x 3 cm at right upper and lower eyelid, partial loss of upper lateral cartilage and inner lining of nasal mucosa,

and complete loss of lower lateral cartilage (Figure 1A). The patient was managed with emergency debridement, tissue vitality test, and reconstruction for closing defect with local advancement flap. The wound was treated with moist lidocaine gauze and bandage, and the patient was for maintained in 300 head-up position. Three-months follow-up revealed that the flap was still viable and the patients were satisfied with the result. The flap have the same color and skin texture as the defect (Figure 1B).

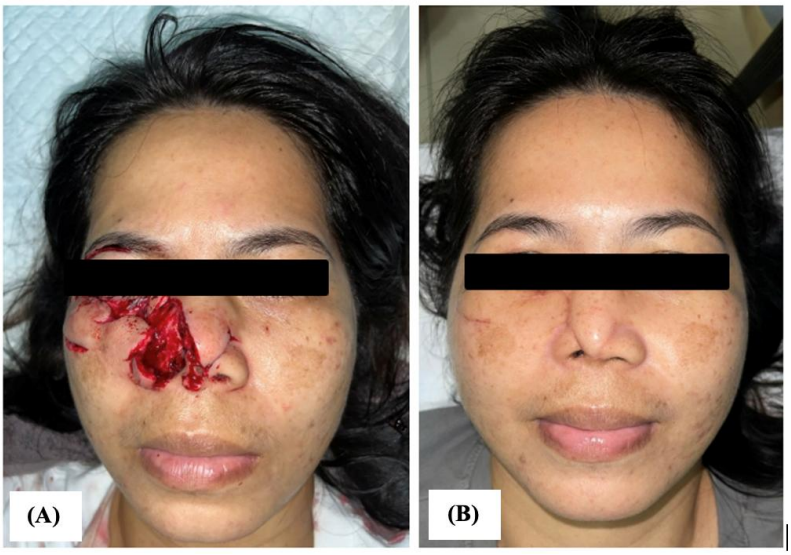

Figure 1. (A) 41-year-old female with open wounds on the upper and lower right eyelids, cheeks and nose after being bitten by dog, (B) 3 months after close defect reconstruction with local advancement flap.

Case 2

The second case is a 23-year-old male presented with pain in the upper and lower lips after being bitten by the patient's pet dog 5 hours before admission. The patient was kissing the dog's lips, then the dog suddenly bit the patient's upper lip. History of other trauma, systemic disease, or allergy were denied. The patient was diagnosed with full thickness defect at lateral one-third of upper lip with soft tissue loss size 5 x 1.5 cm (Figure 2A). We performed debridement and close defect reconstruction with Estlander Myomucosal Flap (Figure 2B). Three-months follow-up revealed that the flap was still viable and the patients were satisfied with the esthetic and functionality of the flap (Figure 2C). The speech and eating function of the patient was not disturbed.

Case 3

The third case is a 7-year-old girl who was bitten in the upper lip when was playing with her pet dog. History of other trauma, systemic disease, or allergy were denied. The patient was diagnosed with with full thickness defect at lateral one-third of upper lip with soft tissue loss size 3 x 1 cm (Figure 3A). We performed debridement and close defect reconstruction with Abbe-Estlander Flap (Figure 3B). Three-months follow-up revealed that the flap was still viable and the patients were satisfied with the esthetic and functionality of the flap (Figure 3C). The speech and eating function of the patient was not disturbed.

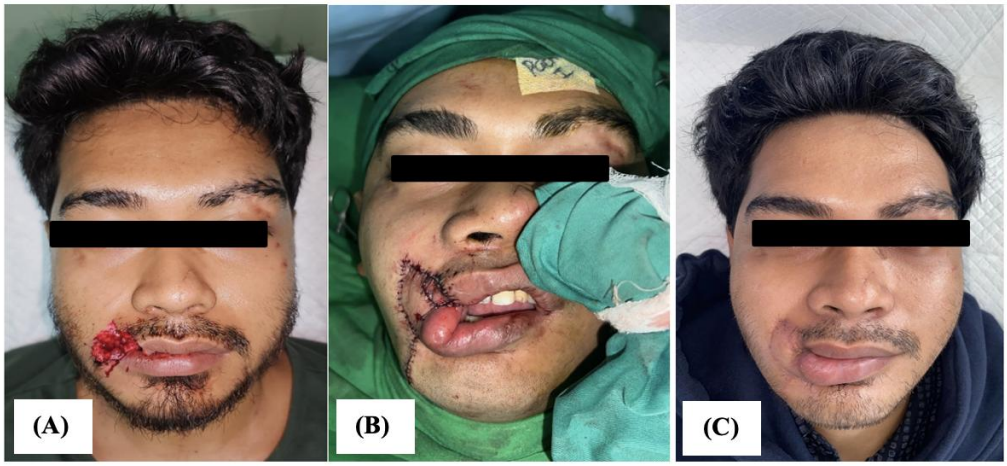

Figure 2. (A) 23-year-old male with full thickness defect at lateral one-third of upper lip with soft tissue loss due to dog bite, (B) after close defect reconstruction with Estlander flap, (C) 1-month follow up.

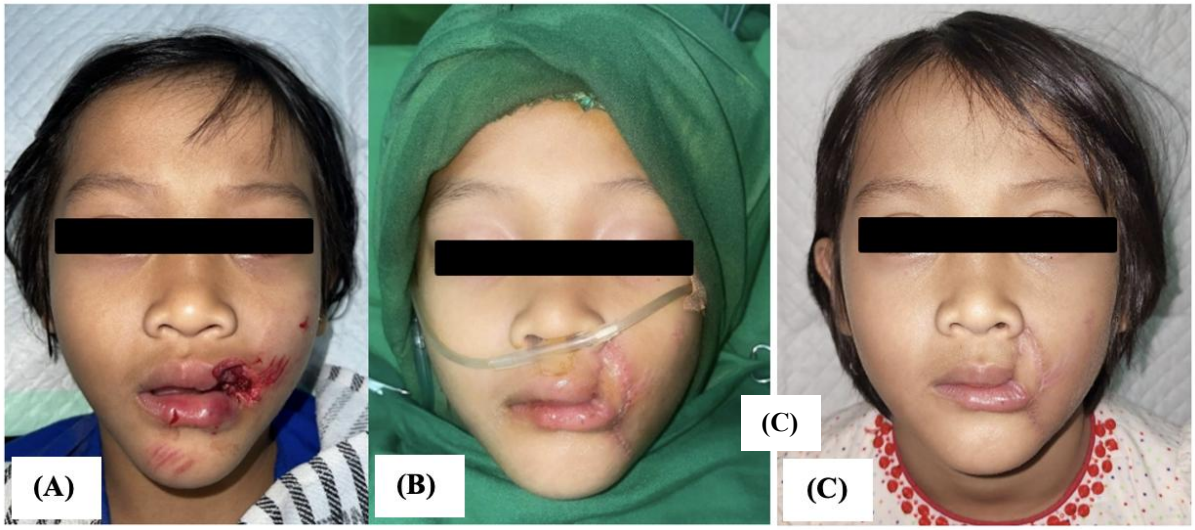

Figure 3. (a) 7-year-old girl with full thickness defect at lateral one-third of upper lip with soft tissue loss due to dog bite (b) after close defect reconstruction with Abbe-Estlander flap, c) 1-month follow up

DISCUSSION

A local advancement flap is a surgical technique used in plastic and reconstructive surgery to repair defects in the skin or soft tissues of a specific area by mobilizing adjacent healthy tissue. This technique involves transferring tissue from an adjacent region to cover the defect while maintaining its blood supply. The procedure begins by identifying healthy tissue adjacent to the defect that can be mobilized without compromising the blood flow to the area. The tissue is then dissected and moved into the defect site, where it is sutured into place. The donor site may be closed primarily or left to heal by secondary intention, depending on the size and location of the defect. Local advancement flaps are commonly used for repairing small to moderate-sized defects. They offer several advantages, including minimal donor site morbidity, preservation of local tissue characteristics, and a relatively straightforward surgical technique.[8,10,11]

Estlander flap is usually used to reconstruct defects in the lip and adjacent facial regions. This flap technique was first described by a Finnish surgeon named Victor Estlander in the late 19th century. The Estlander flap involves the transposition of tissue from the adjacent upper or lower lip to

reconstruct a defect in the opposite lip. It is commonly used for repairing moderate to large-sized defects that cannot be closed primarily or with local advancement flaps alone. The procedure begins with careful planning and marking of the flap design based on the size and location of the defect. The tissue is then dissected and mobilized from the donor lip, taking care to preserve the blood supply to the flap. Once mobilized, the flap is transposed across the defect and sutured into place, creating a natural-looking lip contour. The Estlander flap offers several advantages, including the ability to reconstruct larger defects, excellent tissue match and color match, and preservation of lip function, including speech, swallowing, and oral competence. However, it may be associated with some limitations, such as potential distortion of the lip anatomy and the need for multiple surgical stages in complex cases.[9,12,13]

Abbe-Estlander flap is a modification of the Estlander flap, combining elements of both the Abbe flap and the Estlander flap techniques. Abbe flap was named after American surgeon Robert Abbe. It involves the transposition of tissue from the upper lip to reconstruct a defect in the lower lip. It is commonly used for repairing defects of the lower lip, particularly those involving the vermilion border and oral commissure. The Abbe flap preserves the continuity and function of the upper lip while providing tissue for reconstruction of the lower lip.[13]

Local advancement flaps involve the mobilization of adjacent healthy tissue to cover the defect, while Estlander flaps utilize transposition flaps to reconstruct larger defects involving the lip and adjacent facial regions. By preserving vascular supply and minimizing donor site morbidity, both techniques offer reliable options for soft tissue reconstruction in the facial and lip regions.[8] Our case series demonstrates favorable aesthetic and functional outcomes following reconstruction with local advancement flaps and Estlander flaps. Patients achieved satisfactory cosmetic results with improved symmetry, contour, and oral competence. Functional outcomes such as speech articulation, swallowing, and facial expression were also preserved or improved postoperatively.

Alvarez *et al.* reported the use of Abbe-Estlander flap in two cases of dog bites. Abbe-Estlander flap was able to close >50% defect in upper lip, lower lip, and commissure. Two-months follow up showed acceptable wound healing and the patients were happy with the result. However, the mucocutaneous rim was not aligned and the commissure was rounded. The patient still experienced intermittent liquid leakage and partial closure.[14] Our case had better results than the case of Alvarez *et al.* because the defect in our case were only 1/3 lateral defect, while in Alvarez *et al.* reached more than 50%. Ogbonnoya and Olaitan also reported the use of Abbe-Estlander flap to cover defect in the face after dog bite. Two weeks after the surgery, the wound healed completely without any complications.[15]

All patients in our cases were given ceftriaxone antibiotics, human tetanus immunoglobulin, and rabies vaccine to prevent infection. However, the standard for infection management in animal bite wounds is still controversial. Some authors believe that routine prophylaxis antibiotic is unnecessary in face bite wounds. Others report using broad-spectrum antibiotics in every incidence of animal bite. In retrospective study of 111 cases by Maurer *et al*., 90% of animal bite patients were given prophylaxis antibiotic, mostly Amoxycillin with clavulanic acid.[6]

While our series predominantly reflects positive outcomes, it is essential to acknowledge potential complications and considerations associated with facial and lip reconstruction. These may include wound dehiscence, flap necrosis, scar contracture, and sensory disturbances. Careful patient selection, meticulous surgical technique, and postoperative monitoring are essential to minimize the risk of complications and optimize outcomes.[8]

CONCLUSION

In conclusion, the utilization of local advancement flaps and Estlander flaps for facial and lip reconstruction following animal bites offers reliable and effective solutions for achieving favorable outcomes in terms of both aesthetics and function. The Estlander flap can be used for primary lip reconstruction, defect in the corner of the mouth, and reconstruction of defects ranging from 1/3rd to 2/3rd of the lip including the commissure, while local advancement flaps can be used for repairing small to moderate-sized defects

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the surgical, nursing, and emergency teams involved in the acute management, reconstruction, and follow-up of these patients, as well as to the institution for its continuous support of clinical and academic activities.

DISCLOSURE

The authors declare no conflict of interest related to this case series.

REFERENCES

1. Bula-Rudas FJ, Olcott JL. Human and animal bites. *Pediatr Rev*. 2018;39(10):490-500.
2. Sikka N, Jayam C, Choudhary RS, Bala S. Animal bite in a 6-month-old child and facial injury with associated unusual nasal injury: management of injuries along with 1-year follow-up. *Int J Clin Pediatr Dent*. 2019;12(6):560-5.
3. Chhabra S, Chhabra N, Gaba S. Maxillofacial injuries due to animal bites. *J Maxillofac Oral Surg*. 2015;14(2):142-53.
4. Mendoza JM, Chi JJ. Reconstruction of animal bite injuries to the head and neck. *Curr Opin Otolaryngol Head Neck Surg*. 2019;27(5):407-12.
5. Chávez-Serna E, Andrade-Delgado L, Martínez-Wagner R, Altamirano-Arcos C, Espino-Gaucín I, Nahas-Combina L. Experience in the management of acute wounds by dog bite in a hospital of third level of plastic and reconstructive surgery in Mexico. *Cir Cir*. 2019;87(5):528-39.
6. Maurer M, Schlipköter C, Gottsauner M, *et al*. Animal bite injuries to the face: A retrospective evaluation of 111 cases. *J Clin Med*. 2023;12(21).
7. Turner B, Collin J, Fernandes R. Soft Tissue reconstruction of the maxillofacial region BT - oral and maxillofacial surgery for the clinician. In: Bonanthaya K, Panneerselvam E, Manuel S, Kumar V V, Rai A, eds. *Springer Nature Singapore*; 2021:1941-67.
8. Chung KC. Grabb and Smith's Plastic Surgery. Eighth ed. *Wolters Kluwer Philadelphia*; 2020.
9. Correia Duarte M, Nikkhah D, Kang N. The neurotised estlander flap for lip reconstruction. *JPRAS open*. 2021;27:63-5.
10. Rao JK, Shende KS. Overview of local Flaps of the face for reconstruction of cutaneous malignancies: single

institutional experience of seventy cases. *J Cutan Aesthet Surg*. 2016;9(4):220-5.
11. Chang JW, Lim JH, Lee JH. Reconstruction of midface defects using local flaps: An algorithm for appropriate flap choice. *Medicine (Baltimore).* 2019;98(46):e18021.
12. Eggerstedt M, Smith R, Revenaugh P. Estlander flap for lip reconstruction. *Oper Tech Otolaryngol Neck Surg*. 2020;31.
13. Husein-ElAhmed H, Armijo-Lozano R. Lower lip reconstruction using a skin-mucosa Abbe-Estlander flap after squamous cell carcinoma excision. *An Bras Dermatol*. 2017;92(2):260-2.
14. Alvarez N, Orozco Grados J de J, Chavez Serna E, *et al*. Versatility of the estlander flap: upper lip, lower lip and comissure reconstruction due to a dog bite. *Int J Res Med Sci*. 2019;7:2428.
15. Ogbonnaya IS, Olaitan PB. Dog bite of the face in an adult Nigerian--a case report. *Niger J Med*. 2005;14(1):95-6.