

Nasal Reconstruction by Expanded Forehead Scalping Flap: Case Report with Literature Review

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Summary: Nasal reconstruction is a difficult and complex surgery due to highlights and shadows of three-dimensional central structure of the face. Similarity of tissues, units–subunits, and invisibility of the scar are very important principles for reconstruction. In this case report, we present reconstruction of subunits of the nose by an expanded forehead scalping flap in a 12-year-old boy, whose tip and columellar subunits had been avulsed by a dog bite, in a hidden scar manner. (*Plast Reconstr Surg Glob Open* 2022;10:e4199; doi: [10.1097/GOX.0000000000004199](https://doi.org/10.1097/GOX.0000000000004199); Published online 17 March 2022.)

Nasal reconstruction is a difficult and complex surgery due to the three-dimensional central structure of the face.^{1,2} Although highlights and shadows of this central unit of the face reconstruction are very important, many complexities and details should be considered.³ There are many techniques for nasal reconstruction, such as composite auricular graft, forehead flap, scalping flap, washio flap, and free flap.^{4–17} The double “S” principle is critical, where the first “S” refers to similarity of tissues, and the second “S” refers to the subunits–units principle for reconstruction.^{6,7} Although the technique of reconstruction and similarity of tissues are very important, the donor site morbidity and scar should be considered as important items.⁸ Choosing a proper technique for reconstruction, especially in children due to a lack of excess tissue and wrinkles, is very important. There are many published techniques for nasal reconstruction, with most of them utilizing the forehead flap.^{3,6,11,12} Some articles have also reported the use of forehead tissue as scalping or scalping forehead flaps for nasal reconstruction.^{13–17} In all types of forehead or scalping flaps, remaining vertical scars or skin graft scars in donor sites are perpendicular to minimal tension lines. We only found one article, by Zuker et al, reporting nasal reconstruction in a child using an expanded forehead scalping flap without any obvious scar in the forehead.⁸ In our opinion, this neglected technique has potential for widespread use in nasal reconstruction,

especially to prevent any visible scars in the forehead area. In this article, we present the case of a 12-year-old boy where we used an expanded forehead scalping flap for reconstruction of the tip and columellar subunits that had been avulsed due to a dog bite, and provide a concise literature review.

CASE REPORT AND TECHNIQUE

A 12-year-old boy whose nasal tip and columella had been avulsed due to a dog bite 2 years prior was admitted. After the accident, his wound was managed with systemic antibiotics and daily dressing changes. After 12 days, his wound was temporarily covered using a thick split skin graft from the anterior thigh, by the previous surgeon. He was referred for the tip and columellar reconstruction 2 years after the accident and the unmanaged temporary skin graft.

Surgical Technique

A 50 cm³ rectangular tissue expander (TE) was inserted subgaleally into a pocket in the left frontotemporal area. To choose the best incision site for TE insertion, we considered two important items. The first one was the direction of the frontal branch of the superficial temporal artery, which was determined by color Doppler (Model 701; Newman Medical, Arvada, Colo.). The second item was the cephalic border of the potential expanded flap that would be designed in the future; then, we put the incision there for abstinence of multiple scars. After adequate expansion for 3 months, an expanded flap with proper design, incision, and dissection was transposed to the tip and the columella for reconstruction of these subunits. The distance between the eyebrow and the hairline

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Disclosure: The authors have no financial interests to declare in relation to the content of this article.

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on the right side was determined, and the same distance on the left side was considered, and then the line of incision was drawn. (See Video [online], which displays on-site accessory video content created by serial photographs of the nasal reconstruction by expanded forehead scalping flap.) A template of the defect was prepared 10% larger than the defect considering the above-mentioned items, and the distal part of the flap was designed and transposed to recipient areas. The dissection was performed meticulously and cautiously (the remaining capsule of the TE above it) with frequent control of blood supply to the distal margin of the flap. After control and assurance of the distal margin blood supply, the TE and capsule were removed. (See Video [online].) The TE and capsule were preserved during dissection due to uncertainty about the adequate circulation to the distal end of the flap. If any impairment of circulation during dissection was observed, a delay strategy would be selected. After that, the conchal cartilage was harvested, and the previous skin graft on the tip and columella was removed. We inserted a columellar strut graft and then the columella and tip were recreated using the harvested cartilage graft. (See figure 1, Supplemental Digital Content 1, which displays recreation of lower lateral cartilages by conchal cartilage graft. <http://links.lww.com/PRSGO/B968>.) Consequently, the flap was transported for coverage and reconstruction of the tip and columellar subunits. Fifteen days later, the pedicle of the flap at the proper location was divided, and the remaining tissues of the flap were returned to the temporo-frontal donor site (See Video [online].) (See

figure 2, Supplemental Digital Content 2, which displays final postoperative photograph of inseting of the flap in recipient and donor sites [transverse incision in hair line]. <http://links.lww.com/PRSGO/B969>). Finally, the scar of the forehead incision was transverse and was in the junction of the hair bearing and nonhair bearing areas (Figs. 1, 2). If any vellus hair or anecdotal hair follicles remain after operation it can be easily removed by hair removal laser. In this study, the principles outlined in the Declaration of Helsinki have been followed. (See Video [online].) (See figure 1, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/B968>) (See figure 2, Supplemental Digital Content 2, <http://links.lww.com/PRSGO/B969>.)

DISCUSSION

There are many techniques with different indications, capabilities, and results for nasal reconstruction, such as composite auricular graft, forehead flap, scalping flap, washio flap and free flap.⁴⁻¹⁷ In children, nasal reconstruction with a forehead flap has been used with good advantages¹¹ but the skin graft scar or the vertical scar in expanded forehead cases, especially in darker skinned patients, is a problem. Converse¹³ reported use of the scalping forehead flap for nasal reconstruction for the first time. Because of the good quality and the color match of forehead skin, it is one of the best options for total and subtotal nasal reconstruction.¹³⁻¹⁷ It can even be used for extensive defect of coverage and lining.¹⁶ The

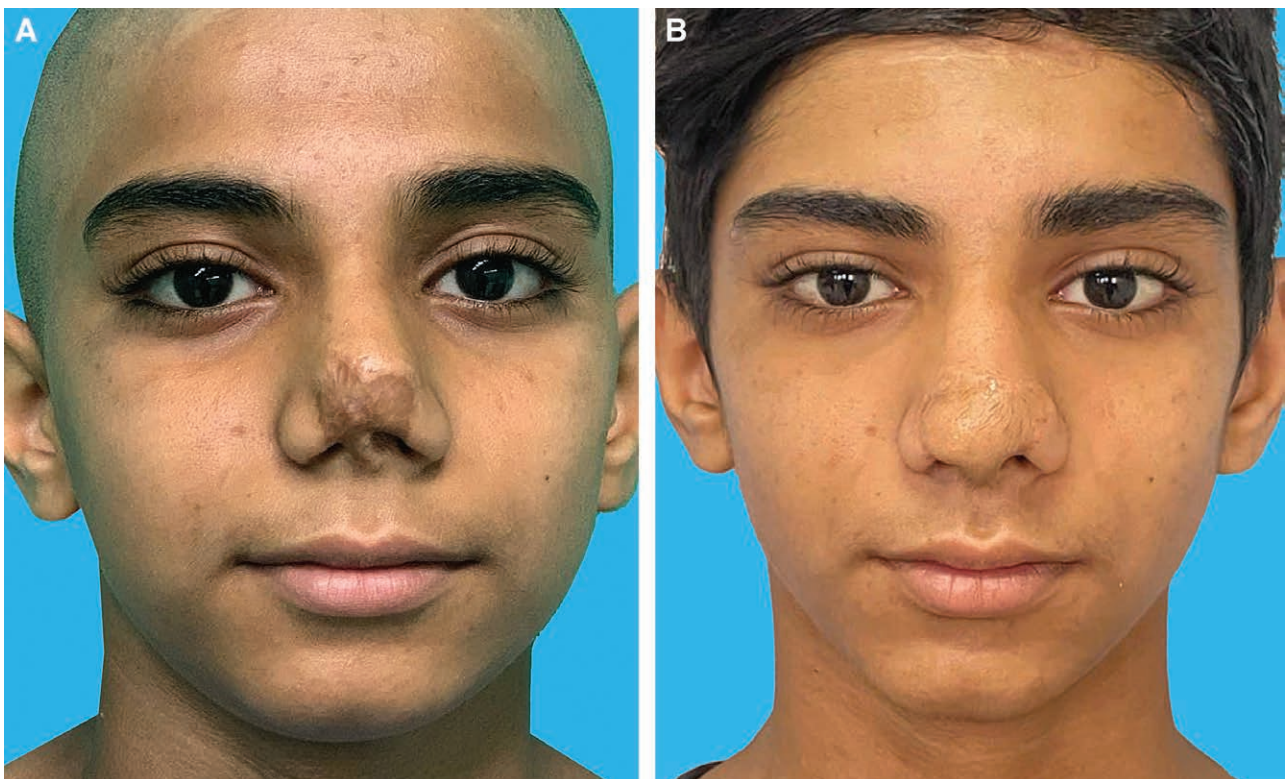


Fig. 1. A, Preoperative photograph of a 12-year-old boy 2 years after a dog bite injury and skin graft. B, Postoperative photograph 6 months after reconstruction by expanded forehead scalping flap, with no visible scar on the forehead area (frontal view).

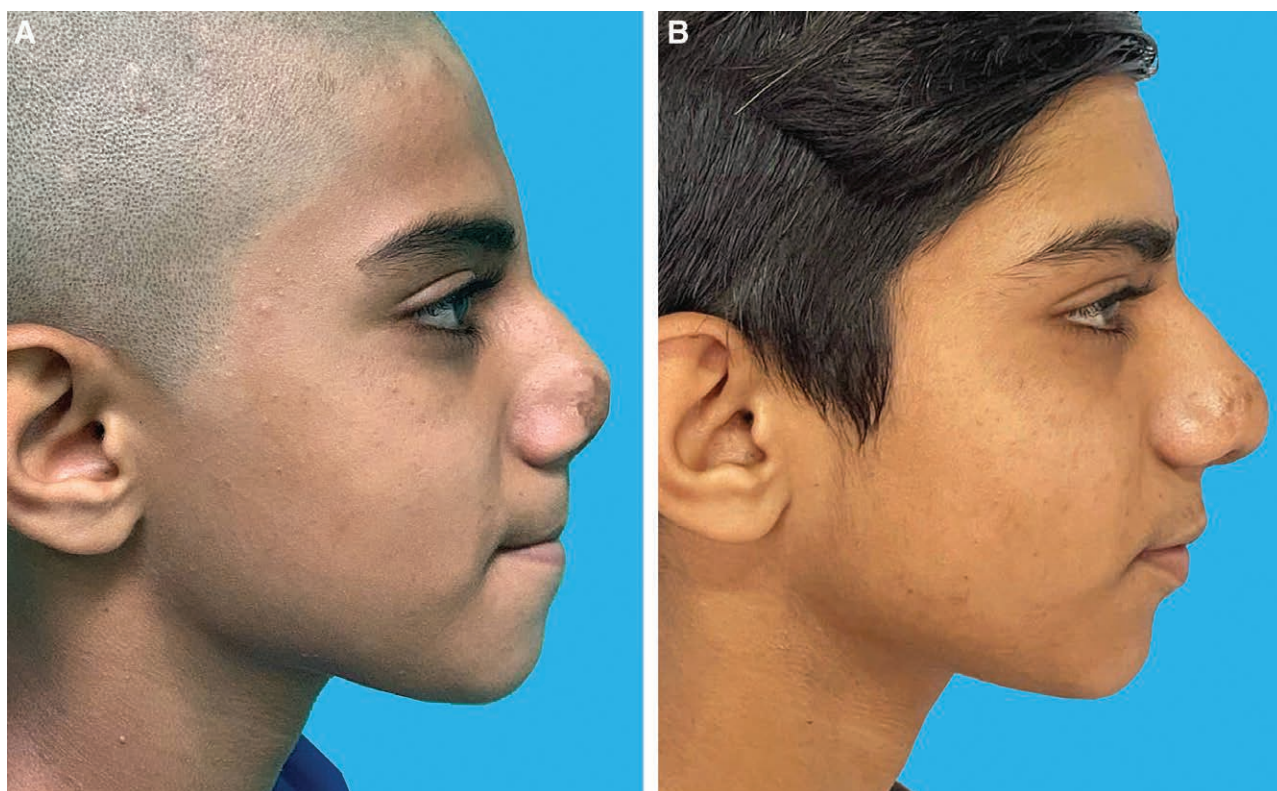


Fig. 2. Preoperative (A) and postoperative photograph (B) of the same patient in Figure 1, 6 months after reconstruction (profile view).

expanded forehead scalping flap has been reported by Zuker et al⁸ as a new method for nasal reconstruction without any visible scar in the forehead. After that, there have been no further reports of this technique. We did not even notice this case report in the initial investigations, in which we were looking for a technique of nasal reconstruction with an invisible scar on the forehead; however, during writing of the article, with further investigation, we found it. We widely explored the literature and did not find any reason for neglecting this good surgical method. The sessions for surgery are the same as the expanded forehead flap, with the advantage that there is no vertical scar. The use of forehead tissue as an expanded scalping flap for nasal reconstruction without obvious scars, especially vertical ones, is very important in children and adults. In our patient, after avulsion of the tip and columellar subunits due to a dog bite injury, conservative management was followed by skin grafting. Preliminary stages for nasal reconstruction, such as skin grafting after trauma, which was previously mentioned,¹⁸ are very important. Subsequently, we used subgaleal TE for expansion of the forehead tissue to use it as a transposition flap to reconstruct the tip and columellar subunits. Harvested conchal cartilage was used for structural reconstruction of the tip and columella. It can stabilize the nasal structure and prevent scar contracture and shrinkage, with a better tip definition. Six months after the pedicle division and returning the remaining tissues of the flap to the donor site, there was only a minimal transverse hairline scar that was inconspicuous. We performed the

surgery for this patient by our decision and design; the technique and its possible advantages and disadvantages were explained to the patient and his parents.

CONCLUSION

In children and adults (especially in those who are darker skinned), planning a strategy for expansion of the forehead tissue in this manner and total or subtotal nasal reconstruction without obvious and visible scars seems to be logical and can also be recommended.

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PATIENT CONSENT

Parents provided written consent for the use of the patient's image.

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