

Case Report

Free radial artery forearm flap reconstruction of forehead defect in a 2-year-old child

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ABSTRACT

Reconstruction of soft tissue defect with exposed bone over the forehead is a technical challenge in pediatric population. The options vary from skin grafting, local flaps to complex microvascular tissue transfer. The local flaps leave unsightly scar in the neighboring area and may violate the hair bearing scalp, hair line and the direction of hair. Skin grafting requires a vascular bed for its take and the aesthetic appearance is inferior. The tissue expansion in an acute stage may not be an option. Here we present our experience of soft tissue reconstruction of a forehead defect in a 2-year-old child with free radial forearm flap (RAFF). To best of our knowledge free radial forearm flap has rarely been reported for usage in reconstruction of forehead defect in pediatric population.

Keywords: Free radial artery forearm flap, Pediatric, Forehead defect

INTRODUCTION

The reconstruction of the scalp and forehead defects are not simple to tackle since the aesthetic restoration is a major criterion. The options vary from simple skin grafting to complex tissue expansion and free tissue transfer. Skin grafting requires a vascular bed. One of the options is tissue expansion and the role of expansion is limited in acute stage, and small defects may be managed by acute tissue expansion method. Next option of reconstruction is local flaps in the form of transposition or rotation flap, but they may violate the hair bearing scalp, hair line and direction of the hair and may leave unsightly scar. The advent of free tissue transfer to the field of head and neck reconstructive surgery has greatly expanded the repertoire of techniques available for treating defects of the scalp and forehead.¹ Experienced surgical team and good facilities for microvascular surgery are the most important factors to obtain good results. Free flap reconstruction has rapidly established itself as a desirable and versatile therapy for defects of the scalp, especially in larger and more complex

cases.² Microsurgery in the pediatric population is challenging because of technical difficulties in flaps dissection as well as microsurgical anastomosis. Reconstruction of the forehead defects may become difficult particularly if traumatic injuries are associated with extensive bone and soft tissue defects. Reconstruction using a very thin and pliable free fasciocutaneous flap would be the ideal choice for reconstruction of defect on forehead which is aesthetically very important area.

This case highlights the importance of free tissue transfer in the form of a thin and pliable fasciocutaneous flap for a child for aesthetic reconstruction of forehead.

CASE REPORT

A 2-year-old boy presented to us with a post traumatic forehead defect on left frontal region with exposed underlying skull devoid of periosteum. On examination there was an oval soft tissue defect in the left frontal region reaching up to the midline with exposed skull devoid of periosteum measuring 4.5×2 cm situated 2 cm above the

medial border of left eyebrow (Figure 1). The parents did not want any distortion of the hair or hairline and the option of tissue expansion was not viable since there was a defect devoid of periosteum. Our plan of reconstruction was to transfer an adipo-fascial flap by the means of microsurgery. We considered two options –Radial forearm flap and Anterolateral thigh flap (ALT) for the reconstruction. Since radial forearm flap was thinner and more pliable when compared to ALT flap and could provide a more aesthetic outcome, we proceeded with radial forearm flap with added advantages of color match.



Figure 1: The defect over the left side forehead showing exposed calvarium devoid of periosteum.



Figure 2: Elevated radial artery forearm flap with its vascular pedicle.



Figure 4: Flap inset, immediate post operative.

Superficial temporal artery and two venae comitantes were dissected out in the preauricular region through a separate incision as recipient vessels. Based on the size and shape of defect an oval radial forearm flap measuring 5.5×3cm was planned on left forearm. Under tourniquet control flap

was elevated with radial artery and its venae comitantes and cephalic vein (Figure 2).



Figure 4: Late post-operative picture showing well settled flap with good aesthesis.

Flap inset was given followed by microsurgical anastomosis of flap artery to superficial temporal artery and vines to the superficial temporal veins (Figure 3).

Donor site in left forearm was partly closed primarily in the proximal part and rest of the area was covered by full thickness graft taken from left groin crease. Flap settled well and donor site too healed completely over a period of time (Figure 4).

DISCUSSION

Forehead is aesthetically important area of face. Loss of skin and subcutaneous tissue due to any cause like trauma, burns, tumor extirpation etc. leads to unsightly scar which will cause psychological stress to the patient. Plastic reconstructive surgeons are now able to obtain coverage over the calvaria after the most devastating of defects; however, the challenge to the reconstructive surgeon today is to do so with excellent cosmetic results.

The history of scalp reconstruction parallels developments in plastic surgery techniques. An interesting and detailed history of scalping injuries and their management was described by Koss et al.³ Augustin Belloste, a French surgeon, in 1696 advocated early perforation of bare cranium to allow granulation tissue and subsequent epithelialization.⁴ This was practiced until Netolitzky, in 1871, used skin grafting of the calvaria after the presence of granulation tissue.⁵ The option of skin grafting was not possible in our child since the exposed calvareum was devoid of the periosteum. Multiple authors shortly thereafter demonstrated successful reconstruction with local flaps.⁶ Orticochea published his four-flap technique for large scalp defects in 1967 and revised his technique to the use of three flaps in 1971.⁷ The advantage of local flap is that similar kind of tissue and no microsurgical expertise required. The disadvantages are the scarring of the nearby area and violation of hairline, hair bearing scalp and unsightly scarring of the grafts for the secondary defects. Our patients parents were against using local flap for the defects these disadvantages. Neumann reported the first

clinical use of tissue expansion in 1957 when he expanded the scalp for ear reconstruction.⁸ The tissue expansion is the now recommended treatment for the scalp and forehead defects but its usage in acute tissue defects are limited. In our patient the defects far fairly big for even trying an acute tissue expansion. Advances in microsurgery have also played a significant role in scalp reconstruction.⁹ In 1976 Miller et al. successfully replanted a totally avulsed scalp with return of normal hair growth and frontalis function and use of microsurgical reconstruction of scalp and forehead defects are routinely used nowadays especially in adults.¹⁰ In our case we felt that a thin pliable fasciocutaneous flap will give the best aesthetic outcome and we chose the free RAFF over the ALT flap for its more thin nature and good pedicle length.

CONCLUSION

Free tissue transfer definitely gives superior results in forehead defects and free RAFF is a good choice because of its thin and pliable nature and good color match.

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