CASE REPORT

THE AESTHETIC RECONSTRUCTION OF POST-BURN EYEBROW ALOPECIA WITH BILATERAL SUPERFICIAL TEMPORAL ARTERY ISLAND SCALP FLAP

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Plastic surgeons face unique challenges in reconstructing eyebrows due to their complex anatomy and gender variations. We report a case of a 16-year-old female who presented with post-burn bilateral eyebrow alopecia. Bilateral eyebrow reconstruction was performed with scalp island flaps based on the posterior branch of the superficial temporal artery, which showed good postoperative outcomes. This case showed that the superficial temporal artery island flap continues to be a versatile option for managing eyebrow alopecia, especially in cases of deep burns of the face.

Keywords: Burns; Eyebrow; Alopecia; Flap; Superficial temporal artery

Citation: Suman D, Kumar Y, Tayal A, Nadikuditi S. The aesthetic reconstruction of post-burn eyebrow alopecia with bilateral superficial temporal artery island scalp flap. J Ayub Med Coll Abbottabad 2024;36(2):459–61.

DOI: 10.55519/JAMC-02-12771

INTRODUCTION

Burns to the face occur in one-fourth to one-third of burn patients.[1] Burns to the face can lead to loss of the eyebrows, which can affect the physical and mental health of the patients because eyebrows have a critical functional and aesthetic role on the face.[2] The eyebrows help in the expression of emotions. The lack or disfigurement of the eyebrow can negatively impact the appearance of the face. The normal look of the face is lost in the absence of the eyebrows and the facial reconstruction is incomplete without eyebrow repair. Being a relatively uncommonly performed procedure, there is a lack of evidence on the surgical and technical considerations required to successfully perform the surgery.[2]

Plastic surgeons face unique challenges in reconstructing eyebrows due to their complex anatomy and gender variations. As a general rule, there are three methods for eyebrow reconstruction: superficial temporal artery (STA) island flap, a composite graft from the scalp, and mini or micro follicular grafts from the scalp.[2] Currently, there is inadequate evidence on the efficacy of STA flap in female patients with post-burn bilateral eyebrow alopecia.

CASE REPORT

A 16-year-old female patient presented with complaints of scarring of bilateral cheeks, and nose, a vitiligo patch over the forehead, and loss of bilateral eyebrows (Figure. 1A, B). Her bilateral cheeks, nose, and forehead were resurfaced by a thick split skin graft harvested from the thigh, and the postoperative course was uneventful. Her past, family, menstrual, and personal history were unremarkable. Otherwise, the patient was in good health except she had poor social interactions, and she dropped out of school at the age of 15 due to a dysmorphic injury to her face. She was interested in studying in the future, but she had poor confidence related to her acceptance in the school by other children. She rarely visited her friends or family relatives and avoided taking part in social gatherings for the same reason. Her family was very supportive but they always felt that they needed assistance in building her confidence in society.

Routine blood investigations were done because of pre-anaesthetic clearance for surgery under general anaesthesia. We reconstructed the bilateral eyebrows using bilateral scalp island flaps based on the posterior branch of the STA (Figure. 1C). On the second post-operative day, the dressing was removed, and the flaps showed good vascularity. The postoperative course was uneventful, the patient was discharged on the fifth postoperative day, and the suture removal was done on the seventh day postoperatively. At the 36-month follow-up, the flap had adequate blood supply, and the patient's expectations were achieved with respect to the shape and appearance of the eyebrow (Figure. 1D, E, F). The patient needs regular trimming of eyebrows due to the growth in eyebrow hair length. Nevertheless, the patient reported increased confidence and a greater degree of comfort in her social relationships.

Figure-1A & B: Eyebrow alopecia scar during childhood & at the time of presentation, respectively.
Figure-1C: Superficial temporal artery flap passed through the skin tunnel and inserted on the recipient side.
Figure-1D, E & F: Post-operative images at 3 months follow-up (right lateral view, frontal view & left lateral view, respectively).

DISCUSSION

Eyebrows are one of the most expressive structures and create a master line of the face. Graft design for eyebrow reconstruction relies on three principles. First, hair follicles in the eyebrow are arranged in a "herringbone pattern," i.e., the hair stream is superolateral in the medial regions of the eyebrows and inferolateral in the lateral regions of the eyebrow; thereby, the harvested graft should match the hair stream characteristics.[3] This can be achieved by using a composite graft from the hairline as hair follicles at the hairline are aligned in one direction which can facilitate controlling the direction of hair follicles. Second, the dermal thickness of the supra-brow and infra-brow parts of the eyebrow is considerably different.[3] So, the graft thickness should be adjusted accordingly. Lastly, the hair density of the eyebrow varies with gender. The desired eyebrow hair density of females is lower compared to males; therefore, a composite graft (with lesser hair density) is preferred in females, whereas an STA graft (with more hair density) is preferred in males.2 However, our female patient felt satisfied even with the STA graft.

The endpoints of treatment are aesthetic and functional restoration while minimizing morbidity and the cost of care.[4] The gold standard for eyebrow alopecia is Follicular unit transplantation (FUT) because it allows excellent reconstruction of eyebrow characteristics with minimal donor site morbidity and a shorter convalescent period.[4] FUT can reproduce the fishbone structure of the hair stream in the eyebrow and has a superior cosmetic outcome with patient and physician satisfaction rates of up to 97%.[4] However, deep burns often develop dense fibrous tissue which can change the direction of the implanted hair follicles. Consistently, Motamed *et al*.[2] reported poor outcomes in patients with burn eyebrow alopecia. Moreover, unlike the scalp, eyebrows are dynamic structures that require additional tissue on top of the underlying

muscles for the motions and emotions expressed by the eyebrows. Some authors recommend the use of additional fascial flaps, which can provide a vascularized bed.[5] Other limitations of FUT are the low density of the reconstructed eyebrow, the need for powerful surgical instrumentation, the requirement of comprehensive anatomical knowledge, and high surgical expertise.[2]

Composite scalp graft represents a promising alternative to FUT in patients with burn eyebrow alopecia. As for the FUT, the vascularity of the recipient site limits graft acceptance. The STA Island flap is one of the most commonly used flaps in eyebrow defects that extend to more than half of the length of the eyebrow.[5] Advantages include the simplicity of the surgery, a compatible flap thickness, optimal colour and texture match, the ability to handle the flap from the hairy area, a wide rotation arc, and the constancy of the pedicle.[6] A common complication is venous congestion, which is a consequence of not taking adequate fascia around the vascular pedicle, the occurrence of torsion while placing the flap, and/or creating a suboptimal tunnel. The torsion can be minimized by having a straight route of the pedicle between the pivot point and the defect site. Venous congestion did not occur in our patient as we *(i)* maintained the integrity of the venous plexus in the temporoparietal fascia during the flap dissection, *(ii)* had pedicle of sufficient dimensions, and *(iii)* tunnelled the flap completely under vision, which minimized torsion or tension. The hair density of the graft was considerably more in both eyebrows, thus requiring the patient to regularly trim them. Some authors cite the difficulty to achieve a desirable hair direction which may require additional makeup and application of gels or Vaseline to keep the hairs lying in a horizontal direction.[2,5] However, our patient did not practice the applications of gel or Vaseline to maintain the hair stream of the eyebrow. In addition, the patient can develop scars in the postoperative period; however, these scars are usually not visible, as in our patient. Overall, STA graft can help achieve excellent results, especially in patients with bilateral eyebrow defects with no need to match hair density with the opposite side. Finally, we conclude that the excellent cosmetic result in our patient with bilateral STA graft increased her self-esteem, ameliorated social functioning, and provided a tremendous psychological impact.

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Submitted: December 23, 2023	*Revised: April 5, 2024*	*Accepted: April 25, 2024*

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