Reconstructions of Small Scalp Defects with Step Flap

Ali Ebrahimi, Nasrin Nejadsarvari[1], Azin Ebrahimi[2]

Department of Plastic Surgery, Baqiyatallah University of Medical Sciences, [1]Department of Medical Ethics, Iran University of Medical Sciences, [2]Medical Student, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Introduction: Defects of the scalp arise from several aetiologies including trauma, burn, injury, infection, radiation and surgical excision of tumours. Multiple options for reconstruction of scalp defects exist that included primary closure, skin grafts, local flaps, regional and distal free flaps. **Patients and Methods:** This was a prospective case-series study, which was carried out in the Department of Plastic Surgery of our Hospital. Step flap was used for small (2.5 cm × 2.5 cm) scalp skin defects reconstructions after skin tumour ablations. In this 2 years study, 15 patients (7 female , 8 male), ranging from 40 to 72 years (mean, 53 years), underwent an operation with local step flap for reconstruction of scalp defects caused by basal cell carcinoma or squamous cell carcinoma excision. **Results:** The patients who present with small scalp malignant tumours need complete resection and perfect reconstruction. This study showed that step flap with sufficient releasing was an effective method for reconstruction of small scalp defects due to skin malignancies. We had no case of flap complications such as ischaemia or necrosis. **Conclusion:** We recommend this local flap (z-flap) as a new approach for small scalp defect reconstruction in all areas of hair-bearing scalp.

Keywords: Reconstructions, scalp, step flap, tumours

Introduction

Defects of the scalp arise from several diverse aetiologies including trauma, burn, injury, infection, radiation, surgical excision of tumour or congenital lesion. Although smaller scalp defects may be closed primarily with simple undermining, larger defects may require advanced reconstruction approaches due to the relative inelasticity of surrounding tissue.[1] Scalp defects should be repaired based on careful evaluation of defect anatomy as well as patient's general health.[2] Scalp reconstruction after ablative surgery can be challenging. The skin in this region is the thickest in the body and divides this anatomic space into the hair-bearing and non-hair-bearing (forehead) segment.[3] Multiple options for reconstruction of scalp defects exist that included primary closure, skin grafts, local flaps, regional and distal free flaps. Achieving the best cosmetic and functional results without compromising the safety of oncologic surgery are the primary reconstructive goals.[4] The defect size, location, thickness and aetiology are the most important factors in reconstructive options.

Patients and Methods

This was a prospective case-series study, which was carried out in the Department of Plastic Surgery of our Hospital between 2013 and 2014. The advantages and disadvantages of step local flap were described for all patients.

All of them filled out the consent form before the operation. This study protocol was approved by the Hospital Ethics Committee. Step flap was used for small (2.5 cm × 2.5 cm) scalp skin defects reconstructions after skin tumour ablations. Therefore, those patients with small basal cell carcinoma (BCC) or squamous cell carcinoma (SCC) up to 1.5 cm diameters were good candidates for reconstruction with this flap. In this 2 years study, 15 patients (7 female, 8 male), ranging from 40 to 72 years (mean, 53 years), underwent an operation with step flap for reconstruction of scalp defects caused by BCC or SCC excision. All patients tumours were excised with 4–6 mm margin and safety of margins were checked by pathologic frozen section during operation.

We used a quadrangular incision for tumour excision, after tumour ablation with enough margins. Bilateral contralateral

Address for correspondence: Prof. Ali Ebrahimi, Baqiyatallah University of Medical Sciences, P. O. Box: 1994943636, Tehran, Iran. E-mail: ae_49341@yahoo.com

Access this article online

Quick Response Code:

Website: www.jcasonline.com

DOI: 10.4103/JCAS.JCAS_138_16

How to cite this article: Ebrahimi A, Nejadsarvari N, Ebrahimi A. Reconstructions of small scalp defects with step flap. J Cutan Aesthet Surg 2017;10:106-8.

parallel incisions [Figure 1] were done from the opposite upper and lower corners of defect with a similar length to defect size. Sufficient undermining of bilateral flaps supraperiosteally were done sufficiently until tension free repair was possible. In those scalps without radiodermatitis, up to 2.5 cm defects can be covered with this local flap but in radiodermatitis scalps this size reduce to 1–1.5 cm defects. In addition, in this type of scalp, this flap is not a good choice. In Figure 1, a representation of the flap advancement is shown. Only bilateral advancement flap is necessary, and there is no need for transposition or displacement or z-plasty but the final shape of defect repair is Z-shape or step shape [Figure 2]. This is not real z-plasty because in z-plasty, we displace flaps for defect coverage but in this procedure only bilateral advancement without displacement was done [Figure 1]. If we check mobility of skin around the tumour before designing the flap, this helps to see the direction of flap release. There is no need for burrow triangle excision in scalp reconstruction with this local flap.

This flap was carried out for all patients, and aesthetic and functional aspects were evaluated clinically and with photographs. This flap is not recommended in escharotic or radiodermatitis patients because of fibrosis and thinness of scalp with poor blood supply.

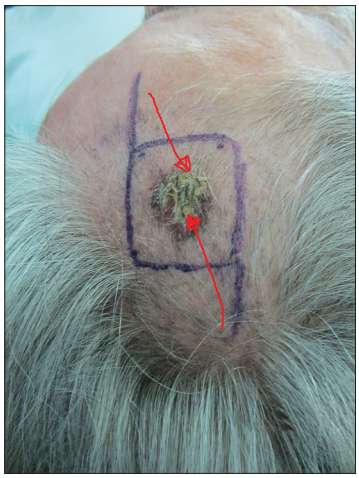

Figure 1: Schematic representation of step flap designing for reconstruction of small scalp defects

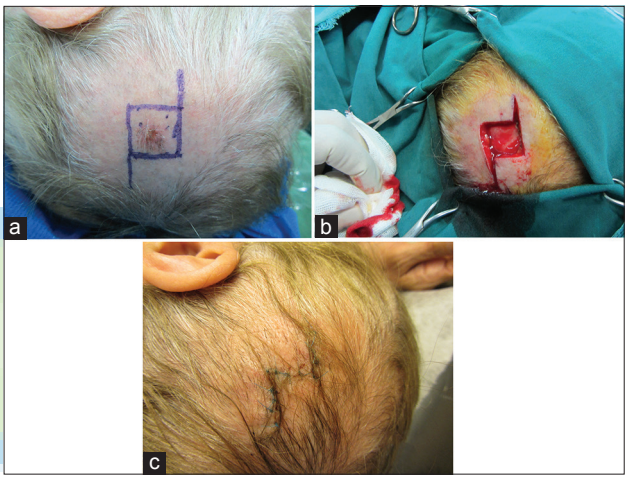

Figure 2: A 70-year-old male patient with basal cell carcinoma of scalp (a) designing of flap (b) intraoperative scalp defect (c) early post-operation

Results

Fifteen patients (7 female, 8 male), ranging from 40 to 72 years (mean age, 53 years), were included in this study. Our study showed that step flap with sufficient releasing was an effective method for reconstruction of small scalp defects due to skin malignancies. We operated 15 patients (7 BCC, 8 SCC), all patients were satisfied, and skin defects were corrected with good aesthetic results in a single stage in all patients. We had no any case of flap complications such as ischaemia or necrosis. This local bilateral transposition advancement flap is a good choice for small defects up to 2.5 cm × 2.5 cm in all cases except radiodermatitis [Figure 2] or escharotic skin due to previous trauma or surgery. Long-term results are good [Figure 3].

Figure 3: Long-term result of step flap in a 70-year-old male patient after squamous cell carcinoma excision and reconstruction

Discussion

Knowledge of scalp anatomy is essential to planning scalp reconstruction.[5] Scalp defects most often arise from oncologic resection, wound healing disorders or accidents.[2] Several factors need to be considered when selecting the ideal flap for each individual scalp defect. The size of the defect, anatomic involvement and overall health of the patient must all weigh in during the decision making process.[6]

Local flaps are the first choice for the repair of defects involving skin, galea and pericranium. However, in the case of comprised locoregional tissue mainly due to fibrosis as a result of previous operations or radiation therapy, local flaps are not possible.[7] This local flap also is not suitable for radiodermatitis skin reconstruction. With consideration of the aesthetic aspects of reconstruction, the local flaps might be preferable in most cases of small defects.[8] Local flaps are also good options for small scalp defects, since restoration of scalp skin with

adjacent similar textured tissue is possible. Scalp flaps have the advantage of replacing the defect with thick hair-bearing tissue similar to native tissue. The advantage of this flap is that it is single stage, with similarity to native hair-bearing tissue without significant morbidity for the distant donor site.

Skin grafting is an excellent option in some situations. For example, if a good vascular bed of non-irradiated tissue is available and if there are no plans for post-operative radiation therapy, then skin grafting with relatively thick split-thickness grafts may be performed safely. This method of reconstruction can, however, result in a suboptimal cosmetic outcome and may not be as durable as normal skin.[5]

Complex defects after scalp malignant tumour resection involving the scalp, underlying cranium, and dural present a significant challenge to plastic surgeons.[9-11] Many reports have demonstrated that microsurgical reconstruction of head defects are associated with a low risk for major complications.[12] Tissue expansion is well described for coverage of large scalp defects and offers the advantage with replacement the hair-bearing skin.[13] However, for small defects local flaps have some advantage to skin grafts that including similar hair-bearing skin, texture, durability, colour and without morbidity of the distant donor site. We recommend this local flap (step flap) as a new approach for small scalp defect reconstruction in all area of hair-bearing scalp.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Beasley NJ, Gilbert RW, Gullane PJ, Brown DH, Irish JC, Neligan PC. Scalp and forehead reconstruction using free revascularized tissue transfer. Arch Facial Plast Surg 2004;6:16-20.
2. Mehrara BJ, Disa JJ, Pusic A. Scalp reconstruction. J Surg Oncol 2006;94:504-8.
3. García del Campo JA, García de Marcos JA, del Castillo Pardo de Vera JL, García de Marcos MJ. Local flap reconstruction of large scalp defects. Med Oral Patol Oral Cir Bucal 2008;13:E666-70.
4. El Marakby HH, Naguib SF, El-Sawy Ael-H, Amin AA. Stepladder reconstructive options in post-ablative complex surgical defects in the head and neck. J Egypt Natl Canc Inst 2008;20:253-61.
5. Newman MI, Hanasono MM, Disa JJ, Cordeiro PG, Mehrara BJ. Scalp reconstruction: A 15-year experience. Ann Plast Surg 2004;52:501-6.
6. Oh SJ, Lee J, Cha J, Jeon MK, Koh SH, Chung CH. Free-flap reconstruction of the scalp: Donor selection and outcome. J Craniofac Surg 2011;22:974-7.
7. Thorwarth M, Eulzer C, Bader R, Wolf C, Schmidt M, Schultze-Mosgau S. Free flap transfer in cranio-maxillofacial surgery: A review of the current data. Oral Maxillofac Surg 2008;12:113-24.
8. Mueller CK, Bader RD, Ewald C, Kalff R, Schultze-Mosgau S. Scalp defect repair: A comparative analysis of different surgical techniques. Ann Plast Surg 2012;68:594-8.
9. Beasley NJ, Gilbert RW, Gullane PJ, Brown DH, Irish JC, Neligan PC. Scalp and forehead reconstruction using free revascularized tissue transfer. Arch Facial Plast Surg 2004;6:16-20.
10. Jones NF, Hardesty RA, Swartz WM, Ramasastry SS, Heckler FR, Newton ED. Extensive and complex defects of the scalp, middle third of the face, and palate: The role of microsurgical reconstruction. Plast Reconstr Surg 1988;82:937-52.
11. Ahn ST, Hruza GJ, Mustoe TA. Microvascular free tissue reconstruction following Mohs' micrographic surgery for advanced head and neck skin cancer. Head Neck 1991;13:145-52.
12. Bo B, Qun Y, Zheming P, Haitao X, Tianyi L. Reconstruction scalp defects after malignant tumor resection with anterolateral thigh flaps. J Craniofac Surg 2011;22:2208-11.
13. Hussussian CJ, Reece GP. Microsurgical scalp reconstruction in the patient with cancer. Plast Reconstr Surg 2002;109:1828-34.