Reconstruction of scalp defect by rotation flap

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Abstract:
Scalp defect can have a number of origins and their repair is depends upon their location, size and depth. Knowledge of scalp anatomy is essential for preparing these flaps. Repair of scalp defects using local hair bearing scalp is technically challenging. Local transposition or rotation flaps are the most common reconstruction methods for moderate or large anterior scalp defects. We present two cases of scalp burn due to electric shock. One over vertex and parietal region the size was 15 x 5.5 cm, other on left temporoparietal region exposing mastoid bone it is of 7 cm diameter circular shape. Reconstruction of the defect was done by rotation flap which has got excellent result without complications. It was primary closure without skin grafting. The peri-cranium bones were even exposed due to electric burns. Based on our experience, we suggest the large scalp defects located especially temporoparietal area can be reconstructed with rotational flaps in one stage without the need for multiple surgeries.

Key words: Local flaps; Reconstruction; Skin graft; Scalp; Tissue expander

Introduction
The scalp represents the thick durable covering that provides protection for the vital underlying calvarium and brain [1, 2]. It is composed of hair bearing (temporal, parietal and occipital) and non hair bearing skin (frontal) underlying occipitofrontalis muscle (connected by the galea aponeurotica) gliding over a thin sheet of nourishing pericranium. Most scalp avulsion occurs within this loose areolar tissue plane, often leaving the pericranium nonviolated and facilitating reconstruction. The skin of the scalp is thickest in the body varying from 3 to 8 mm of depth. The neurovascular structures supplying the scalp traverse through the deep subcutaneous tissue overlying the galea aponeurotica. Scalp defect are mostly caused due to trauma, tumor resection surgery, radiotherapy induced necrosis, burns and infections. There are a number of local flap techniques single or multiple...
defect. The correct design of such flap includes preservation of the original hairline, acceptable re-directioning of hair follicles, the incorporation of large vascular pedicle and wound closure without tension. Knowledge of the scalp anatomy is essential for preparing these flaps. Local flaps must be based on one or two vascular pedicles of the scalp to afford a large rotation angle – thereby facilitating closure of the defect. We describe our cases in which this procedure was used successfully. There are several methods of closing scalp defects: skin grafting, healing by secondary intention [3], granulation tissue formation followed by skin grafting, use of tissue expanders [4]. In which expanders are placed in loose areolar tissue and gradual expansion is done, other methods of expansion is by applying external expansion device but out of all these closure of scalp defect is best done by rotation flaps.

Case report

We present two cases of electrical burn over scalp.
Case 1: burn over both parietal and vertex area of size about 15 cm x 8 cm in size. Figure 1 shows pre operative picture in which scalp defect present in vertex and both parietal area. Figure 2 is the intra operative picture of closed wound without tension on the sutures.
Case 2: has got burn over left temporoparietal region with left pinna of size 8cm circular.
Figure 3 shows the pre operative picture in which scalp defect present in left temporal area exposing mastoid bone. Figure 4 is the intra operative picture of closed wound without tension on the suture.
Both patients were managed conservatively by debridement and dressing. After a period of one and half month reconstruction was done without tension on sutures. Suture removal was done after fourteen days, all sutures were healed without wound gaping.

Discussion

A basic principle in surgery is to use the simplest technique available. The defect in the scalp following the excision of benign or malignant tumors, burns, or secondary to trauma should be ideally replaced with hair bearing scalp. It not only gives aesthetic results but also reconstructs the defect good choice for small defects, but if the defect is large and sutures are placed in tension there is chances of dehiscence postoperatively. Free flaps, such as rectus abdominis and latissimus dorsi, provide excellent reconstruction in size, tissue bulk, and coverage, but they are much more complex procedures and their colour and texture is inferior to those of local flaps [2,3]. Fasciocutaneous flap such as the radial forearm flaps are also excellent choice but, apart from being more complex procedure, are also accompanied by more donor site complications [4]. Tissue expansion is an appropriate technique with many indications in reconstructions in the head and neck. One of its main advantage is that it provides an excellent tissue match for defects in visible areas. There are several disadvantages: some of the complications are exposure and failure of implants, pain, hematoma, seroma, infection, bone resorption, and wide scars leading to premature loss of expander [3]. They also require multiple operations, weeks of expansion, and are rather costly. It would also lead to change in the direction of hair growth. Skin grafts may be used over any size of defect. Healing is facilitated by an intact periosteum; however, exposing the diploic space of bone or galeal rotation flaps will allow healing of the skin grafts over exposed bone. Similar to healing by second intention, split thickness skin grafts will often be compromised after irradiation. Also, poor cosmetic and lack of hair – bearing skin are the main disadvantages of using skin grafts. External tissue expansion uses the principle of mechanical creep and stress relaxation to reduce the large defects. Mechanical creep is the stretching of a material, in this situation skin. When skin is stretched, its convoluted collagen fibers straighten and realign parallel to each other. Caution should be exercised in patients in whom local tissue vascularity may be compromised. Other disadvantages are that there is some discomfort for patient during and after the device tightening and that the application requires closure of the defect at a later time. Here in this case study we had done closure of the large defect in the scalp by local rotation flaps without using the tissue expanders.

Conclusion

The scalp is challenging areas in which to achieve optimal closure, both technically and cosmetically. The poor flexibility and limited appropriate donor tissue make even small defects difficult to close. As in all areas of the head and neck, it is ideal for repairing tissue defect with
tissues that is similar in color, thickness and texture. The hair bearing nature of the scalp makes this goal challenging to achieve. Several options exist for closure of medium and large scalp and forehead defects, ranging from skin graft and granulation via second intention to more extensive advancement flaps and micro-vascular free tissue transfers. Many of these options fail to achieve the goal of replacing the defect like tissue, often resulting in poor cosmetics. Tissue expansion has previously been a reliable method for achieving closure of scalp defects but has the disadvantages of delaying definitive treatment and preplanning.

**Conflict of Interest:**
The authors declare that there are no conflict of interest

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**References**