

## Discussion

### Discussion: One Stage Reconstruction of Skull Exposed by Burn Injury Using Tissue Expansion Technique

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Many surgical procedures claim to show high success rates in scalp reconstruction. However, there has been a limited case of injury to the scalp, specifically due to electrical burn which is severe as to exhibit skull exposure. Moreover, there is scarce number of papers discussing treatment of this certain kind of trauma with tissue expansion technique. We think this article is of enough value to report 10 successful cases of scalp reconstruction using tissue expanders over a long period as 12 years.

But we think there are some shortcomings in this article. The authors seem to overly emphasize their successful outcome without the need of additional surgery by describing the procedure as “one stage” in the title of their study. However, tissue expansion requires a minimum of 2 operative stages; placing and removing the expander. It could even be considered as a 3 step procedure if the expansion period is also taken into account. The term “one stage” in this article is contradictory to the essential nature of expansion technique.

Also, despite the fact that there are many new articles addressing scalp reconstruction, authors have included many outdated citations. Most of the citations are published in 1980s, except only one reference that was published in 2009. We hereupon want to supplement the readers with ideas that have recently come up in numerous journals.

Classic concept of reconstructive ladder can also be applied to scalp reconstruction, thereby allowing whole spectrum of reconstruction methods like healing with secondary intention, direct closure, skin graft, local and distant flap [1]. Lesion as small as 3 cm can be closed directly and lesions larger than 3 cm in size and/or complex in quality can be covered with skin graft, local flap and distant flap. Healing with secondary intention is advantageous by the fact that it does not rely on any certain vascular pedicle, does not require secondary surgery, and is convenient in detecting and managing tumor recurrence. But prolonged moist environment has to be maintained to achieve healing. Direct closure is cosmetically elegant, technically simple, quickly healed, and easily manageable in terms of wound care but cannot be employed in large defects. There are some attempts to overcome

this drawback using double purse-string suture [2]. Skin graft allows coverage of large sized defect in presence of healthy vascular bed, but still has problems regarding poor cosmetic outcome and donor site morbidity. Local flaps - advancement flap, rotation flap, transposition flap - are very useful in covering large defects by preserving a certain vascular pedicle [3]. Wound management is simple, healing is fast, and cosmetically satisfying. However, complications like infection, hematoma, and wound dehiscence can arise in result of giving additional tissue manipulations such as additional incision or tissue undermining. Furthermore, a defect that has some possibility of residual tumor in the wound bed is not a good candidate for local flap coverage. In case of nearly total defect in the scalp, distant flaps as various as anterolateral thigh flap, latissimus dorsi muscle flap, radial forearm free flap, transverse rectus abdominis myocutaneous flap can be used [4-6].

Alloplastic material has recently become available in scalp reconstruction. There are a few case reports covering full-thickness scalp defect through one or two-stage procedure using artificial dermis, dermal regeneration template, and bovine collagen construct [7-11].

Tissue expansion is a good technique that complies to the principles of scalp reconstruction, simply described as “replace like tissue with like tissue” by Eedy et al. [1]. It is a useful method that can be considered as an option regardless of what level of reconstructive ladder the defect lies in. In case of skull exposure as mentioned in this article, galeal flap, multiple burring or chiseling can be done to make a healthy vascular bed and covering it with a skin graft is possible, but it brings a poor cosmetic outcome compared to tissue expansion [12,13]. But tissue expansion requires 2 to 3 months of expansion period, and decreased hair density becomes a problem when trying to cover a defect over 50% of total scalp surface area [14].

Developments in scalp reconstruction include the use of vacuum-assisted closure (VAC). We now have enough theoretical basis how VAC systems improve local blood flow, increase granulation tissue formation, minimize bacterial colonization [15]. Many successful treatments have also been reported using this method [16]. In the article of our interest, open wound was managed with frequent dressing and irrigation, but our experience suggests the wound be treated with VAC. We would posit that VAC system will reduce the risk of wound problem.

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