

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Also, despite the fact that there are many new articles addressing scalp reconstruction, authors have included many outdated citations.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 abdominus 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.

REFERENCES

1. Leedy JE, Janis JE, Rohrich RJ. Reconstruction of acquired scalp defects: an algorithmic approach. *Plast Reconstr Surg* 2005;116:54e-72e.
2. Cruz AP, Campbell RM, Perlis CS, et al. Double purse-string

- closure for scalp and extremity wounds. *Dermatol Surg* 2007;33:369-73.
3. Rohit S, Sirohi D, Sengupta P, et al. Superficial temporal fascia pedicled v-y advancement flap for scalp reconstruction. *J Maxillofac Oral Surg* 2010;9:410-4.
 4. Wang HT, Erdmann D, Olbrich KC, et al. Free flap reconstruction of the scalp and calvaria of major neurosurgical resections in cancer patients: lessons learned closing large, difficult wounds of the dura and skull. *Plast Reconstr Surg* 2007;119:865-72.
 5. Hallock GG. Long-term superiority of composite versus muscle-only free flaps for skull coverage. *Ann Plast Surg* 2004;52:507-10.
 6. Ozkan O, Coskunfirat OK, Ozgentas HE, et al. Rationale for reconstruction of large scalp defects using the anterolateral thigh flap: structural and aesthetic outcomes. *J Reconstr Microsurg* 2005;21:539-45.
 7. Komorowska-Timek E, Gabriel A, Bennett DC, et al. Artificial dermis as an alternative for coverage of complex scalp defects following excision of malignant tumors. *Plast Reconstr Surg* 2005;115:1010-7.
 8. Koenen W, Goerdts S, Faulhaber J. Removal of the outer table of the skull for reconstruction of full-thickness scalp defects with a dermal regeneration template. *Dermatol Surg* 2008;34:357-63.
 9. Kinsella CR Jr, Grunwaldt LJ, Cooper GM, et al. Scalp reconstruction: regeneration with acellular dermal matrix. *J Craniofac Surg* 2010;21:605-7.
 10. Wilensky JS, Rosenthal AH, Bradford CR, et al. The use of a bovine collagen construct for reconstruction of full-thickness scalp defects in the elderly patient with cutaneous malignancy. *Ann Plast Surg* 2005;54:297-301.
 11. Jung SN, Chung JW, Yim YM, et al. One-stage skin grafting of the exposed skull with acellular human dermis (AlloDerm). *J Craniofac Surg* 2008;19:1660-2.
 12. Halpern M, Adams C, Ratner D. Galeal hinge flaps: a useful technique for immediate repair of scalp defects extending to periosteum. *Dermatol Surg* 2009;35:127-30.
 13. Feierabend TC, Bindra RN. Injuries causing major loss of scalp. *Plast Reconstr Surg* 1985;76:189-94.
 14. Antonyshyn O, Gruss JS, Zuker R, et al. Tissue expansion in head and neck reconstruction. *Plast Reconstr Surg* 1988;82:58-68.
 15. Morykwas MJ, Argenta LC, Shelton-Brown EI, et al. Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. *Ann Plast Surg* 1997;38:553-62.
 16. Marathe US, Sniezek JC. Use of the vacuum-assisted closure device in enhancing closure of a massive skull defect. *Laryngoscope* 2004;114:961-4.

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