

Scalp Reconstruction: The Role of Tissue Expansion

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As hair transplant surgeons, we like to treat as many patients as possible for all that we receive in turn: patient gratefulness, ego satisfaction, and financial gain. Hair grafting is not always the best option, however, and there are times when an alternative procedure, such as tissue expansion, may be superior to hair grafting, or may in fact be the only effective treatment option. In this article, I will review the technique of tissue expansion for treating scalp scarring, discuss the indications, and review the advantages/disadvantages of the technique.

Case #1

This 17-year-old female, Patty, wore a hairpiece her entire childhood to conceal a 7cm-wide alopecic mid-sagittal scar that was the result of an attempt to close a congenital amniotic band scar as a 3-year-old (Figure 1). She was prevented from such activities as swimming and sleepovers. In preparation for starting college, Patty and her family investigated different treatment options—two local hair transplant doctors recommended hair transplants, a third recommended several cycles of scalp extension to be followed by transplants. A local plastic surgeon suggested tissue expansion but felt unable to properly restore her hairline.

Patty decided to have tissue expansion, preferring to commit two months to the tissue expansion process, knowing that this would ensure the best chance of complete removal of the scar. A day after graduating from high school, Patty flew to Miami for the first surgery. Performed under general anesthesia (although these procedures can be performed under intravenous sedation), two tissue expanders, each measuring 6 by 13cm, were inserted in the subgaleal plane parallel and adjacent to each side of the defect, with the inflation ports tunneled under the midline defect. Simultaneously, 175 hair grafts containing 2 and 3 hairs were transplanted into the 3cm frontal-most aspect of the scar, where, due to the curvature of the expander flaps, removal of this scar tissue would not be possible.

Two weeks after insertion, twice weekly filling of the expanders with 15–20cc of saline was initiated, so that by eight weeks each contained approximately 300cc. Cosmetically, thanks to her thick curly hair, it wasn't until the last three weeks that the expanders became obvious (Figure 2). Ten weeks after insertion, under general anesthesia, the expanders were removed and the two flaps of expanded scalp tissue were brought together, allowing for the complete removal of the scar tissue, with the exception of the frontal-most 3cm of scar, which was anticipated and already transplanted with hair grafts. The very next day, Patty and her family were able to appreciatively see her now normal scalp (Figure 3).

Case #2

This 52-year-old female, Joyce, two years prior had two melanomas removed from her scalp, resulting in two large alopecic defects (Figure 4). While her scalp density was already somewhat low, she decided to undergo tis-



Figure 1. 17-year-old girl with midline sagittal scar since birth, the result of amniotic band syndrome. The midline scar consists of an atrophic full-thickness skin graft.



Figure 2. Just prior to the second procedure, showing the two filled expanders, one on each side of the defect.



Figure 3. Final result, with essentially the entire scar removed.

sue expansion to allow for the removal of her scars and complete hair coverage. Similar to case #1, two tissue expanders were inserted then inflated (Figure 5), then 12 weeks later the expanders removed and the expanded flaps rotated advanced into the defects (Figure 6). At just

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4 weeks post-op, the approximately 20% of shock hair loss was reversing with the possible expediting of minoxidil, and Joyce no longer needed to wear a hairpiece or head scarf to go out (Figure 7).

Discussion

In the scientific literature, a number of techniques for treating scalp scars has been described. The majority of articles written by and for hair transplant surgeons have focused on the role of hair transplanting, which is the treatment of choice in most cases, as long as there is sufficient donor hair and the scar tissue is sufficiently thick and vascularized to support hair growth. The advantages of hair grafting include a low morbidity and high patient acceptance, a reasonable success rate (I quote a 70–75% growth rate when transplanting into scars), and usually a lower cost when compared to tissue expansion. Therefore, in my practice, the great majority of scars are transplanted.

There is a definite role for tissue expansion in select cases, and hair restoration surgeons must know how to identify these cases in order to assure patients of the best outcomes. The two main indications for choosing tissue expansion over hair grafting are the size and shape of the defect relative to potential supply of donor hair, and the

quality and thickness of the scar tissue. Larger, especially linear or oblong defects, are better suited for tissue expansion, especially when located along the top of the scalp where, unlike the sides of the head, there

are no hairs from above to brush over and therefore cover over the area. Areas of significant scarring and/or tissue atrophy, which is likely to make hair grafting unsuccessful, are best excised and replaced by normal expanded scalp skin. This is especially true in cases where split or full-thickness skin grafts were placed over the cranium.



Figure 7. Final result.



Figure 4. 52-year-old woman with two large scalp scars resulting from excision of two melanomas of the scalp.



Figure 5. The two tissue expanders are now filled. Note that the two inflation ports in this patient were externalized, allowing her local physician to do the twice-weekly expansions.



Figure 6. Three days after the second procedure, with the entire scalp scars excised.

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The ability of tissue expansion to generate an excess amount of normal, hair-bearing scalp tissue means that it provides not only the hairs but also replaces scarred scalp with healthy new scalp tissue. Unlike with intraoperative tissue stretching, which causes mechanical creep (the realignment of connective tissue), prolonged tissue expansion elicits biological creep, the growth of new connective tissue and skin. However, with biological creep, no new hair follicles grow, therefore, there is a loss of hair density in the expanded tissue. While this could potentially be a cosmetic problem in individuals with preexisting thin hair, this has never seemed to be a significant impediment to achieving a good result; in fact, the patient in case 2 had thin hair from female pattern hair loss, yet was extremely happy with her outcome.

Theoretically there is no limit to the amount of tissue that can be created with tissue expansion, provided that the process is conducted gradually. For most patients, 8–10 weeks of expansion twice weekly is sufficient for creating the desired amount of additional tissue. Overaggressive expansion can be associated not only with increased discomfort, but with a higher rate of exposure of the expanders. Other complications with tissue expansion include infection and anagen effluvium, though both of these occur with a low incidence. If desired, the expansion process can be repeated, allowing for the removal of additional tissue. In fact, I will be performing in the next several months just such a procedure on a 5-year-old burn victim as part of OPERATION RESTORE. ♦