

# Cadaveric Split-Thickness Skin Graft With Partial Guiding Closure for Scalp Defects Extending to the Periosteum

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A scalp defect that extends to or below the periosteum often poses a reconstructive conundrum. Achieving the level of tissue granulation necessary for secondary-intention healing is challenging without an intact periosteum; surgeons often resort to complex rotational flap closures in this scenario. For tumors at high risk for recurrence and in cases in which adjuvant therapy is necessary, tissue distortion with a complex rotational flap can make monitoring for recurrence difficult. Similarly, for elderly patients with substantial skin atrophy or those in poor health, extensive closure may be undesirable or more technically challenging and poses a higher risk for adverse events. Additional strategies are necessary to optimize wound healing and cosmesis. Granulation and epithelialization of wounds can be expedited using a cadaveric split-thickness skin graft (STSG) of biologically active tissue. We describe this technique and show its utility in cases in which there is concern for delayed or absent tissue granulation, or when monitoring for recurrence is essential.

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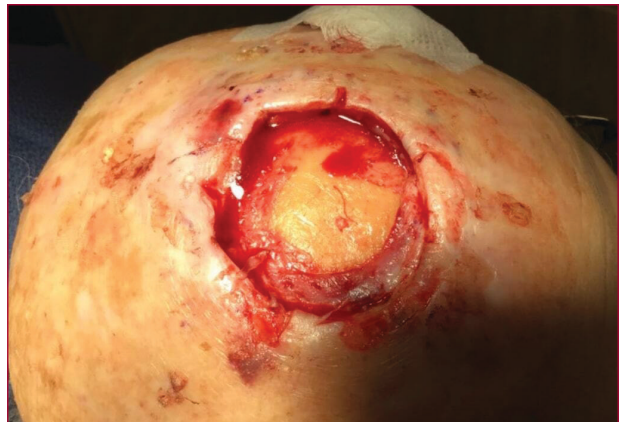
## Practice Gap

Scalp defects that extend to or below the periosteum often pose a reconstructive conundrum. Secondary-intention healing is challenging without an intact periosteum, and complex rotational flaps are required in these scenarios.<sup>1</sup> For a tumor that is at high risk for recurrence or when adjuvant therapy is necessary, tissue distortion of flaps can make monitoring for recurrence difficult. Similarly, for patients in poor health or who are elderly and have substantial skin atrophy, extensive closure may be undesirable or more technically challenging with a

higher risk for adverse events. In these scenarios, additional strategies are necessary to optimize wound healing and cosmesis. A cadaveric split-thickness skin graft (STSG) consisting of biologically active tissue can be used to expedite granulation.<sup>2</sup>

## Technique

Following tumor clearance on the scalp (Figure 1), wide undermining is performed and 3-0 polyglactin 910



**FIGURE 1.** A deep scalp defect devoid of periosteum following Mohs micrographic surgery in an elderly patient with immobile adjacent tissue and multiple comorbidities.

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Drs. Seger and Neill report no conflict of interest. Dr. Tolkachjov is a speaker for Misonix (Bioventus).

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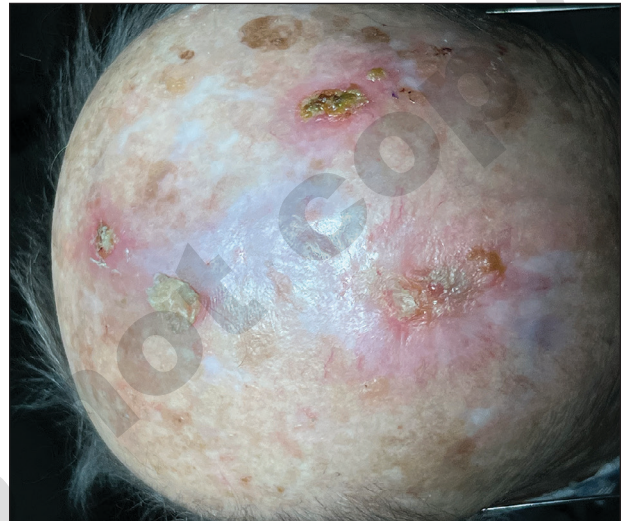
epidermal pulley sutures are placed to partially close the defect. A cadaveric STSG is placed over the remaining exposed periosteum and secured under the pulley sutures (Figure 2). The cadaveric STSG is replaced at 1-week intervals. At 4 weeks, sutures typically are removed. The cadaveric STSG is used until the exposed periosteum is fully granulated and the surgeon decides that granulation arrest is unlikely. The wound then heals by unassisted granulation. This approach provides an excellent final cosmetic outcome while avoiding extensive reconstruction (Figure 3).

**Practice Implications**

Scalp defects requiring closure are common for dermatologic surgeons. Several techniques to promote tissue granulation in defects that involve exposed periosteum have been reported, including (1) creation of small holes with a scalpel or chisel to access cortical circulation and (2) using laser modalities to stimulate granulation (eg, an erbium:YAG or CO<sub>2</sub> laser).<sup>3,4</sup> Although direct comparative studies are needed, the cadaveric STSG provides an approach that increases tissue granulation but does not require more invasive techniques or equipment.



**FIGURE 2.** Pulley guiding sutures (3-0 polyglactin 910) decrease the size of the defect and secure a cadaveric split-thickness skin graft over the remaining exposed periosteum.



**FIGURE 3.** Final cosmetic outcome of a cadaveric split-thickness skin graft at 3 months demonstrating an appropriate wound contour without step-off.

**Skin Substitutes for Split-Thickness Skin Grafts**

Skin substitute	Composition	Current Procedural Terminology codes	Q codes	Average range of sales price per square centimeter <sup>5</sup>
Acellular allograft	Cadaveric skin (dermis) with fibroblasts removed	15271–15278	4102, 4110	\$12.7–\$40.7
Amnion	Human amniotic or chorion membrane	15271–15278	4132, 4133, 4137, 4186, 4159, 4160, 4180	\$95.4–\$420.5
Cellular allograft	Cadaveric skin with keratinocytes, growth factors, cytokines, fibroblasts, and collagen	15271–15278	4196, 4197, 4121	\$45.9–\$179.5
Composite graft	Animal-derived allogenic fibroblasts and keratinocytes on collagen base	15271–15278	4101	\$30.4
Synthetic graft	Hyaluronic acid, silicone	15271–15278	4117	\$19.3
Xenograft	Animal-derived collagen	15400–15431	4104, 4105, 4108	\$23.8–\$47.6

Autologous STSGs need a wound bed and can fail with an exposed periosteum. Furthermore, an autologous STSG that survives may leave an unsightly, hypopigmented, depressed defect. When a defect involves the periosteum and a primary closure or flap is not ideal, a skin substitute may be an option.

Skin substitutes, including cadaveric STSG, generally are classified as bioengineered skin equivalents, amniotic tissue, or cadaveric bioproducts (Table). Unlike autologous grafts, these skin substitutes can provide rapid coverage of the defect and do not require a highly vascularized wound bed.<sup>6</sup> They also minimize the inflammatory response and potentially improve the final cosmetic outcome by improving granulation rather than immediate STSG closure creating a step-off in deep wounds.<sup>6</sup>

Cadaveric STSGs also have been used in nonhealing ulcerations; diabetic foot ulcers; and ulcerations in which muscle, tendon, or bone are exposed, demonstrating induction of wound healing with superior scar quality and skin function.<sup>2,7,8</sup> The utility of the cadaveric STSG is further highlighted by its potential to reduce costs<sup>9</sup> compared to bioengineered skin substitutes, though considerable variability exists in pricing (Table).

Consider using a cadaveric STSG with a guiding closure in cases in which there is concern for delayed or absent tissue granulation or when monitoring for recurrence is essential.

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