Advances in Burn Reconstruction Complicate Coding: Get Familiar with Terminology, Techniques for Accurate Coding

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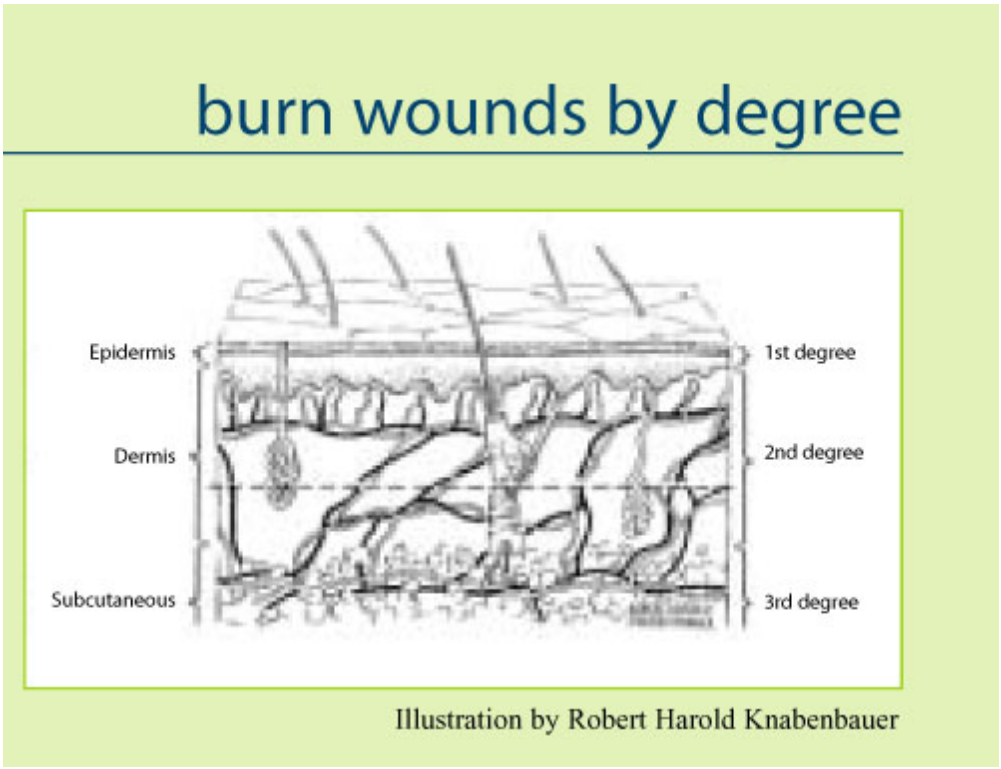
Recent advances in the science of wound healing are making an impact on the treatment of burns. This is particularly evident not only in the way burn wounds are being managed initially, but also in how these wounds are being reconstructed. While these scientific advances make this field an exciting one, they can also make coding these procedures a challenge.

By addressing tissue injury, terminology, techniques, and technology—deemed "the four big Ts"—a clear understanding of the clinical procedures used to reconstruct burn wounds will result. We'll also provide examples of how to accurately code plastic surgery burn reconstruction procedures.

Distinguishing Tissue Damage

Understanding the extent of tissue damage is critically important in burn reconstruction coding, as the extent of the injury rather than the cause of the injury determines the subsequent treatment. While the most common burns encountered and treated today are caused by thermal injury such as scald or fire, burns can also result from chemical, electrical, or irradiation injury.

Burn wounds are categorized by "degree" (see "Burn Wounds by Degree" illustration below). Skin consists of two component parts—the epidermis and the dermis. A first degree, or superficial burn consists of an injury confined to the epidermis. These burns have no blistering, are pinkish-red, and uncomfortable. Sunburn is the classic example of a first degree burn.



Second degree, or partial thickness burns most frequently have blistering, vary from pinkish-red to a mottled white, and are extremely painful. Second degree burns can vary in their natural clinical course. Those burns limited to the upper part of the dermis (called the papillary dermis) will usually heal spontaneously and without scarring, similar to first degree burns. However,

a deeper second degree burn frequently behaves similar to a third degree burn, requiring surgical treatment to promote healing and prevent scarring or functional impairment (see dotted line in "Burn Wounds by Degree", above).

Third degree, or full thickness burns extend all the way through the skin, leaving no dermis to allow for regeneration or healing. These burns present with a dry or leathery white to khaki appearance, and, in contrast to the other burns, usually cause little or no pain. Fourth degree burns are burns that extend into the deeper tissues such as the underlying muscle, tendon, or bone. These injuries generally occur only with prolonged thermal contact or from an electrical injury. Both third and fourth degree burns require surgical treatment.

Understanding the Terminology

Another coding challenge in burn reconstruction is the multitude of terms that are frequently used in operative reports. Because burn wounds that have lost their skin cover need to have it replaced, these terms generally relate to the tissues used to cover the burn wounds. This coverage can either be done to promote primary healing, such as with a skin graft, or to temporarily protect and prepare the wound for later definitive treatment.

The terms "split thickness skin graft" and "full thickness skin graft" are well known terms and are examples of "autografts." These procedures produce a definitive treatment by covering the wound with the patient's own skin taken from somewhere else on the body. The healing that results replaces the skin "lost" from the burn, and frequently no further treatment is required.

However, in some cases the burn wound is not ready or clean enough, or the patient's general condition is not stable enough to allow for the above definitive treatment. Under these circumstances, the tissue placed on the burn wound is used to protect or prepare the wound for later definitive treatment. These tissues may be natural, derived from the same or another species, or "foreign," such as a synthetically created substance.

Tissue bank cadaver skin, an allograft, and pigskin (or procine xenograft), a xenograft, are examples of natural tissues. Biobrane is an example of a synthetically created tissue. (For a list of other commonly used terms in plastic surgery burn reconstruction, see "Frequently Used Terms," below.)

Burn Coverage Techniques

There are three basic techniques for burn coverage: dressings, grafts, and flaps. While first degree burns heal spontaneously and need nothing other than symptomatic treatment, all other burn wounds need some type of burn coverage. This coverage is either to promote spontaneous healing or to provide a replacement for the tissue lost as a result of the burn.

Dressings are used to promote spontaneous healing for partial thickness burns or to protect and prepare a partial or full thickness burn for subsequent definitive surgical treatment. Grafts and flaps (pedicle, muscle, or musculocutaneous flaps/grafts) are definitive surgical techniques.

Skin grafts can be either partial (split thickness) or full thickness. The difference between a split (STSG) and a full thickness (FTSG) skin graft is the thickness of the graft. A STSG only takes off the top part of the skin from the donor area, leaving behind enough skin to allow the donor area to heal spontaneously. Split thickness skin grafts can be taken at various thicknesses. The thicker a graft, the more durable and less prone to skin contracture the graft will be, but the longer the donor site will take to heal.

A FTSG is so thick that it takes the full thickness of skin at the donor site. As a result, the donor area must be closed, usually by undermining the surrounding skin and approximating it with a layered closure. Codes for FTSG generally include the repair of the donor site.

If burn wounds extend deeply, exposing critical underlying structures such as tendons, joints, or bone, it is not possible to cover the wound with just a skin graft. In these cases, a flap is needed. Flaps (sometimes also referred to as grafts) can consist of skin and subcutaneous tissue (pedicle flap/graft or tissue rearrangement), muscle alone, or skin, subcutaneous tissue, and muscle (musculocutaneous or myocutaneous flap). Electrical burns, with their tendency to provide deeper penetrating injury and to involve the extremities, will frequently require both a flap and graft coverage. Additionally, these deeper injuries typically require one or more debridements to prepare the wound for definitive coverage.

Following New Technology

Newer techniques based on recent scientific advances are also being used more frequently. Often, operative notes will use terms such as “artificial skin,” “tissue culture skin,” or “tissue cultured keratinocytes.” Artificial skin is just that—artificial—and does not alone provide a permanent skin coverage solution.

Alloderm and Integra are two examples of artificial skin. (See “Frequently Used Terms,” below.) These skin substrates can be used alone to protect and prepare burn wounds or in combination with a STSG. Alloderm is a decellularized skin substrate, essentially a skin framework with the living cells removed. It comes in various sizes and is freeze dried. It is reconstituted at the time of surgery by being soaked in saline. However, as it only provides a skin substrate, it alone does not provide a permanent skin cover.

Skin can also be grown in tissue cultures to use in burn reconstruction. This technique is frequently used on severely burned patients who do not have enough remaining normal skin to provide the needed donor areas for skin grafting. A small piece of skin is harvested from the burn victim, and that skin is then grown in the lab. With this technique, it is possible to expand the tissue exponentially, obtaining more skin than ever could be obtained from the patient alone. The resultant skin, however, has a poorly developed epidermal/dermal junction and as a result is less durable and more prone to graft loss.

Combining the tissue culture skin with a dermal substrate such as Alloderm helps negate the disadvantages of each. It is also possible to combine a dermal substrate with a very thin STSG and thereby negate the disadvantages, such as durability and tendency for contracture, of using a thin skin graft alone. Consequently, it is not uncommon to see skin substrates used in conjunction with either STSG or tissue cultured skin to provide definitive burn wound coverage.

With its multiplicity of etiologies, extents of injury, various anatomic locations, and numerous staged surgical techniques, burns and their treatments represent a complex area to code. However, by focusing on the type and degree of the burn and being aware of the terminology and techniques used in burn treatment, accurate coding will result.

Coding Burn Reconstruction: Two Case Studies

Burn reconstruction CPT coding can be demonstrated by the following brief case studies.

(Note: In physician professional fee coding, the use of modifier -51 is correct. It is not used, however, in hospital outpatient coding.)

Scenario no. 1

Pre- and Postoperative Diagnosis: Patient presents with a burn to the right lower arm five years ago with flexion contracture, left wrist

Operation Performed: Excision of burn scar, left arm with 5 x 5 cm preparation of recipient graft site. Application of allograft graft 5 x 5 cm. Application of split thickness skin graft 5 x 5 cm

Code assignments:

- 15000 Surgical preparation or creation of recipient site by excision of open wounds, burn eschar or scar (including subcutaneous tissues; first 100 sq cm or one percent of body area for infants and children)
- 15350-51 Application of allograft, skin; 100 sq cm or less
- 15100-51 Split graft, trunk arms, legs; first 100 sq cm or less or one percent of body area of infants and children (except 15050)[1]

15000 is coded first to describe the preparation of the recipient graft site. According to *CPT Assistant*, 15000 is intended for surgical preparation of a recipient graft site, including excision of a burn eschar or scar.[2]

Next, the patient's allograft needs to be coded. Allograft integument grafts are coded to 15350-15351 reflecting the sq cm measurement of the graft.[3] Finally, the split skin graft application is coded to 15100. Modifier -51 is appended to all multiple procedures.

Scenario no. 2

A 10-year-old male presents with a third-degree burn of anterior right thigh sustained in a house fire. Procedure: Preparation of burn wounds for allograft placement (96 sq cm), Bilaminate skin substitute applied 25 sq cm

Code assignments:

- 15000 Surgical preparation or creation of recipient site by excision of open wounds, burn eschar or scar (including skin and subcutaneous tissues; first 100 sq cm or one percent of body area for infants and children)
- 15350-51 Application of allograft, skin; 100 sq cm or less
- 15342-51 Application of bilaminate skin substitute; 25 sq cm

In this scenario, the acute burn is treated by preparation of recipient site followed by allograft. In addition, bilaminate skin substitute is applied.[4,5]

Frequently Used Terms

Autologous, autogenous, autograft: Self-generating tissue transplanted from one location to another within the same individual

Allogenic, allograft (old term: homograft): Tissue transplanted between unrelated individuals of the same species

Xenograft (old term: heterograft): Tissue transplanted between different species

Alloplastic, alloplast: An inert foreign body used for implantation into tissue or pertaining to such an implantable body

Alloderm: Acellular dermis; provides dermal substrate

Cultured autologous keratinocytes: Growing cells in tissue culture

Graft: Tissue separated from its donor bed; survival relies on ingrowth of new vessels from the recipient tissues

Flap or vascularized flap: Tissue that is transplanted but remains attached to the donor blood supply or becomes revascularized via microvascular anastomoses to recipient vessels. The latter is called free flap or free tissue transfer

Notes

1. American Medical Association. *CPT Assistant* 9, no. 4 (1999): 10.
2. *Ibid.*
3. American Medical Association. *CPT Assistant* 9, no. 1 (1999): 7.
4. *Ibid.*
5. American Medical Association. *CPT Assistant* 8, no. 11 (1998): 5-6.

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