

Evolution of Skin Grafting for the Treatment of Skin Burns

Hadeeqa, Imama, Hamail

1st Year BDS, Islamabad Medical and Dental College, Islamabad Pakistan

Key Points

- Advancements in burn care
- Use of fish skin for transplant treatment of burns

The history of burn care has a very extensive basis. Initially, it was described around 1500 BC, but significant medical improvements have been made over the past 200 years. Montgomery's time saw a significant reduction in treatment complexity, although developments over time included the use of ointments, antibiotics, and significant skin grafting. Following the work of Swiss physician Jacques Louis Reverdin, the first skin graft was carried out in 1870.

Method:

In the past, cold materials were applied on burns to offer a cooling effect and as stimulants. However, skin grafting, a surgical process that involves removing skin from a specific location of the body known as the donor site and applying it to the site where there is skin loss with the aid of some specialized devices, is now primarily utilized for therapeutic purposes. If there is a vast region to be operated on, this procedure can take one to three hours or even overnight. Skin grafting is a necessary procedure that could result in difficulties.¹

Result:

You will initially have a purple or crimson colour after having recently had surgery while the skin grafting process is underway. This technique allows for the recovery and restoration of missing or injured skin. The skin's functionality is also restored. Skin grafting allows for the recovery of lost skin following illness, skin burns, cosmetic procedures, or reconstructive surgery.

Since the previous 50 years, burn care has advanced significantly, with a notable decrease in mortality that can be attributed to advancements in early burn excision, early fluid resuscitation, infection management, and nutrition. Burn care has undergone several changes over the years, from straightforward operations to more intricate ones. The most recent

and sophisticated method is skin grafting, which was formerly the basic application of cold products, ointments, and dressings. Janzekovic demonstrated her early excision and split-thickness autologous skin transplant wound covering concept in 1970. Even today, this procedure is regarded as the gold standard for surgical burn therapy. Split-thickness skin grafting has the significant benefit of allowing the same donor site to be used repeatedly following recovery, which normally takes 7 to 14 days. Less scarring and morbidity at donor sites, which expand the donor sites that can be considered, are further advantages over full-thickness skin grafts. The thighs, legs, belly, back, arms, forearms, and chest are often used donor sites. The scalp or even the scrotum might be used as a last option donor site in cases with severe burns where there is a lack of suitable skin. Unmeshed STSGs (sheet grafts) and STSGs extended using certain expansion techniques need to be distinguished from one another. Small burns are frequently covered with sheet grafts, while big burns are best covered using meshed split-thickness skin grafting.²

Split-thickness skin grafting has a long history that begins in the late 19th century. Ollier created the first known split-thickness skin grafting technique in 1872. By covering the entire wound surface with skin grafts, his studies showed not only a faster healing but also reduced scar development and consequently less scar contractures. Ollier dubbed his method "dermo-epidermic grafting" since these grafts included both epidermis and some dermis. Prof. Carl Thiersch, head of the department of surgery in German Surgical Association Congress, His method included using a razor blade to cut the skin as thinly as possible using pointed, horizontal incisions, resulting in thin strips of epidermis that only contained a small portion of dermis. The Thiersch Graft technique, which gained widespread attention, was developed by Thiersch. The technique is also known as "Ollier-Thiersch graft" because of how similar both discoveries were. The

Blair and Brown method of "split skin grafts" of intermediate thickness was first introduced in 1929. Because dermal layers are present, these grafts are thicker than "Ollier-Thiersch grafts." Ollier and Thiersch recommended only including the epithelial layer, however the split skin grafts of intermediate thickness also contained a sizeable portion of the dermal layer. The goal was to keep both the "Ollier-Thiersch graft" and the full-thickness skin transplant's benefits. An innovative split-thickness skin grafting technique was created in 1941 by American surgeon Earl C. Padgett utilizing a manual dermatome.

The "three-quarter"-thickness skin graft showed good graft take, and the dermatome made it possible to create new skin donor sites that could not have been created using free hand skin grafting techniques.¹

A phase III randomized controlled trial involving 115 outpatients with superficial partial-thickness burns affecting 15% or less of body surface area and no prior treatment was carried out in Fortaleza, Brazil, from April 2017 to October 2018. Participants ranged in age from 18 to 70. Glycerolized fish skin was administered to 57 patients, while 1% silver sulfadiazine lotion was applied to 58 others. Reepithelialization time, dressing usage, treatment-related expenses, and pain severity (as measured by the visual analogue scale, Electronic von Frey, Burns Specific Pain Anxiety Scale, and painkiller use) were the main outcomes. Every 48 hours, patients were assessed. Patients who had fish skin treatment needed fewer dressing changes (1.6 versus 4.9; $p = 0.001$) and fewer days for reepithelialization (9.7 versus 10.2; $p = 0.001$). Additionally, they required fewer analgesics and scored lower on the Burns Specific Pain Anxiety Scale, Visual Analogue Scale, and Electronic von Frey measures. The final average treatment-related cost per patient was decreased by 42.1 percent because to the usage of fish skin. The reepithelialization-prompting, pain-relieving, and cost-saving properties of Nile tilapia fish skin may help under-resourced public health systems in underdeveloped nations.² The goal of the current study was to ascertain whether a combination of NexoBrid and fish skin transplant treatment was on par with or superior to the existing standard of care. Consequently, depending on the depth of the lesion,

fish skin grafts, STSGs, or Suprathel (PolyMedics Innovations GmbH, Denckendorf, Germany) were used to cover burn injuries. The focus was on the development of wound healing and the scar quality of healed burn wounds for validation because dealing with scarring is still a difficult aspect of burn treatment. Retrospective data collection was done on patients (aged 18 to 60) with mixed dermal burn wounds who underwent subsequent treatment with at least two different wound-cover procedures, including Kerecis Omega3 Wound. Depending on the depth of the wound, burn wounds were coated after enzymatic debridement using NexoBrid. Suprathel was used to treat superficial partial-thickness burns because it is already the accepted standard of care in our institution. Deep partial-thickness burns were treated with either an autologous STSG (0.2 mm, meshes:1.5) or a fish skin graft. The patient's healthy skin served as a control for all relative measurements made on the graft-treated areas.

It was observed that enzymatic debridement in combination with intact fish skin grafts resulted in faster burn wound healing and better outcomes than split thickness skin grafts.³

Reference:

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