

The Meek Micro Stamp Skin Graft for Treatment of Extensive Deep Burn Cases

Att Nitibhon, MD¹ ; Pornprom Muangman, MD²



Att Nitibhon, MD

Abstract

It is difficult to fully cover the wound in extensive deep burn cases. Conventional skin grafting cannot resolve the problem if the donor site is limited and is much smaller than the recipient site. The Meek micro stamp skin grafting was introduced to Thailand in 2015 and we used this technique on 2 patients. The first patient had a 55% body surface area burn, as a result of a high voltage electrical injury as well as an inhalation injury. The second patient had an 80% body surface area burn, with an inhalation injury. The result is we required smaller donor sites than in a conventional case. Mesh skin grafts and complications such as a graft not taken, wound infection and cosmetic result was comparable to the conventional mesh graft technique.

Keywords: meek graft, extensive deep burn

In extensive deep burns the wound must be closed by autologous skin graft. Due to the limitation of the donor site, adequate skin grafts remain a significant difficulty. The technique to expend harvested skin graft was presented by Mr. Cicero Parker Meek¹ from the University of South Carolina Aiken (USCA), USA in 1958. But the technique was complicated so after Tanner et al.,² presented the mesh skin graft technique in 1964, the Meek technique was discontinued. In 1993, the modified Meek technique was reintroduced and it was claimed to be superior to the mesh skin grafting technique and at present is used by many burn centers worldwide.³ The Mesh graft technique creates perforations then stretches the skin out while the modified Meek technique cuts the skin into small square pieces and stretches these out, and they can be further expanded as needed. The modified Meek technique was introduced in Thailand in 2015 and we had the opportunity to perform this technique on two patients with extensive deep burn wounds.

Case Report # 1

A male patient from Thailand, aged 50 years, had a history of underlying hypertension and severe dependence on EtOH. He was injured by 22,000 volts of high electricity. He was conscious during the transfer to Bangkok Hospital headquarters from the initial hospital where he had been treated. He was diagnosed with a high voltage electrical injury, with burns to 55% of his total body surface area (TBSA), many parts of the wounds were considered deep tissue burns and he had suffered an inhalation injury. Post treatment, he underwent sequential burn debridement by sharp instruments, and hydrosurgery (Versajet).

- On 26th day, he underwent modified Meek technique skin grafting with 30 pieces of 1:4 expansion prefold gauzes at his right arm and trunk and sheath graft for his right hand.
- On 33th day, he underwent modified Meek technique skin grafting gauges using another 30 pieces of 1:4 of expansion prefold gauge of his left arm.
- On 47th day the wound was almost all healed, the graft took (about 90%) with minimal infection at the same micro stamp. The areas of graft failure were mostly detected on the right chest (approximately 7% of body surface area) and finally we had to perform a skin graft reoperation. The other areas of graft loss were scattered (approximately in 3% of body surface area) however all of these areas were finally healed by epithelialization.
- After that, the small wound healed slowly (because of vigorous physical therapy) and healed on 71th day.

¹ Surgery Center, Bangkok Hospital, Bangkok, Thailand

² Department of Surgery, Faculty of Medicine Siriraj University Hospital, Mahidol University, Bangkok, Thailand.

* Address Correspondence to author:
Att Nitibhon, MD
Surgery Center, Bangkok Hospital
2 Soi Soonvijai 7, New Petchaburi Rd.,
Bangkok 10310, Thailand.
email: att.ni@bangkokhospital.com



Figure 1: Day1.



Figure 1: Day47.



Figure 3: Day78.



Figure 4: Day110, patient at OPD.



Case Report # 2

A 41-year old male from South Asia had 80%TBSA burns with an inhalation injury. He had initial treatment for his burns at a local hospital then was referred to Bangkok Hospital headquarters. On arrival, he presented with significant burns to the majority of his body, with the exception of his scalp, some sections of his abdomen and as well as minor area of both legs. The mortality rate is 79% in the age group of 40-50, with 71-80% TBSA burns also presenting an with inhalation injury.⁴ We used the modified baux score to predict the burn mortality rate in this study.⁵

After meticulous supportive treatment, he underwent and escharotomy of both arms and sequential debridement of the wounds with sharp instruments and hydrosurgery (versajet).

- On 30th day, he underwent modified Meek technique skin grafting and 104 pieces of 1:4 expansion prefold gauzes were used. His right hand was grafted by sheath graft. On the next day another 16 pieces of 1:4 expansion prefold gauzes were used.

- On 47th day, another 18 pieces of the same gauzes were used for his trunk. His face and neck were grafted by sheath graft.
- On 54th day we covered the rest of the area of deep burn which is about 55% of body surface area.
- The patient suffered from an 80% extensive burn and most areas of the wounds were quite deep and required a skin graft for wound closure. The patient didn't have enough donor skin to harvest and we decided to use meek graft in order to increase a higher ratio of skin expansion and decrease the areas of reharvested skin graft. However, the high ratio of skin expansion by meek technique from 1 to 4 caused a decrease in skin graft strengthening because the distance between pieces of Meek microskin were increased. So the epithelialization between pieces of skin graft was more difficult and this was linked to the increasing area of graft loss especially over the joints and frequently moving areas. He had an additional conventional mesh skin grafting.
- The modified Meek technique skin grafting was used for about 90% with minimal infection at the same micro stamp. In our opinion, only the cosmetic result is comparable with conventional mesh skin grafting.
- The patient was discharged 85 days post treatment.



Figure 1: Arrival.



Figure 2: 30 day at the 1st graft.



Figure 3: At 12 weeks.

Discussion

In cases of patients with significant deep tissue burns, finding an adequate donor skin site is often problematic. The mesh technique that was introduced by Tanner et al.,² can moderately reduce this issue. We find that if we use 1:1.5 mesh, the graft can cover only the wound just a little bit more than donor site, not 1.5 times. If we use 1:3 mesh we must use an

intermediate thickness graft such as 0.018 inch, which for a prolonged illness burn patient, the donor site will heal over a much longer time period than usual. It may take 1-2 months to heal and there is likely to be a scar.

We used 1:4 expansion gauze and 0.014-inch thickness modified Meek skin grafting. It was shown that the graft can cover the wound 4 times more than the donor site. In addition, we found that we could use a small limited donor skin graft to cover a large deep burn wound area. The donor site healed within 1 month and the grafted area healed in about 2 weeks. The graft took about 90% with minimal infection and the area that was lost due to infection were only individual micro stamps and not the whole sheath as mesh graft. The risk of infection, whether lower or higher, cannot be evaluated here because of the few number of cases. Lastly, in our opinion, the late scar formation is comparable with conventional mesh skin grafting.

References

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Conclusion

Meek technique skin grafting can be an alternative treatment for severe burn patients and is superior to conventional mesh skin grafting as less area is required from the donor site. The technique provided a rapid and efficient surgical grafting for wound coverage compared to the conventional approach. Overall, it helped to increase the percentage of graft take and decreased the length of hospitalization stay. However, one disadvantage to take into account is the high cost of the treatment.

Conflicts of interest: None declared.