ABSTRACT

Background: In Singapore, we experience a unique annual surge of burn cases involving sole of foot during the Hindu fire walking festival. Traditionally, superficial partial-thickness burns of the soles were managed expectantly with regular dressings. We conducted a study to evaluate the effectiveness of an alternative approach of using synthetic skin substitute (Biobrane®).

Method: A case series of foot burns admitted October 2016 to the Singapore General Hospital Burns Centre. Burn cases with superficial partial-thickness burn of bilateral sole of foot were included in the study. Exclusion criteria included deep dermal burns and burns that required excision and closure with skin grafting. The patient demographics, time to presentation, medical co-morbidities were analyzed. Outcomes such as length of hospital stay, incidence of infection, need for further surgery, return to pre-injury amputation status and occupation and cost were studied.

Result: A total of 6 partial thickness burns of sole of foot in 3 patients with bilateral foot burns which were treated with Biobrane® were included in the study. Patients were able to return pre-injury functional status - return to work and pre-morbid ambulation status. Neither incidence of wound infections nor any needs for repeat surgery were recorded. However, this group required an increased length of stay and incurred high treatment cost.

Conclusion: Biobrane® is a viable adjunct in the management of sole of foot burns. The authors believe there is potential for an improved rate of recovery with Biobrane®. However, the higher cost and length of stay are among its drawbacks. In view of the limitations of our study - case series and small sample size, a prospective and double arm assessment will be required to present definite evidence for synthetic skin substitute in these cases.

Keywords: Foot, Sole, Burn, Biobrane
INTRODUCTION

The annual fire walking ceremony is a religious festival celebrated by the Hindu community where male devotees walk across a burning charcoal pit.\textsuperscript{1,2} During the festival, our institution will experience an increased number of foot burn cases. Biobrane\textsuperscript{®} is a bi-layered synthetic skin substitute which has been shown to be effective in treating superficial, partial-thickness skin burns. Its advantages includes reduced need of dressing changing, pain control, reduced length of hospital stay and improved healing time.\textsuperscript{3-6} Traditionally, superficial partial-thickness burns of the sole are managed expectantly with regular dressings. We evaluate the effectiveness of an alternative approach of using Biobrane\textsuperscript{®}.

METHOD

A case series of foot burns admitted October 2016 to the Singapore General Hospital Burns Centre. Burn cases with superficial partial-thickness burn of bilateral sole of foot were included in the study. Exclusion criteria included deep dermal burns and burns that required excision and closure with skin grafting. The patient demographics, time to presentation, medical co-morbidities were analyzed. Outcomes such as length of hospital stay, incidence of infection, need for further surgery, return to pre-injury ambulation status and occupation and cost were studied.

RESULT CASE 1

A previously healthy 30-year-old Indian man presented with superficial partial thickness burn injury due to fire-walking barefooted. He was admitted on the day of the injury. He underwent wound debridement and Biobrane\textsuperscript{®} application one day after admission. Intra-operative findings included 1\% TBSA on the left sole and 1\% TBSA on the right sole. First wound inspection on Post Operation Day (POD) 2 showed that Biobrane\textsuperscript{®} was stable and took well, no signs of infection. He was discharged on POD 2. Second wound inspection was done on POD 4 in clinic with Biobrane\textsuperscript{®} stable, the wound healing well. At the third wound inspection on POD 10, as can be seen in Image 1, Biobrane\textsuperscript{®} was ready to be trimmed as the wound was clean and epithelializing. There was no sign of infection and no need for repeat surgery. He was able to perform light duties 10 days after the surgery and returned to employment as a business manager one month after injury.

CASE 2

A previously healthy 32-year-old Indian man presented with superficial partial thickness burns due to fire-walking barefooted. He was admitted on the day of the injury. He underwent burn wound debridement and Biobrane\textsuperscript{®} application on the day of admission. Intra-Operatively, it was noted that he sustained 1\% TBSA on the left sole and 1\% TBSA on the right sole. Wound inspection done on POD 2 showed that wound was clean but slightly moist. He was continued on light-iodine gauze dressing and discharged on POD 8. Subsequently, wound inspection on POD 10 (Image 2) in clinic showed that wound was clean and epithelialized with no sign of infection. A repeat surgery was not indicated. He was able to return to light duties at work from POD10 and returned to premorbid work as a safety officer one month after surgery.

Disclosure: The authors have no financial interest to disclose.
CASE 2

A 32-year-old Indian man presented with partial thickness mid-dermal burn injury due to fire-walking barefooted. He was admitted three days after the injury. He has asthma and works as an office worker. He underwent burn wound debridement and Biobrane® application 5 days after the injury. Intra-operatively, noted patient sustained 3% TBSA of bilateral feet burns over soles and pulps of toes. The right foot was partial thickness to mid-dermal burns and the left foot was mid dermal burns. At the first wound inspection on POD 2, Biobrane® was stable and wound was clean. Subsequent wound inspection on POD 6 showed that Biobrane® was taking well. He was discharged on POD 6. At the outpatient wound inspection on POD 12, as can be seen in Image 3, wound was epithelialized, except for a small raw area over the left fifth toe. There was no sign of infection and no need repeat surgery indicated. He returned to light duty on from POD 12 and returned to full employment one month post operation.
DISCUSSION

The use of Biobrane® for superficial partial thickness burn has been proven to be successful.4,5 The cost incurred for these three patients range from 2378 – 2951 US dollar. The cost is higher compare to traditional dressing, in example paraffin gauze. The superiority of Biobrane® compared to paraffin gauze is that we did not need to change it. In another research by Austin et al, Biobrane® and cadaveric allograft showed no statistically significant difference, although cadaveric allograft cost more than Biobrane®6

Longer length of stay may caused by the use of Biobrane®. Krezdorn et al showed that Biobrane® did not prove to have beneficial effects on length of stay. In elder patients, Biobrane® may prolonged the length of stay.3 This was opposite to the research of Fan et al, which showed Biobrane®, compared to silver foam, has significantly shorter length of stay in paediatric patients with partial thickness burns.7

CONCLUSION

Biobrane® is a viable adjunct in the management of sole of foot burns. The authors believe there is potential for an improved rate of recovery with Biobrane®. However, the higher cost and length of stay are among its drawbacks. In view of the limitations of our study-case series and small sample size, a prospective and double arm assessment will be required to present definite evidence for synthetic skin substitute in these cases.

REFERENCES