MEBO Applied to the Granulation Wound of Burn after Skin Grafting

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**Abstract** 54 cases of burn were treated with MEBT. MEBO was directly applied on the granulation wounds after skin grafting. Clinical and histopathological observations were conducted and revealed that the skin graft on the granulation wounds multiplied and enlarged quickly. The number of fibroblasts or fibrocytes in the granulation tissues of MEBT group was much fewer than that of non-MEBT group and proved that MEBO was beneficial to the enlargement and the survival of skin graft. It is probably capable of restraining the multiplication of fibroblasts.

**Key words** Burn; Granulation lesion area; Skin grafting; MEBT;

Half exposed method in treating the granulation wound of burn after skin grafting using single layer of large mesh gauze with antibacterial medicines was usually adopted in the past. This method had the following advantages compared with bandaging method: it was convenient to observe the burn wound and infection was easy to be controlled and the amount of dressing could be reduced. However, if purulence accumulation or infection beneath the gauze occurred, the survival rate of transplanted skin graft could be affected. Mechanical injury, aching of burn wound, haemorrhage and skin graft avulsion could occur because of the adhesion of gauze when wound dressing was changed. 54 cases of granulation wound with skin grafting were treated with MEBT in our department from August 1989 to June 1991. The previous problems were solved and the effect was satisfactory. The details are as follows:

**Clinical Data**

54 cases involving 30 males and 24 females were included in this group. The age was from 1 to 61 years old and the average age was 29 years old. The largest burn wound was 98% (Ⅲ-degree 37%) and the smallest was 1% with an average of 25%. There were 15 cases caused by charcoal fire burn, 24 cases caused by flame burn, 9 cases caused by acid burn, 3 cases caused by boiling water and 3 cases of scalp avulsion wound. For 48 cases, the crusta was removed and skin grafting was applied to the granulation wound. For 6 cases, the eschars were removed and skin grafting was applied to the fresh wound and all skin grafts were small with a thickness of the blade. The distance of the transplanted skin graft was 0.5~2.5 cm.
Time and Method of Medicine Application

1. Time of medicine application: A layer of large mesh gauze with antibacterial medicine was used as the inner dressing after skin transplantation and sterile gauze with pressure dressing was applied externally. The external dressing was removed after 3 days and MEBO was spread onto the single large mesh gauze that was preserved. The inner large mesh gauze was removed after 4~6 hours and MEBO was spread onto the burn wound directly and wound dressing was changed once every 4~6 hours.

2. Method of medicine application: MEBO was spread with sterile tongue depressor or cotton stick onto the burn wound evenly with a thickness of 1 mm. The range of the medicine was 1 cm larger than that of the burn wound. The burn wound was exposed thoroughly and was covered with medicine all the time. The liquified matter at the burn wound was wiped off with sterile paper or cotton stick timely to avoid friction or pressure suffered by the burn wound. Attention should be paid to avoid erasing the skin graft within a week after skin grafting. Proper external fixation should be adopted when the patients fell asleep.

Clinical Observation and Result

1. The observation on the survival rate of the skin graft: The survival rate of the transplanted skin grafts was estimated 10 days after skin grafting. Biopsy of tissues was performed at the same time. The survival rate of 51 cases after skin grafting was larger than 90% and 1 case reached 80% and 2 cases were lower than 50%.

2. Observation on the distance of skin grafts and the time of healing: According to Wang LN’s observation \[1\], the burn wounds with a distance of 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm and 2.5 cm between skin grafts were observed. The burn wounds with a distance of 0.5 cm healed on the 8\textsuperscript{th} day after transplantation. The healing time was 10, 12, 15 and 20 days after operation for burn wounds with a distance of 1.0 cm, 1.5 cm, 2.0 cm and 2.5 cm separately. It was concluded that the extending distance a day of the transplanted skin graft was 0.54 cm.

3. Observation on clinical symptoms and physical signs: The patients were enquired and examined. The aching, haemorrhage and infection conditions at the burn wounds and also the avulsion condition of the transplanted skin graft were observed. There were only 3 cases with skin graft dissolving and defluxion.

4. Histological observation: 6 cases were chosen randomly 10 days after transplantation. The tissues from the transplanted skin graft and the diffusion region were chosen for pathological examination. The hyperplasia of squamous epithelium of the transplanted skin graft was obvious under light microscope especially the
hyperplasia of prickle-cell layer. The epidermic cells had distinctive layer and there were rich capillaries growing in the skin. The diffusion part of the transplanted skin flap was the parakeratosis squamous epithelium and the deep layer was the granulation tissue (Figure 1).

Figure 1 The growth of the transplanted skin graft was fine

6 cases of patients treated with MEBT and 3 cases of patients treated with other methods were chosen. Pathological examination of granulation tissues before skin grafting was performed. The results showed that the amount of fibroblasts and collagenous fibers of the former were less than that of the later significantly (Figure 2 and 3).

Figure 2 The amount of fibroblasts in the granulation tissue of MEBT group was small. (×100)

Figure 3 The amount of fibroblast and fibrous cells in the granulation tissues of non-MEBT treatment under light microscope observation was relatively much.

Typical Case

A female patient with the age of 36 years old was chosen. The patient fainted when she had a shower because of gas poisoning and the back of the patient contacted the charcoal fire for about 10 minutes.
She was saved and sent to our hospital on February 26, 1990. The diagnosis was: 5% burn at the back, III degree. MEBO was spread onto the burn surface and the crusta was removed by silkworm. After that, small skin grafts with a thickness of the blade were transplanted to the granulation wound 28 days after burn. The dressing was opened 3 days after transplantation and MEBO was spread onto the burn wound. The survival rate of the skin grafts was 95% and the burn wound healed 14 days after skin grafting. Aching, haemorrhage, infection, dissolving and avulsion of skin graft at the lesion area didn’t occur during the course of dressing change (Figure 4 and 5).

Discussion

According to the experimental results of Hinman [2], the endepidermis cells grow rapidly in the moist environment and the healing condition of the skin is fine. MEBO can prevent the pervaporation of moisture at the burn wound to keep it moist [3] and it’s good for the survival and growth of skin flap. There were 51 cases with over than 90% survival rate among the 54 patients in this research and one case with 80% survival rate. The pathological examination proved that the transplanted skin grafts grew well and extended to the surrounding environment. It showed that MEBO didn’t have bad effects on the survival and growth of transplanted skin graft. There were 2 cases with lower than 50% survival rate and they were related to low proteinemia, anemia and stale granulation wound and so on.

The outstanding advantage of MEBO application onto the burn wound after skin grafting was: there was no dressing covering the burn wound so the burn wound was exposed thoroughly. Gauze didn’t need to be changed and it was convenient for observation and debridement. The mechanical injury or avulsion of transplanted skin
The pathological examination on the granulation tissues showed that the amount of fibroblasts of MEBT treatment was less than that of non-MEBT treatment significantly. It showed that MEBO could restrain the growth, proliferation of fibroblast and decrease the formation of scars. It deserved further investigation.

For the time of applying MEBO onto the burn wound after skin grafting, it is considered feasible to open the dressing and smear MEBO onto the lesion area 3 days after transplantation. 1~2 days after skin grafting, the nutrient was supplied mainly through the exuded plasma. The cohesion of skin graft and the burn wound was not fast, so during this period, bandaging method was adopted to fix and protect the transplanted skin graft from erasure and the pressure was maintained to make the skin graft and the burn wound stick to each other tightly. Newly born capillaries had grown into the skin graft 3 days after skin grafting and relatively fast fibrous connection formed between the skin graft and the burn wound and the skin graft couldn’t be erased easily. On the contrary, if we opened the dressing too late or bandaging method was continued, purulence and blood accumulation beneath the skin graft couldn’t be observed timely. Infection of burn wound or dissolving, necrosis of transplanted skin graft would occur.