A Case of Pediatric Extensive Deep Burn Treated with MEBT/MEBO

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[Abstract] Objective: To observe the effect of MEBT/MEBO in treating pediatric extensive deep burn. Method: The child was treated with MEBT/MEBO in the whole course in association with systemic treatment. Results: Wounds healed in 42 days. No deformity and no dysfunction of the limbs occurred. Conclusion: MEBT/MEBO is very efficacious in treating pediatric extensive deep burn.

[Key words] Extensive deep burns; Pediatric; Treatment MEBT/MEBO
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The fatal rate and the disability rate of pediatric extensive deep burn were quite high and in infants and babies below 3 years old it was even worse. In order to find the best therapy, MEBT/MEBO was applied in the whole course in association with systemic treatment to a 3-year-old child of extensive deep burn, who was sent to our hospital on March 15th 2001. The result was satisfactory and wounds healed in 42 days. No deformity of the limbs and functional disturbance occurred. The treatment was summarized as follows:

1. Clinical data

Patient: Lao, female, three years old. She was burned by lime with lots of areas wounded and was sent to the emergency room in our hospital on 11:30 p.m., March 15th 2001. This pediatric patient unfortunately fell into a lime pool when she was playing outside. Although she was rescued out of the lime pool in 2 minutes, the lime attached to the skin was not washed off in 3 hours, hence causing extensive deep burns in the whole body. The results of physical exams upon hospitalization were: T 36.5°C, P 160 times/min, R 26 times/min, dotty, apathetic, poor reaction, disoperative, purple in mouth and lips. The four limbs were wet and cold. No arrhythmia occurred. The breath voice of the two lungs was clear. The four limbs, the trunk and the perineal position were burned. All of the rotten skins on the wounds fell off. No blisters and no exudation were found. Most wounds in two hands, two feet, two legs and two arms showed wax-white color. The other wounds showed deep red color. No obvious pain incurred when the wounds were treated by skin ploughing and tension relieving method. The diagnosis upon hospitalization were:

1) Extensive deep burn caused by quicklime. Total burned area was 70% TBSA with 30% of deep II degree, 25% of superficial III degree and 15% of deep III degree.

2) Hypovolemic shock.

The right subclavian vein puncture was applied immediately after hospitalization.
Deep intravenous channel was set up to replenish fluid quickly to treat shock. Antibiotics were applied systemically to prevent infection. The third degree circle wounds in the far ends of the four limbs was disinfected by 0.1% Benzalkonium Bromide solution and then skin ploughing and tension relieving treatment was applied. All the wounds were applied with MEBO externally. Since the beginning of shock period, necessary nutrient (Pepti-2000 Variant) was given via nasal feeding tube. After the shock period, the combination of medicine and blade method was applied to remove the necrotic tissues in the III degree wounds quickly without causing damage to other tissues. Almost all the necrotic tissues in the wounds were removed 10 days later and granulation tissues began to occur. Preventive antibiotics were applied for ten days. But on the 15th day after burns, systemic pyaemia occurred because of the venous duct in the left neck (pseudomembrane was found on the tip of the venous duct and it was proved to be Acinetobacter baumannii after bacteria culture). At the same time of searching and removing the cause (removed the venous duct), sulperazone was applied for 5 days according to the instructions of drug allergy and finally systemic pyaemia was under control. The wounds of deep II degree and superficial III degree almost healed 27 days later after the burn. To the remained deep III degree wounds with no obvious growth of skin islands, dotted grafting was applied on the 35th day. One week later (the 42nd day), all the wounds on the body healed. A recent body examination showed no deformity of the limbs and no functional disturbance occurred.

2. Discussion

1) Anti-shock treatment

Since the right subclavian vein puncture was applied immediately and deep intravenous channel was established, proportional fluid replenishment was in time. Fluid replenishment should follow the formula advocated by Xu Rongxiang. The ratio of colloid to crystalloid was 1:1. Urine output, which was an important index of transfusion speed and the quality and quantity of the fluids, should be maintained at above 1ml per kilogram body weight per hour. Colloid mainly included albumin and plasma. When pachemia in the shock period was corrected, proper whole blood was transfused to strengthen the oxygen carrying capability of blood and improve the oxygen supply for tissue cells. Thus the poor blood and oxygen conditions in important organs were ameliorated. At the same time, crystalloid, colloid and water was transfused in small amount (50 ml) in turn in order to prevent the imbalance of osmotic equilibrium of body fluid in pediatric patient caused by large amount of single-constituent transfusion. The patient went through shock period successfully since the treatments were proper. It seemed that the primary thing to do against the shock caused by pediatric extensive deep burn was to establish a safe and effective intravenous channel. Deep vein puncture was safe and reliable but it was not recommended to choose peripheral veins or vein incisions as the transfusion channel. The reason was the former channel could not provide the body with necessary transfusion amounts within a short time while the latter was quite destructive and the channel could only maintain for a short time. Another important thing to do was to adjust the transfusion speed, the quality and quantity of the fluid promptly according
to the urine output, and osmotic pressure of plasma, crystalloid and colloid. It should be emphasized that the ratio of colloid to crystalloid should be kept at 1:1. If the condition permitted, the choice of colloid should choose albumin. Otherwise, too much crystalloid transfusion could cause overdosage and even cause congestive heart failure and lung edema.

2) Treatment of deep wounds

All the wounds in this case were deep wounds. Deep 2\textsuperscript{nd} degree wounds were the most superficial wounds while 3\textsuperscript{rd} degree wounds covered a large area. As a result, whether the treatment was proper determined the life of this pediatric patient. Skin ploughing was not applied in treating deep 2\textsuperscript{nd} degree wounds. The whole process followed the principles\cite{[1]} of treating deep 2\textsuperscript{nd} degree wounds advocated by Professor Xu Rongxiang. The necrotic tissues were liquefied and discharged from outside to inside under the effect of MEBO. Any methods which would damage the remaining epithelial tissues should be avoided. To the necrotic tissues in the circular 3\textsuperscript{rd} degree wounds in the limbs, besides the early skin ploughing and tension relieving to prevent ischemic necrosis in four limbs, the combination of medicine and blade method should be applied 72 hours later after burns repeatedly. In 10 days after the burns, all necrotic tissues in the wounds were basically removed and granulation barrier was formed. This not only created good conditions for the forming of skin islands from the remaining epithelial tissues in the wounds and the healing of the wounds but also eliminated the possible causes of regional and systemic pyaemia. These were also the key reasons why the extensive deep wounds of the pediatric patient could heal in only 40 days. As a result, in treating 3\textsuperscript{rd} degree wounds, the rule of “cleaning the wounds thoroughly and draining smoothly” should be followed strictly. The MEBT/MEBO proposed by professor Xu Rongxiang created physiological moisten environments for the epithelial tissues remaining in the wounds. It also provided an artificial scab-dissolving period for the necrotic tissues in the wounds. The scab-dissolving period occurred before the crest-time of immune rejection reaction. In this period, MEBO started the four bio-reactions of hydrolyzation, enzymolysis, acidification and saponification hence caused the liquefaction of the necrotic tissues in the wounds. The systemic inflammation reaction caused by this was not serious and was different fundamentally from that caused by immune rejection. Because the necrotic tissues in 3\textsuperscript{rd} degree wounds were quit thick, the four bio-reactions were hard to start and the necrotic tissues were difficult to liquefy if just applying medicine in the wounds. This would certainly cause the block of drainage and even cause regional or systemic pyaemia. If the method of “the combination of medicine and blade” was applied skillfully, it could not only keep the smooth drainage in the wounds but also clean the necrotic tissues thoroughly before the crest-time of the immune rejection reaction occurred hence reduced the danger of the occurrence of systemic inflammation syndrome.

3) Application of antibiotics

In this pediatric patient, antibiotics were used preventively for the first 10 days and therapeutically 15 days later after the burns. Systemic pyaemia occurred because...
the venous tube in the left neck was kept there for a long time. After its removal (removal of venous tube), sulperazone was applied systemically for 5 days and finally systemic pyaemia was under control. According to the characteristics of MEBT, the opportunity of applying preventive antibiotics was immediately after hospitalization. It could also prevent enterogenic infection. The time of application was during the shock period and the crest-time of liquefaction period (before most of the necrotic tissues were removed), which was within 10 days after the burn. When routine broad-spectrum antibiotics were applied over 1 week, routine antifungal drug was also applied to prevent secondary infection. The following aspects should be taken into consideration when choosing antibiotics: under no drug allergy instructions, 1. common bacteria in the wounds, 2. dominant bacteria in the wounds, 3. the exudants in the wounds and blood bacteria culture results plus drug allergy results. When systemic pyaemia occurred, antibiotics were applied therapeutically. On the basis of actively searching and removing the related causes, proper antibiotics were applied according to the conditions of the wounds and the results of blood bacteria culture and drug allergy tests.

4) Maintenance of internal organ functions

(1) Maintenance of heart functions. During the period of fluid replenishment in shock stage, cedilanidum, a cardiotonic glycoside that has a selective effect on heart to increase myocardial contractile force and to improve the circulation function, was applied. Biphenyldicarboxylate (enzyme-reducing drug) and nutritional drug for cardiac muscle (Fructose-1.6-diphosphate) were applied to treat the abnormal increase of indexes of cardiac muscle zymograms. Soon all indexes returned to normal.

(2) Maintenance of kidney functions. In different stages of the treatment, adequate blood circulation volume should be maintained to prevent shock and lack of blood and oxygen in the kidney. The application of drugs with renal toxicity should be avoided. After the correction of shock, solute diuretic such as mannitol, which could not only protect the kidney functions by its slow diuresis effect but worked as anti-oxygen free radicals, could be applied.

(3) Maintenance of gastrointestinal functions. High gastrointestinal nutrition support (Pepti-2000 Variant was injected via the nasal feeding tube) was given since the beginning of shock period to prevent the atrophy of gastrointestinal membranes and to assist the recovery of their physiological functions. 654-2 and H2 receptor inhibitor were applied to relieve the convulsion of smooth muscles in the blood vessels in gastrointestinal membranes, to improve the poor blood and oxygen conditions in the gastrointestinal membrane, to maintain the mechanic, biological and immunological barrier of the gastrointestinal barrier and to prevent the occurrence of stress ulcer and enterogenic infection.

(4) Maintenance of respiratory functions. The respiratory tract was kept smooth. Low flow oxygen was given to the patient to increase the body’s oxygenation function.
(5) Nutrition Support Treatments

This pediatric patient received intestinal nutrition (Pepti-2000 Variant was injected via the nasal feeding tube), which was the main nutrition support treatment, together with parental nutrition. According to the illness, whole blood, plasma or albumin was supplemented. Daily energy intake should be no less than 500 Kcal. Total protein level was kept around 65 g/L in the whole treating process, albumin level was around 35 g/L and hemoglobin level was around 14 g/L to prevent anemia and hypoproteinemia. The colloid osmosis pressure in the blood should be kept at normal level to stabilize the body's internal environment and to strengthen the body's immunity and anti-infection ability. Because of the prompt and effective nutrition support treatment, the wounds healed rapidly in 40 days after the burns.

References


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