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Treating aplasia cutis congenita in a newborn with the combination of ionic silver dressing and moist exposed burn ointment: A case report

Guo-Feng Lei, Jun-Ping Zhang, Xiao-Bing Wang, Xiao-Li You, Jin-Ya Gao, Xiao-Mei Li, Mei-Ling Chen, Xiu-Qin Ning, Jiang-Li Sun

ORCID number: Guo-Feng Lei (0000-0003-1629-5256); Jun-Ping Zhang (0000-0001-9135-2519); Xiao-Bing Wang (0000-0002-2411-2723); Xiao-Li You (0000-0002-2027-6763); Jin-Ya Gao (0000-0002-6318-1801); Xiao-Mei Li (0000-0001-6543-6794); Mei-Ling Chen (0000-0003-2796-470x); Xiu-Qin Ning (0000-0001-9798-4672); Jiang-Li Sun (0000-0002-6662-8824).

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Guo-Feng Lei, Jun-Ping Zhang, Xiao-Bing Wang, Xiao-Li You, Xiao-Mei Li, Xiu-Qin Ning, Department of Neonatal Intensive Care Unit, Sanmenxia Central Hospital, Sanmenxia 472000, Henan Province, China

Jin-Ya Gao, Jiang-Li Sun, Department of Intensive Care Unit, Sanmenxia Central Hospital, Sanmenxia 472000, Henan Province, China

Mei-Ling Chen, Reproductive endocrine center, Sanmenxia Central Hospital, Sanmenxia 472000, Henan Province, China

Corresponding author: Guo-Feng Lei, MD, Attending Doctor, Department of Neonatal Intensive Care Unit, Sanmenxia Central Hospital, Xiaoshan Road, Sanmenxia 472000, Henan Province, China. leiguofeng1981@sina.com

Telephone: +86-15036469906

Fax: +86-398-2933151

Abstract

BACKGROUND

Aplasia cutis congenita (ACC) in newborns is a condition in which congenital defects or hypoplasia is present in part of the epidermis, dermis and even subcutaneous tissue (including muscle and bones). First reported by Cordon in 1767, ACC is a rare disease with a low incidence of 1/100000 to 3/10000. Currently, there are 500 cases reported worldwide. ACC can be accompanied by other malformations. The onset mechanism of the disease remains unknown but is thought to be correlated to factors such as genetics, narrow uterus, foetal skin and amniotic membrane adhesion, use of teratogenic drugs in early pregnancy and viral infection.

CASE SUMMARY

In August 2018, we treated a newborn with ACC on the left lower limbs using a combination of ionic silver dressing and moist exposed burn ointment (MEBO) and achieved a satisfactory treatment outcome. The skin defects were observed on the external genitals and on areas from the left foot to 3/4 of the upper left side. Subcutaneous tissue and blood vessels were observed in the regions with skin defects. The following treatments were provided. First, the wound was rinsed with 0.9% sodium chloride solution followed by disinfection with povidone-iodine twice. And then MEBO was applied to the wound at a thickness

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of approximately 1 mm. After applying ionic silver dressing, the wound was covered with sterile gauze. The wound dressing was replaced every 2-3 d. At the 4-mo follow-up, the treatment outcome was satisfactory. There was minimal scar tissue formation, and limb function was not impaired.

CONCLUSION

The combination of ionic silver dressing and MEBO to ACC is helpful.

Key words: Aplasia cutis congenita; Newborns; Ionic silver dressing; Moist exposed burn ointment

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Core tip: Aplasia cutis congenita (ACC) is a rare disease in China and abroad. There is not yet a well-developed treatment for this disease. Combination of ionic silver dressing and moist exposed burn ointment in treating ACC is an useful and effective method. This treatment is worthy of being promoted in clinical practice.

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INTRODUCTION

Aplasia cutis congenita (ACC) is a rare disease in China and abroad. Patients with this disease often have other abnormalities or malformations. According to the literature, the incidence of ACC is approximately 1 in 100000, but the mortality rate is as high as 18%. Currently, there is not yet a well-developed treatment for this disease. A critical step in treating ACC is a prompt skin grafting to cover the wound^[1]. Although skin grafting is important for patients with large areas of skin defect, this surgical process can aggravate the patient's pain and suffering. Recently, with more in-depth studies on the treatment of ACC in newborns, methods employed in treating burn wounds have yielded beneficial therapeutic effects for treating ACC^[2]. Amongst the non-surgical methods, wound protection, infection prevention and nutrient supplementation are key to ensure treatment outcomes^[2]. Herein, a case of ACC treated in our hospital is reported along with a retrospective analysis of the clinical data and discussion on lessons learned.

CASE PRESENTATION

Chief complaints

In August 2018, a female infant presented to our hospital with the skin defects on the external genitals and areas from the left foot to 3/4 of the upper left side.

History of present illness

Patient's symptoms were observed after birth

History of past illness

The patient was a female infant born at 37⁺⁶ wk *via* C-section. Intrauterine distress was not observed. However, premature rupture of foetal membranes and bloody amniotic fluid were present. The baby was found with the umbilical cord around her neck. There was no abnormality in the placenta, and no asphyxia was observed. The Apgar scores were 10 at 1-10 min after birth. The birth weight was 2800 g.

Personal and family history

The 28-year-old mother was in her second pregnancy but first birth. A miscarriage had previously occurred at age 25. The mother performed a urine pregnancy test 35 d

after menstruation and received a colour ultrasound 54 d after menstruation. The results suggested intrauterine pregnancy, and the foetal size was consistent with the gestational age. Foetal movement was sensed at week 16 and remained active until delivery. The thyroid function test at week 18 displayed no abnormalities. Foetal chromosome (T21, T18, T13) screening at week 22 indicated that the baby was at low risk of aneuploidy. A four-dimensional colour ultrasound examination at week 26 found no abnormalities. After admission for delivery, no abnormalities were observed by various examinations on the mother including a routine blood test, routine urine test, coagulation test, infectious disease tests, hepatitis B, liver and kidney functions and electrocardiogram. The family did not have a history of congenital conditions.

Physical examination upon admission

The results of the physical examination of the infant after birth are described next. The infant appeared to be born full term with normal appearance and responded well to stimulation. Skin defects were observed on the external genitals and on areas from the left foot to 3/4 of the upper left side. Subcutaneous tissue and blood vessels were observed in the regions with skin defects (Figure 1).

Laboratory examinations

Laboratory blood tests were normal.

Imaging examinations

The ultrasound, lower limbs computed tomography (CT) scan, high-resolution chest CT scan, and head magnetic resonance imaging were normal.

FINAL DIAGNOSIS

The baby was diagnosed with ACC and was transferred to the Division of Neonatology for further treatment.

TREATMENT

The following treatments were provided: (1) Wound treatment: The wound was rinsed with 0.9% sodium chloride solution followed by disinfection with povidone-iodine twice. Moist exposed burn ointment (MEBO) was applied to the wound at a thickness of approximately 1 mm. The surface covered by MEBO was extended beyond the edges of the wound. After applying ionic silver dressing, the wound was covered with sterile gauze. The wound dressing was replaced every 2-3 d; (2) Infection prevention: Intravenous injections of second-generation cephalosporin were provided for 7 d; and (3) Nutrition support: An intravenous infusion of 10% glucose was given along with premium powdered formulas. The condition of the infant was complicated by hypoproteinaemia, which was corrected by the infusion of albumin. With the above-described treatment, the skin on the lower limbs of the patient recovered after 26 d (Figure 2), and the patient was discharged. The patient was prescribed multi-sulfonic acid mucopolysaccharide cream to prevent scar tissue formation and soften existing scar tissue.

OUTCOME AND FOLLOW-UP

During treatment, the functions of the limbs were preserved; limb shortening was not observed. No blisters were observed on the skin. A histopathological examination was not performed. At the 4-mo follow-up, the treatment outcome was satisfactory. There was minimal scar tissue formation, and limb function was not impaired.

DISCUSSION

ACC is a rare neonatal disease with a low incidence rate. The incidences are typically sporadic. However, the condition may be genetic. The cause of ACC is not known. According to the literature, the most common factors of ACC include foetal chromosomal or genetic abnormalities (particularly *BMS1* and *UBA2* genetic abnormalities)^[3], trauma^[4], amniotic fluid or amniotic membrane abnormalities (e.g., foetal skin and amniotic membrane adhesion)^[5], intrauterine complications (e.g., infection)^[6], vascular lesions (e.g., thrombus and vascular diseases)^[7] and the use of



Figure 1 Aplasia cutis congenita in our patient.

teratogenic drugs during pregnancy (*e.g.*, cocaine, methotrexate, angiotensin inhibitor)^[8]. ACC is diagnosed mainly based on clinical manifestations: Clear skin defects are observed on regions of the body at birth; the defects can be accompanied by defects or hypoplasia of subcutaneous tissues (including muscle and bones); the shape of the defected skin is irregular, which can be sheet-like, in patches, or irregular shapes; and the size and depth of the skin defects also vary. Pathophysiological examination often suggests defects in the epidermis and dermis. Total or partial defects can also be found in the lipids of the subcutaneous tissue. ACC can be accompanied by other diseases or complications such as epidermolysis bullosa (EB), cheilopalatognathus and polycystic kidney disease. In 1986, Frieden^[9] classified ACC in newborns into 9 groups based on the location and features of the lesions and the accompanying conditions: Scalp ACC without multiple anomalies, scalp ACC with associated limb abnormalities, scalp ACC with associated epidermal and organoid nevi, ACC overlying embryologic malformations, ACC with associated foetus papyraceus or placental infarcts, ACC associated with EB, ACC localized to extremities without blistering, ACC caused by specific teratogens and ACC associated with malformation syndromes. Scalp lesions are the most common and comprise 70% of defects, followed by defects in limbs and the trunk. Some cases can be accompanied by defects in the oral mucosal membrane or perineal mucosal membrane and skeletal malformation in limbs^[10].

Conservative and surgical methods can be employed as treatment for ACC. Conservative treatment includes the application of topical ointments such as silver sulfadiazine dressing, antibiotics, *etc.* Surgical treatments include split-thickness or full-thickness skin grafts, acellular dermal matrices, autologous epithelial transplantation, tissue expansion, cranioplasty, *etc.* The selection of the treatment method depends on the width, depth, location and involved subcutaneous tissues of the defects. Conservative treatments are recommended if the defect is only at the skin level without damage to the bones and if the area of the defect is less than 3 cm². Conversely, skin grafts are necessary when the defected area is large and involves critical organs or tissues such as the scalp while also accompanied by the exposure of large blood vessels or sagittal sinus. The skin defects in limbs often display clearly defined boundaries and typically involve the epidermis and dermis. Approximately 85% of ACC cases are simple defects without complications. However, the indications for selecting between conservative versus surgical treatment remain controversial. Bigliardi *et al*^[11] reported a case of ACC in the right lower limb. The defect involved the thigh, knee and lower leg to the first and second toes. Ulcer-like defects were observed, and the blood vessels were clearly visible. The wounds recovered after 3 mo of silver sulfadiazine topical cream application. In a case reported by Pająk *et al*^[12], a skin defect in the right lower limb was 4.0 cm × 1.5 cm in size. In addition to antibiotic ointment and ionic silver dressing, suturing was performed. Although the patient recovered after one month of treatment, a linear scar formed. These case reports suggest that for ACC that does not affect bone tissues, conservative treatment might provide a better outcome. However, surgical treatment is necessary when a large area of defect is present.

The major ingredients of MEBO include sesame oil, beeswax, berberine, phellodendron and baicalin. MEBO provides a moist environment to the wound tissue. An appropriate level of humidity is beneficial for tissue recovery. Linoleic acid, multiple amino acids, vitamins and trace elements are essential for the survival of cells. These ingredients can effectively activate the transformation of residual skin tissue to stem cells and allows in situ cultivation. The newly formed skin tissues can



Figure 2 The same patient after 26 d.

then adhere to the adjacent hyperplasia tissues to promote natural recovery. Additionally, MEBO can relieve mild local and systemic inflammation, promote wound recovery and improve recovery quality.

Ionic silver dressing is a 3D foaming structure that allows the effective absorption of exudate and water vapor. This absorption can minimize impregnation of the wound, which then inhibits the growth of bacteria and lowers the risk of infection. Ionic silver dressing is a natural broad spectrum antimicrobicide that contains silver compound, which provides high bacterial inhibition with its slow-release abilities. In the process of treating the case reported herein, a high amount of exudate and the bleeding of the newly formed blood vessel were observed on days 4-7. The exudate and bleeding were greatly reduced with the application of ionic silver dressing.

CONCLUSION

The treatment of our case demonstrated that the combination of MEBO and ionic silver dressing can effectively promote skin growth and prevent infection. This treatment method does not involve surgical operation; thus, it reduces the pain and suffering of the patient while simultaneously reducing the financial burden. This treatment is worthy of being promoted in clinical practice.

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Aplasia Cutis Congenita Type VI (Bart Syndrome): Case Report

Hamda Nassereldine* and Hawraa Zgheib

Pediatric Department, Saida Governmental Hospital, Beirut Arab University, Beirut, Lebanon

*Corresponding author: Hamda Nassereldine, Pediatric Department, Saida Governmental Hospital, Beirut Arab University, Beirut, Lebanon. E-mail: hamda-nassereldine.94@hotmail.com

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Abstract

Bart syndrome is classified as type VI aplasia cutis congenita, presented clinically by absence of skin, nail malformation and epidermolysis bullosa [2].

It is a rare familial disease [1]. The exact incidence is unknown but estimated to be 1-2 in 10000 births [8]. Here we present a case of female newborn born with absent skin diagnosed clinically and managed by skin care, well followed up with complete healing.

Keywords: Absence of skin; Epidermolysis bullosa; Nails dystrophy; Skin care

Introduction

Bart syndrome also known as aplasia cutis congenita type VI is one of the extremely rare dermatological diseases [1] characterized by absence of skin. It is first described in 1966 by brucel J. Bart. Clinical manifestations are described by Bart triad: aplasia cutis, epidermolysis bullosa and nails deformities [2].

In this paper we are reporting a case of newborn female born with the classical clinical trial of Bart syndrome without any other systematic involvement.

Case Presentation

We report a case of full term baby, born via normal vaginally delivery for a healthy primigravida mother. Maternal history was negative, no pregnancy complications was mentioned, no drugs or radiation exposure was noticed. The mother denies family history of similar disease. Baby was born pink tonic and crying, no resuscitation was needed upon delivery, she received routine postnatal care, however upon physical examination there was symmetrical bilateral absence of skin over the anteromedial aspect of the legs starting from the knees and extending to the dorsal form of the feet (Figure 1). The lesions were sharply demarcated covered by red ultrathin translucent membrane and vascular structures was visualized. Some finger nails shows dystrophy and no mucocutaneous involvement, otherwise normal physical examination (Figure 2).

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The baby was otherwise healthy with normal weight, height and head circumference. He was admitted to neonatal intensive care unit for skin care and further investigations. Screening for any associated anomalies was done including chest X-RAY, KUB, echo cardiography and echo abdominal and pelvis were all normal.

Labs were done and were all within normal ranges (Table 1 and 2).

Table 1: Labs done on admission.

CBCD	
WBC	21100 MM3
RBC	4.48 MIL/MM3
Hemoglobin	15.4 G/DL
Hematocrit	48%
Neutrophils	68%
Lymphocytes	22%
Platelets	341000 CU/MM

Table 2: Labs done on admission.

BIOCHEMISTRY	
Magnesium	1.84 MG/DL
Calcium	9.5MG/DL
Fasting blood sugar	105 MG/DL
Chloride	104 MMOL/L
Potassium	4.58
Sodium	137 MMOL/L
Total bilirubin	8.59 MG/DL
Direct bilirubin	0.49 MG/DL
SGPT	11 U/L
Urea	24 MG/DL
Creatinine	0.5 MG/DL
CRP	45.7MG/L



Figure 1: Symmetrical bilateral absence of skin over the anteromedial aspect of the legs starting from the knees and extending to the dorsal part of the feet. The lesions are sharply demarcated covered by red ultrathin translucent membrane and vascular structures.

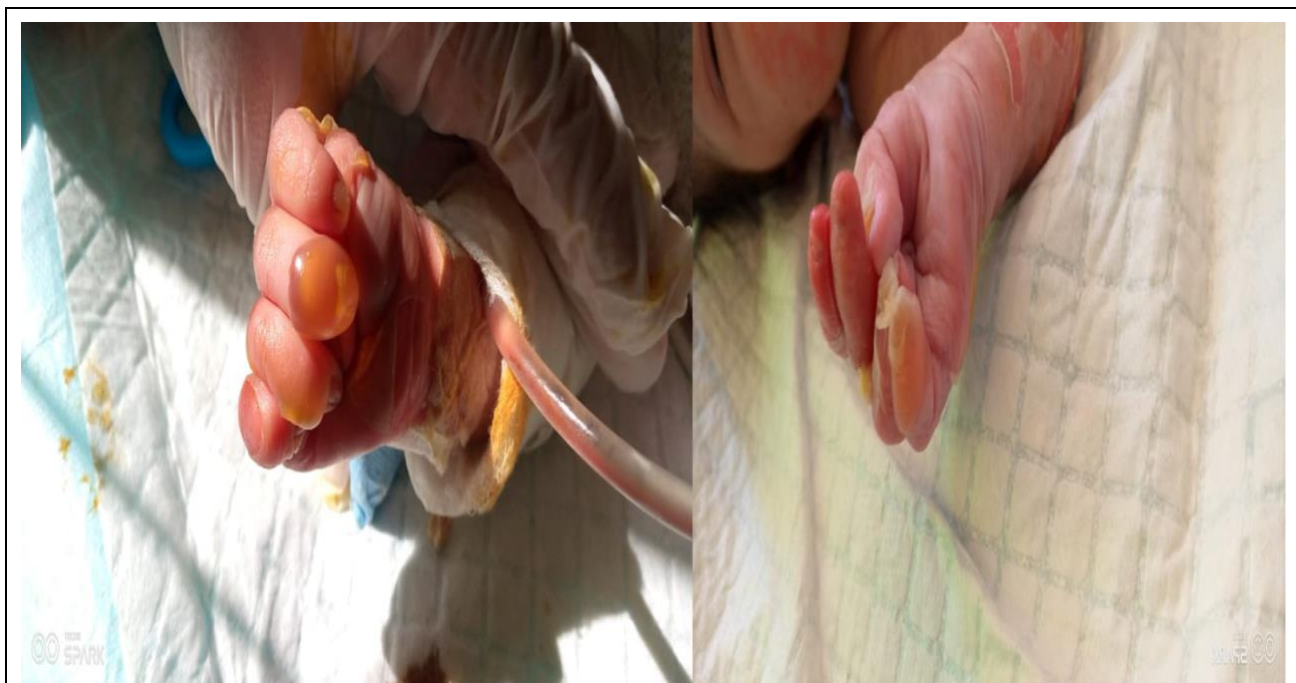


Figure 2: Finger nails dystrophy.

Dermatology team was consulted where they give routine daily skin care using daily dressing with normal saline and antiseptic solution. Mebo cream and fusidic acid were applied twice daily and the wound was closed by vaseline gauze. Systematic intravenous antibiotics was given (ampicillin and cefotaxime) for 7 days. After 1 week of skin care infant was discharged home with detailed instruction about wound care and regular follow up. Patient was followed by dermatology center where a complete healing of skin was observed 6-8 weeks after discharge.

Discussion

Aplasia cutis congenita is one of the rare genetic diseases affecting the mechanobullous system. This disease is described by absence of skin and classified into [9] subgroups differentiated by the number and location of skin lesions and associated systematic congenital malformation [3].

Bart syndrome is type VI of aplasia cutis congenita that is characterized by the triad of aplasia cutis, epidermolysis bullosa and nails malformations [2].

It is an autosomal dominant disease [4], however many sporadic cases were reported as in our case where family history was negative. Causes and underlying pathophysiology is genetic and related to COL7A1 gene on chromosome [3,5-6].

This disease could be isolated to dermatological findings but associated systematic malformation could be found especially with those having junctions epidermolysis bullosa (ureteral stenosis, renal anomalies, pylori atresia, flat nose, wide set eyes, broad nasal root) [4,7]. Our case was isolated to skin lesions only. Diagnosis is made clinically, however skin biopsy and genetic testing is required to confirm the diagnosis [8]. In the reported case above diagnosis was based on clinical triad no skin biopsy was done. Regarding the treatment is conservative treatment including proper wound care and infection control. Specific wound care for Bart syndrome should be given using diluted povidone iodine and fusidic acid cream. Lesions should be closed by dexpanthol plus chlorhexidine sterile gauze [8]. But in our case regarding the shortage in medical equipment dressing was done using mebo fusidic acid and Normal saline dressing and it was closed using Vaseline gauze. Rarely surgical treatment is given. Bart syndrome can be associated with other congenital malformations that determine the prognosis, also extension and location of skin lesions is considered a prognostic factor. However, prognosis is good with routine skin care, infection control and regular follow up [9].

Conclusion

Bart syndrome is one of the subtypes of aplasia cutis congenita that affect the skin, it is a congenital disease that is diagnosed clinically. It can be associated with other congenital malformations. The treatment is based on wound care and infection control. It has a good prognosis while a close follow up is done [9].

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Case Report: A Severely Burnt Neonate Treated with Moist Exposed Burn Therapy

Xu Chenghua, Duan Yanfang, Wang Min, Lu Wei

Affiliation: Department of Burns, Yichang Hospital of Traditional Chinese Medicine, Yichang 443000, Hubei (Xu Chenghua, Duan Yanfang); Department of Pediatrics, Yichang Central People's Hospital, Yichang 443003, Hubei (Wang Min, Lu Wei)

【Abstract】 A neonate who was severely burnt 15 minutes after birth was given comprehensive systemic treatment including anti-shock, anti-infection, stress ulcer prevention, myocardium nourishment, and bleeding prevention, etc. Moist Exposed Burn Therapy was used to treat local wounds. After 20 days of treatment, wounds healed completely, with no obvious scar formation.

【Keywords】 MEBT; MEBO; Neonate; Burns; Wounds

Burns immediately after birth are rare and mostly caused by hot water during bathing. These burns are often in large size, affecting deeper layers of skin, and the treatment tends to be difficult. As Moist Exposed Burn Therapy (MEBT) is efficacious in relieving pain, preventing infection, and reducing scar formation in the treatment of various burn wounds, it was used in treating local wounds in a neonate who was severely burnt 15 minutes after birth.

1. Baseline data

15 minutes after birth, the female neonate (gestational age 37+ weeks) was scalded in hot water bath in a local hospital, and 3 hours after birth, she was transferred to our hospital and admitted for severe burns. Apgar score: 9 at 1 minute, 10 at 5 minutes. Examination on admission: T 35.8 °C, P 134 bpm, R 43 bpm, weight 3.1 kg; conscious, unresponsive, cold extremities, cyanosis, muffled heart sound, no bowel sound, no urine output. Wounds on left

elbow, back, buttocks, perineum, lower extremities, and feet were red and white; scattered blisters of different sizes were seen, and some were broken and peeled with exudate. Clinical diagnosis: severe burn, 40% TBSA (18% TBSA superficial II degree burns, 22% TBSA deep II degree burns), hypovolemic shock.

After admission, the neonate was placed in a 37°C incubator to keep warm, and placed in prone position. As for local treatment, local wound was washed with warm normal saline, and then blisters were cut to release blister fluid, with blister skin preserved. Moist Exposed Burn Ointment (MEBO) was evenly applied on wounds at about 1 mm thickness, and silver dressing was used to cover wounds except those on perineal area. Dressing change was performed once daily. After granulation tissue grew well, recombinant human granulocyte macrophage stimulating factor gel was applied topically. As for systematic

treatment, catheter was placed in scalp vein and peripherally inserted central catheter in right axillary vein. Imipenem cilastatin sodium (from day 1 to day 5) and ceftazidime (from day 6 to day 15) were given for anti-infection, cimetidine for stress ulcer prevention, sodium creatine phosphate for myocardium nourishment, and vitamin K1 for bleeding prevention. Fluid resuscitation in the first 24 hours, 540 mL fluid containing 120 mL normal saline, 50 mL plasma, 10 g albumin, 320 mL 5% glucose solution was

administered, in the second 24 hours, 430 mL fluid containing 100 mL normal saline, 50 mL plasma, 6 g albumin, 250 mL 5% glucose solution, and in the third 24 hours, 375 mL fluid containing 80 mL normal saline, 50 mL plasma, 3 g albumin, and 230 mL 5% glucose solution. And from day 4 to day 15, only 40-80 mL/kg fluid was administered daily for fluid replacement.¹⁻² After 20 days of treatment, wounds healed completely, with no obvious scar formation. (Figures 1-6)



Figure 1. On admission; Figure 2-5. In treatment; Figure 6. 20 days after treatment.

2. Discussion

Generally, it is difficult to treat burns in neonates as their organs are underdeveloped

and immune system is immature. As for those with severe burns, multidisciplinary treatment is important. In this study, the neonate was

treated with MEBT for local wounds while receiving comprehensive systemic treatments including anti-shock, anti-infection, prevention of stress ulcers, myocardium nourishment, and prevention of bleeding. As studies showed, MEBO could form a film on wound, preventing infection caused by bacteria invasion. It provided analgesic effects by protecting nerve endings from external stimulation, which was conducive to preventing children from crying.³ Moreover, active constituents contained in MEBO could activate potential regenerative cells in wound tissue into stem cells which then differentiate into cells of different skin layers, promoting

wound healing in situ.⁵ MEBO also could inhibit the excessive proliferation of fibroblasts, thereby reducing scar formation. After wound granulation tissue grew well, the topical application of recombinant human granulocyte macrophage stimulating factor gel could promote the proliferation of hematopoietic progenitor cells, granulocytes, and mononuclear macrophages, promoting wound healing.⁷

In conclusion, MEBT/MEBO could effectively promote the healing of severe burn wounds in neonates, and reduce skin scar formation.

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Cutaneous Chemical Burns Associated With Chlorhexidine-Alcohol Solution in an Extremely Preterm Infant

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Lee Shi Zhen¹  and Khoo Ngeh Poh¹

Abstract

Safe cutaneous antisepsis in neonatal intensive care unit is imperative. Chlorhexidine-based solution is commonly used for skin preparation prior to the placement of intravascular devices. However, in premature infants, its usage has not been standardized. We present a case of chemical burns secondary to the use of chlorhexidine-alcohol skin preparation solution in an extremely low birth weight infant.

Keywords

Chlorhexidine, prematurity, burns, neonatal intensive care, extremely low birth weight, antisepsis

Introduction

Management of an extremely premature infant is a challenging endeavor for the neonatologist. As sepsis is one of the leading causes of mortality in infants admitted to the neonatal unit, antisepsis plays a pivotal role in reducing health care-associated infections. We encountered a case of chemical burns secondary to the use of chlorhexidine-alcohol skin preparation solution.

Case Report

A preterm female infant was born at 25 weeks gestation via emergency caesarean section due to maternal eclampsia. The birth weight of the infant was 660 g and she was intubated in view of respiratory distress. While in the neonatal unit, in view of need for administration of parenteral nutrition and to anticipate need of inotropic support, a decision was made for central umbilical venous and arterial catheterization. Skin preparation was done with 0.5% chlorhexidine in 70% alcohol followed by sterile drapes over the abdomen. The procedure lasted for approximately 45 minutes. Upon removal of the sterile drapes, the lower abdomen was found to be erythematous. Immediate plastic surgical consult was made. There were superficial and deep partial thickness burns over the lower abdomen which was 3% of total body surface area (Figure 1a). The burn area over infraumbilical region was deep (Figure 1a, b). Immediate irrigation of burn area with normal saline was performed. Wound was managed conservatively with Moist Exposed Burn Ointment (MEBO; Julphar, United Arab Emirates) dressing every 4 to 6 hours. Wound healed uneventfully after 2 weeks with scarring (Figure 1c, d). The infant was stable throughout.

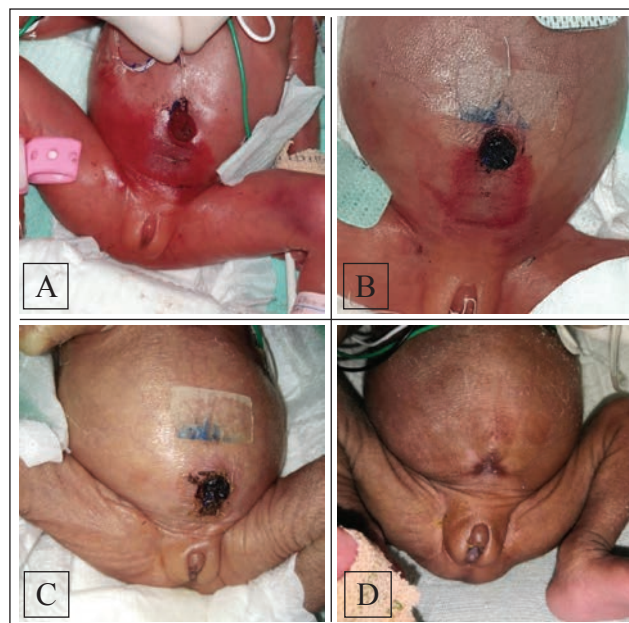


Figure 1. Burn wound secondary to chlorhexidine-alcohol topical antisepsis. (A) Mixed thickness burns over lower abdomen during the incident. (B) Superficial partial thickness component healed after 1 week with residual deeper dermal component. (C) Wounds healed after 2 weeks. (D) Scarring over periumbilical area after 1 month.

¹ Plastic and Reconstructive Surgery Department, Hospital Melaka, Jalan Mufti Haji Khalil, Malaysia

Corresponding author:

Lee Shi Zhen, Plastic and Reconstructive Surgery Department, Hospital Melaka, Jalan Mufti Haji Khalil, Melaka 75400, Malaysia.

E-mail: michael_ksz_1985@yahoo.com

Discussion

Prompt insertion of central access is vital in the survival of extremely low birth weight (ELBW) infants.¹ Therefore, cutaneous antiseptics is mandatory to ensure safety of the procedure. Albeit there are myriad types of antiseptics, chlorhexidine-based preparation is commonly used in neonatal intensive care.^{2,3} Chemical burns secondary to 0.5% chlorhexidine in 70% alcohol is not uncommon and was described by a few authors in the literature.^{1,2,4,5} The concentration of 0.5% chlorhexidine alone rarely causes burns injury.¹⁻³ We concur with published cases that the alcohol component perpetuated chemical burns.^{1,2,4} In our case, the burn injury was deep due to various factors. First, the skin of premature infant is vulnerable to external injury. This is due to some of the skin characteristics: the stratum corneum has far fewer layers, dermis is much thinner, and reduced dermoepidermal cohesion which increases skin permeability.⁵ Second, the duration of exposure of the skin preparation solution contributed to the depth of the burn wound. The solution was left on the abdomen till it dried while umbilical catheterization was performed. The excellent intrinsic wound healing potential of a neonate enables the burn wound to heal without skin grafting. MEBO dressing was chosen due to its simplicity to the semiskilled personnel and its ability to provide moist wound healing.⁶ A burn injury causes significant stress and depletes the already low physiological reserve of ELBW infants. Excessive water loss, hypothermia, and sepsis are recognized consequences of burns in neonates.⁴ We advocated frequent dressing change to reduce burn wound bacterial bioburden and to ensure adequate moisture of the wound. We strongly agree that the use of an alcoholic formulation of chlorhexidine should be avoided in ELBW infants.^{1,2,4} To minimize the harm of topical antiseptics in premature infants, we recommend (1) sterile water or saline to remove residual antiseptic preparations 30 seconds after application, (2) use lowest possible concentration of chlorhexidine aqueous solution (preferably < 0.5%), (3) to apply only the minimum amount of chlorhexidine solution required without allowing it to accumulate, and (4) to inculcate awareness of chemical injury among health care personnel.

Conclusion

This case highlights the importance of ensuring safe topical antiseptics in every neonatal unit. Despite not common, a burn

injury in ELBW infant incurs additional stress which can potentially jeopardize survival.

Acknowledgments

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Declaration of Conflicting Interests

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ORCID iD

Lee Shi Zhen  <https://orcid.org/0000-0001-5517-3855>

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Efficacy of Triple-combination Therapy in Treating Full-thickness Skin Defects in Children

Su Yongtao, Wang Chunlei, Zhang Bo, Zhu Junhui

Affiliations: Burn and Wound Repair Center, PKUCare Luzhong Hospital, Zibo City 255400, Shandong Province, China

Corresponding author: Su Yongtao, yongtaosu@126.com

【Abstract】 Objective To evaluate the clinical efficacy of triple-combination therapy, Recombinant Bovine Basic Fibroblast Growth Factor (rb-bFGF), Moist Exposed Burn Ointment (MEBO) and red/blue light, in treating full-thickness skin defects in children. **Methods** 35 children with full-thickness skin defects admitted in Burn and Wound Repair Center, PKUCare Luzhong Hospital from March 2010 to October 2018 were treated with triple-combination therapy. Wound healing time and wound healing rate were assessed. **Results** Wound healing time was 27-69 (36.4±6.1) d, and wound healing rate was 97.1%. **Conclusion** The triple-combination therapy showed significant efficacy in treating full-thickness skin defects in children, which effectively reduced wound healing time and improved wound healing rate.

【Key words】 Moist Exposed Burn Ointment; Recombinant Bovine Basic Fibroblast Growth Factor; Red/blue light; Full-thickness skin defects

For children with full-thickness skin defects, skin grafting may lead to severe scar formation because children have much thinner layer of skin.¹ In order to find a better treatment method, triple-combination therapy, Recombinant Bovine Basic Fibroblast Growth Factor (rb-bFGF), Moist Exposed Burn Ointment (MEBO) and red/blue light, was used in our department and the efficacy was assessed.

1 Clinical data

1.1 General data

35 children with 45 sites of full-thickness skin defects admitted in Burn and Wound Repair Center, PKUCare Luzhong Hospital from March 2010 to October 2018 were enrolled in this study. Among all the children, male (n=28)

and female (n=7); age 3-12 (5.3±2.1) y; wound diameter 5.0-20.0 (6.5±4.7) cm. Number of defect sites: children with 3 sites (n=2), children with 2 sites (n=6), children with 1 site (n=27); wound sites: upper extremities (n=16), lower extremities (n=13), trunk (n=7), face and neck (n=5), perinium (n=4); cause of injury: crush injury (n=13), minor wound infection (n=8), dog bite (n=4), infusion extravasation (n=3), and postoperative incision necrosis (n=2). This study was approved by the Ethics Committee of PKUCare Luzhong Hospital.

1.2 Inclusion and exclusion criteria

Inclusion criteria: 3-12 years old; full-thickness skin defects; wound diameter 5.0-20.0 cm; good compliance. Exclusion criteria: burn or

scalding wounds; poor physical condition; combined with systemic infections and other diseases that affect wound healing.

2 Methods

2.1 Treatment method

Tetanus antitoxin and broad-spectrum antibiotics were immediately given after admission, and sensitive antibiotics was used later according to the results of bacterial culture and drug sensitivity test of the wound secretion. For wound management, wounds were washed with saline, cleaned and dried with sterile gauze, and sprayed with rb-bFGF. Then blue light irradiation therapy was performed for 20 minutes, and it was switched to red light in late stage of wound healing when inflammatory response was much relieved. After that, wound was evenly smeared with 5mm thickness MEBO, covered with MEBO impregnated dressing and wrapped with sterile gauze in sequence. Dressing was changed once a day.

Some hypergranulation, oedema of granulation tissue, or scar formation of wound edge occurred during treatment. Edematous granulation tissue was cut off, and scar of wound edge was also scraped off a little so as to speed up wound healing. In the later stage of treatment, elastic bandage was used to prevent further scar formation.

3 Results

Wound healing time was 27-69 (36.4±6.1) d, and wound healing rate was 97.1%. Among 35 children, 34 children's wounds were completely healed. One child with radiation injury was found no granulation tissue growth

after 20 days of treatment, skin grafting was preformed and the wound healed after that. 32 children with complete wound healing had no scar formation, and 2 children had scar formation on foot, and they were treated with silicone cream combined with bandage compression, and no functional impairment was noted after treatment; and one child with syndactyly of the fingers was treated with surgical method.

3.1 Case report

3.1.1 Case 1

Description: 6-year-old female, admitted for localized swelling, pain and darkening of left upper limb for 17 days after surgery. 29 days before admission, this patient had a car accident which caused a comminuted fracture of left ulna and radius. Internal fixation was performed in a local hospital, followed by severe swelling and pain of left upper limb, and the affected skin also gradually turned dark brown.

Physical examination: Severe swelling of left forearm, 14.0 cm*10.0 cm wound was seen on lateral side with a black tough scab on wound surface and no pain sensation.

Radiography: Comminuted fracture of left ulna and radius.

Clinical diagnosis: skin necrosis on left forearm; postoperative internal fixation of left ulnar and radial for comminuted fracture.

Treatment: triple-combination therapy was used after debridement. At day 15, necrotic tissues were largely removed (Figure 2); at day 30, granulation tissue grew well (Figure 3); at day 44, wound healed with no scar formation (Figure 4).

3.1.2 Case 2

Description: 9-year-old male admitted for skin necrosis on right groin and penis resulting from radiation therapy for acute leukemia. This patient was diagnosed with acute leukemia and treated with radiation therapy in a local hospital 70 days before admission. Skin of right groin and penis was broken 20 days ago, wound condition was not improved after being treated with topical triethanolamine, and wound gradually enlarged and became deeper.

Physical examination: A 6.0 cm*5.5 cm wound was seen in right inguinal area, which reached the muscular layer and communicated

with perineum, with a black scab on wound surface; some skin necrosis was seen in the penis (Figure 5-6).

Clinical diagnosis: radiological injury of skin of right groin and penis.

Treatment: triple-combination therapy was used after debridement. At day 11, scab came off naturally; at day 20, no granulation tissue was seen at the wound base (Figure 7). Therefore, autologous split-thickness skin grafting was performed. At day 7 after the surgery, wound grew well (Figure 8); At day 10, wound healed and the patient was discharged.



Figure 1: On admission; Figure 2: Day 15; Figure 3: Day 30; Figure 4: Day 44



Figure 5-6: On admission; Figure 7: Day 20; Figure 8: Day 7 after autologous thin-skin graft surgery

4. Discussion

MEBO provides a moist environment for wound healing, which liquefies and removes necrotic tissues from wound thus accelerating wound repair.² It can inhibit fibroblasts from excessive differentiation and proliferation, then control collagen synthesis, thereby preventing overgrowth of scar.³⁻⁴ Red light irradiation is

capable of improving cellular metabolism thus boosting wound healing, while blue light irradiation produces reactive oxygen molecules, therefore killing bacteria.⁵⁻⁶ rb-bFGF is efficient in enhancing cell division and proliferation, so that the formation of granulation tissue can be stimulated.⁷⁻⁸

In conclusion, it demonstrated significant efficacy in treating full-thickness skin defects in children with triple-combination therapy, which effectively reduced wound healing time and prevented scar formation.

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Treatment of Severe Destructive Foot and Ankle Injury in a Young Child with a Skin Regeneration Technique

Sir,

Severe destructive foot and ankle injuries in children are most often caused by traffic accidents, crushing by heavy objects, and machine strangulation and are often combined with injuries to the skin, subcutaneous tissue, tendons, vessels, nerves, and bones, which require multiple surgical treatments.¹ Some patients with severe injuries may experience toe necrosis and even permanent loss of the parts distal to the forefoot, midfoot, and ankle, resulting in various degrees of disability.²

In April 2018, a 3-year child with a severe destructive injury to the left foot was admitted to our hospital. Fracture reduction, internal fixation, and vascular and nerve repair surgery were performed in the Emergency Department (ED). On the second day, skin on the dorsum and toes 1-3 of her left foot gradually started to develop a dark purple appearance, and debridement and toe amputation were planned. On day three, physical examination revealed that the skin of the entire dorsum, sole, and medial side of the foot distal to the wound on the left ankle was bluish-purple, and some areas were blackish-purple with scattered blisters; the skin was bluish-purple at the base of toes 1-3 and blackish-purple at the tips of the toes (Figure 1).



Figure 1: Three days after the injury, the skin of the dorsum distal to the left ankle was bluish-purple, and most of it was dark. The skin of toes 1-3 was blackish-purple in colour, without blood supply.

The patient was shifted to the Orthopedic Ward. After hospitalization, the patient received active anti-infection and sympto-

matic treatment, and her vital signs were stable. *In-situ* skin regeneration, moist exposed burn ointment (MEBO), wound, and ulcer dressing were planned. The skin on the dorsum of the left foot had high tension and obvious ecchymosis. A small incision was made to reduce the tension, and a rubber strip was placed for drainage. When the dressing was changed three days later, the wound, drainage exudate, and secretions were cleaned with normal saline. The dressing was changed once each day. Twelve days later, the necrotic areas of the skin of the dorsum and sole were limited, and the necrotic tissue surrounding the drainage port was reduced. Twenty-three days later, the black skin scabs gradually fell off, and fresh granulation tissue formed under the wound. By days 52 to 58, wounds on the dorsum and sole were completely epidermised. The distal phalanges of toes 1-3 of the left foot were absent, and the wounds on the stumps were healed. The child had a normal arch, a normal forefoot width, good limb movement, and no obvious contractual sequelae (Figure 2).



Figure 2: Follow-up at 110 days after the injury. The wound of the dorsum and toes 1-3 were healed, with partial scarring.

In this case, the child had a severe destructive injury to the left foot and ankle due to a traffic accident. After the surgery in ED, the entire foot developed extensive swelling, and the sole experienced massive ischemic necrosis. After a thorough evaluation of the child's condition, we chose *in-situ* skin regeneration treatment. MEBO wound and ulcer dressing treatment effectively controlled infection of the wound. The inflammatory degeneration of the wound liquefied on its own, and non-invasive debridement was realized, while the granulation tissue of the wound remained moist.^{3,4} The regenerative potential of the cells and the physiological repair of the skin tissue were activated, which allowed the wound tissue to repair and heal itself without the need for skin grafting.

The results showed that the *in-situ* skin regeneration treatment was significantly superior to traditional Western medical therapy. The child had less pain, good compliance, a short wound healing time, and a good healing effect; therefore, this treatment method is worthy of clinical promotion.

ETHICAL APPROVAL:

Ethical approval was obtained from concerned quarters.

PATIENT'S CONSENT:

Written informed consent was obtained from the patient.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

GLHP: Manuscript preparation, literature review, contributed to the diagnosis, and provided clinical assistance.

XL, XC: Study design, manuscript correction, contributed to the diagnosis, and provided clinical assistance.

All authors approved the final version of the manuscript to be published.

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Xueping Luo¹, Xiaoming Chen¹ and Guofeng Lei²

¹Department of Ankle Surgery, Sanmenxia Central Hospital, Sanmenxia, China

²Department of Child Health, Sanmenxia Central Hospital, Sanmenxia, China

Correspondence to: Guofeng Lei, Department of Child Health, Sanmenxia Central Hospital, Sanmenxia, China
E-mail: leiguofeng1981@sina.com

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Clinical Efficacy of Moist Exposed Burn Ointment in Treating Postoperative Wounds of Children after Penile Adhesion Separation

Song Song, Xu Wenhui, Ji Xiangdong

Department of Urology, Dongda Hospital, Pizhou City, 221300, Jiangsu Province

【Abstract】 Objective To study the clinical efficacy of Moist Exposed Burn Ointment (MEBO) in treating postoperative wounds of children after penile adhesion separation. **Methods** 68 children treated in our hospital from June 2012 to June 2015 were enrolled and randomly divided into treatment group and control group. Both groups were given the same surgical treatment for penile adhesion separation. For postoperative wound management, control group was treated with erythromycin topical gel, and treatment group MEBO. Treatment efficacy was compared between two groups. **Results** After treatment, compared with control group, treatment group had significantly higher healing rate 97.06% vs. 67.65%, shorter duration of swelling and redness 3.4±0.1 days vs. 6.7±0.2 days, lower incidence of penile adhesion recurrence 2.94% vs. 20.59%, and lower incidence of urinary retention 0 % vs. 11.76% (all $p<0.05$). **Conclusion** After penile adhesion separation surgery in children, MEBO could significantly improve postoperative wound healing rate, shorten duration of swelling and redness, and reduce incidence of complications.

【Keywords】 MEBO; Penile adhesion separation; Clinical efficacy

In male infants and toddlers, penile adhesions are common, and some patients also have phimosis. Pediatric patients are usually taken to hospital with the chief complaint of lump in foreskin or abnormal urination. As they are of young age, general anesthesia could pose a great risk. Therefore, penile adhesion separation under local anesthesia is commonly performed for treatment. In this surgical procedure, large size of foreskin is separated, causing severe edema and considerable pain. After surgery, urination could be affected to some extent,¹ and there might be recurrence of penile adhesion. Therefore, it is important to find an efficacious method to treat wound

after penile adhesion separation. In this study, MEBO was used in this randomized controlled trial to evaluate its clinical efficacy.

1. Clinical data and treatment method

1.1 Baseline data

68 children with penile adhesion who were treated in our hospital from June 2012 to June 2015 were enrolled and randomly divided into treatment group and control group. Control group (n=34): age 9 months to 12 years, average 6.7 years, (s =1.2); penile adhesions (n=27), phimosis with penile adhesions (n=7). Treatment group (n=34): age 10 months to 8 years, average 7.2 years (s=1.6); penile

adhesions (n=29), phimosis with penile adhesions (n=5). Difference on baseline data between two groups showed no statistical significance (all $p > 0.05$).

1.2 Methods

Surgery for control group: with the help of family members, patients were placed in supine position with legs slightly placed apart so that perineum area was completely exposed. Urethral orifice and penis were cleaned using cotton balls impregnated with povidone-iodine, and then 5g lubricating analgesic gel was applied between foreskin and glans. 5 minutes later, according to the specific condition of each patient, mosquito clamps were selected and used to gently expand foreskin opening. Next, foreskin was gently retracted by left hand, glans fully fixed, and adherent foreskin slowly separated using vascular forceps. Full exposure of corona and frenulum indicated complete separation. Smegma was completely removed, and then cotton balls impregnated with povidone-iodine was used again to clean. Erythromycin topical gel was applied on glans and corona, and then retracted foreskin was pushed forward, covering glans. For treatment at home, family members were instructed to clean glans with 5% potassium permanganate solution, and then apply erythromycin topical

gel 4 to 6 times daily.

Treatment group: surgery procedure was the same as control group, except that MEBO was used instead of erythromycin topical gel. For treatment at home, MEBO was applied 4 to 6 times daily by family members.

1.3 Clinical outcome

Healing rate, duration of swelling and redness, incidence of penile adhesion recurrence, and incidence of urinary retention were recorded in two groups.

1.4 Statistical analysis

SPSS17.0 was used for statistical analysis, measurement data was represented as mean \pm standard deviation ($\bar{x} \pm s$), tested with t test, and count data percentage (%), tested with χ^2 test.

2. Results

After treatment, compared with control group, treatment group had significantly higher healing rate 97.06% vs. 67.65%, shorter duration of swelling and redness 3.4 ± 0.1 days vs. 6.7 ± 0.2 days, lower incidence of penile adhesion recurrence 2.94% vs. 20.59%, and lower incidence of urinary retention 0% vs. 11.76% (all $p < 0.05$) (Table 1).

Table 1 Clinical efficacy

	Healing rate [n (%)]	Duration of swelling and redness (day)	Recurrence of penile adhesion [n (%)]	Urinary retention [n (%)]
Treatment group (n = 34)	33 (97.06%)	3.4 ± 0.1	1 (2.94%)	0 (0.00)
Control group (n = 34)	23 (67.65%)	6.7 ± 0.2	7 (20.59%)	4 (11.76%)
χ^2/t	10.12	51.77	5.10	4.25
p	<0.05	<0.05	<0.05	<0.05

3. Discussion

Among children, redundant foreskin and phimosis are common congenital problems, which greatly affect patient's quality of life.

For male infants and toddlers, circumcision poses a great risk and causes high incidence of complications. So in clinical practice, penile adhesion separation surgery is often performed for treatment.² In these patients, foreskin is very soft, so after surgical procedure of penile adhesion separation, most patients do not need circumcision. While for those with congenital phimosis, circumcision is needed.

In conventional postoperative treatment of penile adhesion separation, erythromycin topical gel is usually applied, but swelling and pain might last long, which causes pediatric

patients to cry and affects urination. Studies showed MEBO could promote postoperative wound healing in children who received penile adhesion separation surgery.

MEBO has shown significant efficacy in this study. The function mechanism of MEBO: it creates a moist environment on wound surface; it provides sufficient nutrients such as amino acids, saccharides, and fatty acids for wound healing; active constituents contained in it could provide antibacterial effect and analgesic effect; it could improve microcirculation.

In conclusion, MEBO could significantly improve wound healing rate, shorten duration of swelling and redness, and reduce incidence of complications after penile adhesion separation in child patients.

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Comparison of Treating Neonatal Diaper Dermatitis with Moist Exposed Burn Ointment and Zinc Oxide Ointment

Han Yuli, Lu Ruicun, Wu Xiaoli

Affiliation: Affiliated Children's Hospital of Zhengzhou University, Henan Children's Hospital, Zhengzhou Children's Hospital, Zhengzhou City 45000, Henan Province, China

【Abstract】 Objective To compare efficacy of treating neonatal diaper dermatitis with Moist Exposed Burn Ointment (MEBO) and Zinc Oxide Ointment. **Method** 78 infants with diaper dermatitis admitted to the Affiliated Children's Hospital of Zhengzhou University from February 2017 to February 2018 were enrolled and randomly divided into study group (n=39) treated with MEBO and control group (n=39) treated with Zinc Oxide Ointment. Efficacy, healing time, and length of hospitalization were compared. **Result** After treatment, for study group and control group, efficacy was 94.97% vs. 76.92%, healing time was 4.21±2.05 days vs. 6.45±2.31 days, and length of hospitalization was 7.33±1.16 days vs. 9.36±2.15 days (all $p<0.05$). **Result** Applying MEBO in diaper dermatitis could significantly increase efficacy, shorten healing time and length of hospitalization.

【Key words】 Moist Exposed Burn Ointment, Zinc Oxide Ointment, Neonatal Diaper Dermatitis, Efficacy, Comparison.

Diaper dermatitis is a common skin disease among infants, which is usually caused by skin being soaked and irritated by uncleaned urine and stool¹. Zinc Oxide Ointment is a common medication used to treat diaper dermatitis. Disadvantages of using it include prolonged treatment period and unsatisfied treatment outcomes. To find a more effective method to treat diaper dermatitis, Moist Exposed Burn Ointment (MEBO) was used in our study and compared with Zinc Oxide Ointment.

1. General data and method

1.1 Baseline data

78 infants with diaper dermatitis admitted to the Affiliated Children's Hospital of

Zhengzhou University from February 2017 to February 2018 were enrolled and randomly divided into study group (n=39) and control group (n=39). In study group, male (n=24), female (n=15), age 5-26 (15.6±3.1) days old, course of disease 3-10 (6.3±2.1) days. In control group, male (n=21), female (n=19), age 6-28 (16.1±3.2) days old, course of disease 2-9 (5.9±2.0) days (all $p>0.05$).

1.2 Methods

For both groups, before application of ointment, treated areas were cleaned with cotton balls soaked with warm water and dried with gauze. After cleaning, for study group, 1mm thickness of MEBO was applied with sterile cotton stick. For control group, 1mm

thickness of Zinc Oxide Ointment was applied. Infrared lamp was used for 10 minutes to promote absorption of ointment for both groups. Above treatment procedures were conducted for both groups 3 times a day for 1 week. Hot water and soap water were not used due to it could further damage skin barriers of infants.

1.3 Clinical outcomes

Healing time, length of hospitalization, and efficacy were compared. Evaluation criteria of efficacy²: 1. Cured: symptoms disappeared; 2. significantly effective: more than 60% of affected areas were healed; 3. effective: 20%-60% of affected areas were healed; 4. ineffective: nil improvement of affected areas. Efficacy = cases of cured + significantly effective + effective patients / total numbers of patients*100%.

1.4 Statistical methods

SPSS 17.0 was used for statistical analysis.

Measurement data were represented as mean ± standard deviation $\bar{x}\pm s$, tested by *t*-test. Count data were represented as n (%), tested by Chi-square.

2. Results

2.1 Healing time and length of hospitalization

For study group and control group, healing time was 4.21±2.05 days vs. 6.45±2.31 days and length of hospitalization was 7.33±1.16 days vs. 9.36±2.15 days (all *p*<0.05) (Table 1).

2.2 Efficacy

For study group and control group, numbers and percentage of cured cases was 25 (64.10%) vs. 18 (46.15%) of significantly effective cases was 7 (17.95%) vs. 6 (15.38%) of effective cases was 5 (12.85%) vs. 6(15.38%), ineffective was 2 (5.13%) vs. 9 (23.08%). Compared with control group, study group had significantly higher efficacy 94.97% vs. 76.92% (*p*<0.05).

Table 1 Healing time and length of hospitalization ($\bar{x}\pm s$)

Groups	Healing time (days)	Length of hospitalization (days)
Study group (n=39)	4.21±2.05	7.33±1.16
Control group (n=39)	6.45±2.31	9.36±2.15
<i>t</i>	4.5294	5.1893
<i>p</i>	0.0000	0.0000

3. Discussion

Infants have thinner stratum corneum and stratum lucidum compared with adults, which could easily result in redness and swelling when their skin is irritated. Diaper dermatitis is a fungi or bacterial infection reaction of skin due to buttock areas being remained in a

moist environment for a long time. The most common symptoms of diaper dermatitis are redness and swelling of skin. Early symptoms could be relieved through frequent diaper changes and removal of diaper to allow exposure of dermatitis area. Topical medication will be needed for severe

symptoms.

Zinc Oxide Ointment is a commonly used medication to treat diaper dermatitis. It could effectively help maintain dryness of buttock areas to promote recovery. Nevertheless, protective barrier could hardly be formed on the skin to prevent invasion of bacteria by using Zinc Oxide Ointment. Also, it's difficult for carer to clean the mixture of the ointment and stool, which could further induce damage to the skin. MEBO contains cortex Phellodendron, radix Scutellaria, and Rhizoma

Coptidis, which could reduce pain and promote repairing and regeneration of damaged skin³. Besides, MEBO could form a protective membrane on the skin surface to prevent invasion of bacteria from urine and stool.

The results of this study indicated that compared with using of Zinc Oxide Ointment, using MEBO to treat diaper dermatitis was significantly more effective with much shortened healing time and length of hospitalization.

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Efficacy of Moist Exposed Burn Ointment in Preventing and Treating Phlebitis of Scalp Caused by Indwelling IV Cannula in Infants

Yang Qunzhen, Zeng Jing

Affiliation: Pediatrics Department of Xiangfan No.1 People's Hospital, Xiangyang City 441000, Hubei Province, China

Corresponding author: Yang Qunzhen Email: chiupopo@163.com

【Abstract】 Objective To evaluate efficacy of using Moist Exposed Burn Ointment (MEBO) to reduce incidence of scalp phlebitis and treat scalp phlebitis caused by indwelling IV cannula in infants. **Methods** 200 infants received highly irritant intravenous medication by indwelling IV cannula at scalp site were enrolled and randomly divided into prevention group (n=100) and treatment group (n=100). Prevention group was further divided into study group I (n=50) applying MEBO on cannula site and control group I (n=50) without any prevention measure. Treatment group was further divided into study group II (n=50) applying MEBO on cannula site and control group II (n=50) applying 50% magnesium sulfate wet compress. **Result** After treatment, study group I had significantly lower incidence of scalp phlebitis compared with control group I 32% vs. 64%, and study group II had significantly higher treatment efficacy compared with control group II 100% vs. 72% (all $p<0.05$). **Conclusion** Applying MEBO could significantly reduce incidence and improve treatment efficacy of scalp phlebitis caused by indwelling IV cannula in infants.

【Key words】 Indwelling IV cannula, Phlebitis, Moist Exposed Burn Ointment, Prevention, Treatment.

Phlebitis is a common complication of IV therapy, which could be caused by numbers of reasons such as receiving highly irritant medication. Infants with scalp phlebitis not only suffer from pain but might also experience appearance change caused by formation of scars and loss of hairs. 50% magnesium sulfate wet compress is a conventional treatment method for phlebitis. However, treatment outcomes could be varied. To find a better treatment method, Moist

Exposed Burn Ointment (MEBO) was used to treat scalp phlebitis caused by indwelling IV cannula in our department in last year and the study result is as follows.

1.General data

1.1 Baseline data

200 infants (male 151, female 49, age 1 day - 1 year old) received highly irritant medications intravenously by indwelling IV cannula on scalp were enrolled and randomly

divided into prevention group (n=100) and treatment group (n=100). Prevention group was further divided into study group I (n=50, male 38, female 12) treated with applying MEBO at the cannula site along the proximal direction of veins for a length of 3-5 cm to prevent scalp phlebitis, and control group I (n=50, male 38, female 12) without any prevention measures. Treatment group was further divided into study group II (n=50, male 36, female 14) treated with MEBO for I-III degree of scalp phlebitis caused by indwelling IV cannula, and control group II (n=50, male 39, female 11) treated with 50% magnesium sulfate wet compress (all $p>0.05$).

1.2 Methods

For study group I and II, MEBO was applied topically to veins along the proximal direction at IV cannula site twice a day. For control group I, nil prevention measure was used, and for control group II, 50% magnesium sulfate wet compress was applied at affected area continually.

1.3 Evaluation criteria

Evaluation was conducted 7 days post treatment.

For prevention group, incidence of scalp phlebitis was compared according to the

classification of phlebitis by American Infusion Nurses Society¹: I degree - redness and swelling of skin without red line-like change of veins and hard lumps; II degree - redness and swelling of skin with early red line-like change along veins; III degree - redness and swelling of skin with obvious red line-like change along veins.

For treatment group, treatment efficacy was compared with self-designed evaluation criteria: 1. cured: redness, pain and swelling are disappeared; 2. significantly effective: pain and swelling are apparently relieved, and red line-like change is improved; 3. ineffective: nil obvious improvement of symptoms. Efficacy = cases of cured + cases of significantly effective/total cases.

1.4 Statistical method

Counted data was tested by χ^2 test.

2.Result

2.1 Incidence of phlebitis

For study group I and control group I, incidence of phlebitis is shown in Table 1 .

2.2 Treatment efficacy

Comparison of treatment efficacy between study group II and control group II is shown in Table 2.

Table 1 Incidence of phlebitis (n, %)

Group	I Degree	II Degree	III Degree
Study Group I (n=50)	13 (26%)	3 (6%)	0
Control Group I (n=50)	26 (52%)	6 (12%)	0

Note: all $p<0.05$.

Table 2 Treatment efficacy (n, %)

Group	Cured	Significantly effective	Ineffective
Study Group II	39 (78%)	11 (22%)	0
Control Group II	18 (36%)	18 (36%)	0

Note: all $p < 0.05$.

3. Discussion

Scalp phlebitis caused by indwelling IV cannula is a common complication of IV therapy in pediatric department. Common symptoms include redness, swelling, pain, abscess, and necrosis of local skin, and it could even lead to difficulty in regrowth of hairs. 50% magnesium sulfate wet compress is a conventional treatment method for scalp phlebitis. Magnesium sulfate is a hyperosmotic solution so it could help to relax smooth muscles and dilate blood vessels by blocking the action of neurotransmitters. Therefore, blood circulation of local skin site could be promoted, which could help to relieve symptoms such as redness, pain and swelling. However, it is difficult for infants to tolerate the wet compress treatment process. Treatment site may be scratched by infants due to unpleasant feeling, which might lead to

magnesium sulfate crystals dropping into their eyes.

MEBO was used in the last year in our department to reduce incidence and treat scalp phlebitis caused by indwelling IV cannula in infants. MEBO could form a protective membrane after application at local skin site, which could help to prevent invasion of bacteria. Also, living environment of bacteria on the wound is disturbed so that proliferation of bacteria will be inhibited. Thus, using of MEBO could protect the wound and prevent infection.

The result of this study indicated that using MEBO could effectively lower the incidence and relieve symptoms of scalp phlebitis in infants with indwelling IV cannula.

Reference

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The 4th Regenerative Medical Technology Case Competition in Mongolia, Even More Popular and Just as Exciting as Ever



On March 24, 2023, the 4th *Mongolian Regenerative Medical Technology Case Competition* was brought to the participants in Ulaanbaatar by MEBO International and Lenus Med LLC. After years of development, this competition has become a widely acknowledged event amongst the doctors involved in wound management in Mongolia, and this time it has attracted a record of 17 doctors to share their most valuable experience. It created a great opportunity for knowledge and experience sharing among the 50+ medical professionals who joined the event. On top of the previous 3 competitions, this event managed to give the Mongolian doctors a glimpse of a broader scale of indications that regenerative medical technology could deal with. A collection of 47 wounds of more than 20 categories including burns, frostbite, plastic surgery, trauma, etc. were demonstrated, and the difficult-to-treat cases didn't fail to impress us, featuring wound of leprosy patient, wounds combined with necrotizing fasciitis, and complex postoperative wounds. The cases were evaluated on the following dimensions: degree of wound complexity, treatment protocol, and treatment result.

Since the 1st *Mongolian Regenerative Medical Technology Case Competition* in 2020, the event has gained more popularity, making it possible for more acceptance of regenerative medical technology in this country. We are witnessing the competition event changing for the better, evolving from a small event joined by a dozen of doctors to an academic platform where experts from China and Mongolia share valuable experience mutually.

Grand Opening of the Rong Xiang Xu Bioscience Innovation Center at California State University, Los Angeles

On April 14, the grand opening of the Rongxiang Xu Bioscience Innovation Center at California State University, Los Angeles (CSULA) was held successfully. Officers served in different government departments in the U.S. attended the ceremony. Kevin Xu, Chairman of Board of MEBO Group and Dr. Li Li, Chairman of the National Rongxiang Xu Foundation attended the ribbon-cutting ceremony.



The Rongxiang Xu Bioscience Innovation Center is named with the name of Dr. Rongxiang Xu, the pioneer of Human Body Regenerative Restoration Science. The major role of this 20,000 ft² center is to provide a platform for young entrepreneurs to facilitate their career. The center has multi-function classrooms, conference rooms, and also is a part of the Cal State LA BioSpace initiative and home to the Cal State LA BioSpace incubator, which provides critical laboratory space and helps emerging entrepreneurs turn their scientific discoveries into job-creating businesses.

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