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CASE REPORT

Fighting postsurgical infection after myelomeningocele repair with medical honey (Medihoney): a case report

Kazem Hajmohammadi[1] · Yousef Mohammadpour[2] · Naser Parizad[3]

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Abstract

Surgical site infection (SSI) prolongs the treatment period, delays wound healing, increases antibiotic consumption, and leads to patient death in complicated cases. This case was a 10-day female infant born at 37-week- and 6-day of gestational age with a birth weight of 3700 g and Apgar 5/8 by emergency cesarean section due to spina bifida cystica with myelomeningocele (MMC). She was admitted to the neonatal intensive care unit (NICU) because of respiratory distress and hypotonic lower extremities on June 2, 2022. A cardiovascular and neurosurgery consult was okay for reconstructive surgery, and she had MMC repair surgery by a plastic surgeon on June 5, 2022. The surgical site was infected, and SSI had no improvement, despite regularly receiving wet and Vaseline gauze dressing and intravenous antibiotic therapy. We started the treatment using Medihoney™, honey antibacterial wound dressing, on SSI once a day for 2 weeks, then once every other day for the next 6 weeks. Her SSI was cured entirely after 2 months, and she was discharged from our wound treatment team in satisfactory general condition. Clinicians and wound care management teams could use honey antibacterial wound gel to treat SSI, particularly in newborns with weakened immune systems after spinal birth defects repair.

Keywords Honey dressing · Neonates · Wounds · Surgical wound infection · Myelomeningocele · Case report

Introduction

Surgical site infection (SSI) is one of the most expected complications of surgery [1]. About 1–3 out of every 100 patients who undergo surgery experience SSI [2], usually caused by bacteria or other microorganisms [3]. SSI prolongs the treatment period, increases antibiotics usage, delays wound healing time, causes patient death in complicated cases, and imposes high expenses on the patient and the health care system [4]. SSIs could result from chronic underlying diseases, immunodeficiency, high body mass index (BMI), elderly patients, malnutrition, and smoking [5, 6]. SSI is often diagnosed by fever, redness, swelling, warmness, and purulent wound drainage [4].

There are several treatment options for SSIs, and the best option is selected based on the wound location and condition. Wound debridement, antibiotic therapy, and wound dressings are traditional methods to manage SSIs [7]. Because of the increased rate of antibiotic resistance in patients, traditional treatments are usually unsuccessful these days [8]. Thus, utilizing alternative approaches to treat SSI has obtained more attention [9]. Dressing with Medihoney™, the honey antibacterial wound dressing, is one of these alternative options [10].

A literature review confirmed that honey products suppress bacteria [10, 11] by the high concentration of glucose, hydrogen peroxide, and its acid and osmotic effects [12]. Researchers have also confirmed that honey fights infection by stimulating the lymphocytes in the wound site and improving the activities of phagocytes and other antibacterial components [10, 12]. Moreover, not having adverse effects is another significant factor

✉ Naser Parizad
parizad.n@umsu.ac.ir

Yousef Mohammadpour
mohammadpour.y@umsu.ac.ir

[1] BSN, Imam Khomeini Teaching Hospital, Wound Manager, Urmia, IR, Iran

[2] Department of Medical Education, School of Medicine, Urmia University of Medical Sciences, Urmia, IR, Iran

[3] Patient Safety Research Center, Clinical Research Institute, Faculty of Nursing and Midwifery, Department of Critical Care Nursing, Urmia University of Medical Sciences, Campus Nazlu, 11 KM Road Seru, Urmia 575611-5111, West Azerbaijan, IR, Iran

that encourages clinicians to use this natural substance [11]. In addition, the hyperosmotic effect of honey prevents the drying and sticking of the wound to the dressing, and thus, no pain or tissue damage will happen during dressing changes [13]. These honey features encouraged us to research the effect of honey antibacterial wound gel dressing on non-healing SSI in a newborn who had an MMC repair surgery. The result can add a point to the body of literature and assist clinicians in decision-making.

Case presentation

The present case was a 37-week- and 6-day-old female newborn with a birth weight of 3700 gr, a height of 47 cm, a head circumference of 36 cm, and Apgar 5/8. She was born to a 34-year-old mother by emergency cesarean section due to spina bifida cystica with MMC at Motahhari Hospital, Urmia, Iran. History taking showed that the newborn's mother had three previous pregnancies, and it was her fourth child. She was from a low-class Azeri family. During the pregnancy, the mother had no diagnostic evaluations or prenatal examinations. The mother had no history of medication use and denied alcohol or drug abuse, smoking, or any underlying health condition. The mother developed high blood pressure from the fifth month of pregnancy. At birth, the newborn's vital signs were as follows: temperature: 36.7 °C, respiration rate: 62 bpm, pulse rate: 115 bpm, blood pressure: 56/24 mmHg, O_2 saturation: 96%. She was admitted to the NICU because of respiratory distress and hypotonic lower extremities on June 2, 2022. The patient had a 5-cm open wound on her back and was covered by a sterile dressing. The newborn underwent plastic surgery consultation. The plastic surgeon recommended surgical repair if everything went well. She had no kyphosis; thus, there was no indication of Z-plasty repair. The lab works were within the normal limit before surgery. A cardiovascular and neurosurgery consult was okay for reconstructive surgery, and she had MMC repair surgery by a plastic surgeon on June 5, 2022. The lab work was repeated, and a brain computed tomography (CT) scan was prescribed for the patient after surgery (see Table 1). The patient's hemoglobin (Hb) had dropped to 8.6 mg/dL after surgery, 40 mL of packed red blood cells was transfused twice, and her Hb went up to 9.1 mg/dL. The brain CT result revealed the posterior fossa is small, and evidence of cerebellar tonsil herniation to the foramen magnum was seen along with triventricular hydrocephalus. The results suggested Chiari malformation type 2.

The patient had a wet and Vaseline gauze dressing every 12 h and PRN. She prophylactically received cefotaxime 150 mg intravenous (IV) q12h (BID), gentamycin 8.5 mg IV q12h (BID), and ampicillin 190 mg IV q12h (BID). Her surgical site was infected on the third day after the surgery in the neonatal unit, and she was transferred to NICU (Fig. 1). The wound dehiscence occurred gradually, and SSI had no improvement, despite regularly receiving dressing and intravenous antibiotic therapy (Fig. 2). Wound culture showed multidrug-resistant *Pseudomonas aeruginosa* infection. An infectious disease specialist was consulted, and broad-spectrum antibiotic therapy was started according to the antibiogram result. The medical team consulted the wound treatment team on the ninth day after surgery. The newborn was transferred to our wound treatment team.

Medihoney™ antibacterial wound dressing was used for a month to treat newborns' SSI. Medihoney™ antibacterial wound gel is produced by American Derma Sciences, Inc. After the SSI was irrigated with normal saline, the Medihoney™ wound gel was applied to the infected area and dressed every 24 h for 2 weeks, and then, the dressing was changed every 48 h for the next 6 weeks. The newborn first received Amp vancomycin 30 mg IV q12h (BID) and Amp cefotaxime 150 mg IV q12h (BID) for 7 days, and then she received Amp meropenem 80 mg IV q8h (TID) for 3 weeks. The newborn's two edges of the wound were closed, and her SSI healed completely after one and a half

Table 1 Labs results of newborn

Biochemistry			
Test	Result	Unit	Normal range
BS	78	mg/dL	50–200
Urea	10	mg/dL	3–12
Cr	0.64	mg/dL	0.1–0.5
Serum Na	139	mmol/L	133–146
Serum K	5	mmol/L	3.4–6.0
Serum Ca	9.9	mg/dL	8. –10.3
CRP	11.3		> 10 positive
Hematology			
WBC	7.6	× 1000	6.0–16.0
R.B.C	2.34	Mill/mm^3	4.2–5.4
Hb	8.6	mg/dL	12–16
HCT	24.6	%	36–46
MCV	105.13	fL	77–97
MCH	36.75	pg	26–32
MCHC	34.96	%	32–36
plt	540	× 1000/mm^3	140–440
Neutrophils	35	%	50–70
Lymphocytes	50	%	22–45
Monocytes	3	%	1–5
BG & Rh	O + (positive)		
Blood culture × 2	Negative		

Fig. 1 Surgical site infection the third day after the surgery

months (Fig. 3). The newborn was discharged from the hospital in good general condition. The SSI was totally healed after two months (Fig. 4).

Discussion

Honey has been used for wound treatment for a long time [14]. Using honey for treating infectious wounds was primarily recognized by the Sumerians in 2100–2000 Before Christ (BC) [15], and its healing popularity remained until the discovery of antibiotics [16].

Because of the weak immune system in newborns and the inability of their bodies to fight different microorganisms, the infection could be fatal in this age group [17]. Newborns with MMC are susceptible to infection due to the open spinal canal and must be surgically closed within 48 h [18]. Preoperation bacterial colonization may cause infection in the surgical site and subsequent complications in these patients. Prophylactic antibiotic therapy and early MMC repair seem

Fig. 2 Wound dehiscence due the infection

necessary [18, 19]. The bacterial colonization rate of these patients at the time of surgical repair varies from 7 to 70% because of the time interval between childbirth and surgical intervention and the difference in the method of birth [18]. Delayed surgical intervention and cesarean section surgery are risk factors for developing SSI and are associated with an increased rate of infection [18, 20]. There are different treatment options for managing infected wounds, including hyperbaric oxygen therapy (HBOT), stem cell-based therapy, negative pressure wound therapy (NPWT), honey dressing, and growth factor therapy [8]. Although NPWT causes less pain and a more satisfactory cosmetic scar, honey dressing treatment is cheaper, more effective, and more acceptable [12, 21].

We introduced a case of a term newborn with MMC, which was repaired by a plastic surgeon three days after birth. Our case had risk factors, including delayed surgical repair of the defect and cesarean delivery. The surgical site

Fig. 3 Newborn's surgical side wound after one and half months treatment

was infected despite receiving prophylactic antibiotics, and her SSI showed no improvement despite antibiotic therapy and routine wound care. Her SSI was completely cured by using Medihoney™ dressing for a month. She was discharged from the hospital in satisfactory general condition.

Consistent with our report, researchers have already confirmed the extraordinary effect of honey dressing on treatment-resistant infections in different cases [10, 22]. Goli et al. successfully treated extravasation injury in a male neonate [23]. Parizad et al. reported successful SSI treatment after postnatal sacrococcygeal teratoma surgery [24]. Sudirjo et al. reported effective treatment of chronic diabetic foot ulcers by honey dressing in Indonesia [25]. To the best of our knowledge, this is the first case of successful treatment of postsurgical MMC closure infection by using Medihoney™ dressing.

Fig. 4 The wound healed 2 months after treatment

Conclusion

Some benefits of using honey include strengthening the immune system, infection management, and wound healing. This case report showed that SSI following MMC closure could be successfully treated by applying honey antibacterial wound gel, particularly in newborns with weakened immune systems. Thus, we recommend clinicians use honey dressing products as an appropriate alternative to traditional dressings in newborns, especially in cases with non-healing SSI. However, no clear guidelines exist for using honey in neonate wound care. Mainly, due to the limited research on neonate patients, comprehensive randomized controlled trials should be performed to create detailed and consistent guidelines for neonate wound care in clinical practice.

Abbreviations SSI: Surgical site infection; MMC: Myelomeningocele; NICU: Neonatal intensive care unit; BMI: Body mass index; CT: Computed tomography; Hb: Hemoglobin; IV: Intravenous; BC: Before Christ; HBOT: Hyperbaric oxygen therapy; NPWT: Negative pressure wound therapy; BID: Bis in die; TID: Ter in die

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Author contribution All authors (Kazem Hajimohammadi, Yousef Mohammad pour, and Naser Parizad) have actively participated in this case report preparation. Kazem Hajimohammadi and Yousef Mohammad pour managed the patient's wound. Kazem Hajimohammadi, Yousef Mohammad pour, and Naser Parizad performed the Literature review; Kazem Hajimohammadi and Naser Parizad wrote the case report draft; Kazem Hajimohammadi, Yousef Mohammad pour, and Naser Parizad wrote the final case report. All authors reviewed and approved the case report.

Data availability Not applicable.

Declarations

Ethics approval and consent to participate In this case report, the authors declare that they followed the regulations approved by the Research Ethics Committees of Urmia University Medical Sciences (IR.UMSU.REC.1401.157) and the Helsinki Declaration of the World Medical Association. Informed consent was obtained from the newborn's parents to report the case after explaining the report's aim and giving full assurance to keep her information confidential and her identity anonymous.

Consent for publication The newborn's parents signed informed consent regarding publishing their data and photographs.

Conflict of interest The authors declare no competing interests.

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