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Nursing care of a newborn with deep incisional surgical site infection: a case report

Cuidados de enfermagem a recém-nascido com infecção de sítio cirúrgico incisional profunda: relato de caso

Cuidados de enfermería a un recién nacido con infección del sitio quirúrgico incisional profunda: informe de un caso

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ABSTRACT

Objective: To describe a case of deep incisional surgical site infection in a children's hospital in South Brazil, emphasizing the nursing care measures provided to the newborn. **Method:** Case study with data collection from medical record, approved by the institution and the Human Research Ethics Committee. **Results:** From the diagnosis of surgical site infection, a plan was established for specific care of the lesion using occlusive dressings made with technologies aimed at accelerating the second-intention healing process. **Conclusion:** Despite the severity of the lesions, the scientific knowledge and the skill of the nurses during treatment of the surgical site infection provided the newborn with full surgical wound healing and hospital discharge before the estimated moment.

DESCRIPTORS

Infant, Newborn; Surgical Wound Infection; Nursing Care; Occlusive Dressings; Technology; Case Reports.

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INTRODUCTION

Necrotizing enterocolitis (NEC) is the most common pathology affecting the gastrointestinal tract (GIT) of premature and term newborns (NB), representing a risk to these patients' lives[1]. The current occurrence of NEC is, indeed, a manifestation of the great successfulness of neonatologists in keeping NB alive in increasingly shorter gestational ages[2]. Despite the survival of premature infants, the mortality attributed to this condition has not changed in the last five decades. This outcome is unavoidable for 50% of NB requiring surgical intervention[2].

The precise physiopathology of NEC has not yet been explained in full detail, but evidence suggests that this is a multifactorial process which includes ischemia and intestine lesion with subsequent inflammatory reactions in the intestinal wall[1,3]. The Bell stage system is widely employed for descriptive purposes and disease stratification, classifying disease severity as mild (Bell stage I), moderate (Bell stage II), or severe (Bell stage III). It can be diagnosed through a simple abdominal radiography, which reveals intestinal pneumatosis (Bell stage II), whereas more advanced cases present pneumoperitoneum (Bell stage III)[2].

Treatment is established according to disease stage and can be divided into two varieties. The conservative one includes fasting with total parenteral nutrition, gastric drainage, fluid balance, administration of analgesics, antibiotics, and catecholamines, in addition to early ventilatory support. The second line of treatment, the surgical one, is an absolute indication when there is evidence of GIT perforation with pneumoperitoneum (Bell stage III). Laparotomy provides for the appropriate resection of the affected intestinal segments and commonly results in ostomy[1].

Despite the mortality, NB who survive NEC may experience serious complications. The morbidity index ranges from 20 to 50% and is characterized by intestinal stenosis, short bowel syndrome, and delayed growth and neurodevelopment. Also, they need to be hospitalized for longer and are more vulnerable to death before discharge[2].

However, one complication related to NEC is rarely described in the literature and derives from surgical intervention: the surgical site infection (SSI). In most cases, care of the surgical wounds is minimized, amplifying the risk of SSI. According to the Diagnostic Criteria of Healthcare-related Infection in Neonatology[4], the SSI are infections related to surgical procedures with or without placement of protheses or implants in hospitalized or outpatient neonates, being classified as per the affected skin layers.

Since the skin is the first line of defense against harmful external factors, its barrier function is lost when this organ has some continuous lesion. It thus can no longer protect the physiological functions of the internal organs and is subject to microbial infection[5-6]. Once infected, the lesion will severely affect the patient's life and health[7].

Given the vulnerability of neonate patients, there are few interventions which pose no risk and the nurse must be able to identify the appropriate products and procedures. Integumentary integrity must be the metric to enhance the quality of neonatal care and, in the clinical practice, nurses must update the knowledge required to provide evidence-based care to the NB. They may use thus technologies which offer appropriate information and assist decision-making[8].

The objective of this case report is therefore describing the main nursing care measures provided to a NB submitted to laparotomy due to NEC who developed SSI.

METHOD

Design of study

The methodology adopted for the development of this study was the case report, guided by the Case Report Guidelines (CARE) tool[9].

Case reports aim to expand locally, nationally, and internationally the professional knowledge on a clinical manifestation, diagnostic approach, or alternative therapy against a disease to improve the quality of care provided to patients[10].

Scenario

This study took place in a children's hospital in the metropolitan area of Curitiba which provided care to children aged 0 to 18 and had surgical and clinical hospitalization units, Neonatal Intensive Care Unit (NICU), and a Pediatric Intensive Therapy Unit, in addition to a Surgical Center (SC), laboratory, breast milk collection room, imaging center, and outpatient facility with specialists.

The NB was hospitalized in a type III NICU with 20 active beds which receives patients from the entire state of Paraná and has a multidisciplinary team composed of nurses, nursing technicians, physicians, physiotherapists, speech therapists, social workers, and psychologists for integral care.

Selection criteria

This particular NB was chosen for this study due to presenting concomitant medical diagnoses of NEC and SSI and being hospitalized in the NICU during 2020.

Data collection

The data were collected from the patient's medical record between September 20 and 30, 2020 by the authors who provided direct care to the NB. To collect data systematically, an instrument created by the researchers was employed; this included data on the NB from her admission to NICU discharge, divided into the following topics: medical diagnoses, history of mother and NB, medical specialties (pulmonary, cardiovascular, ophthalmology, neurology, orthopedics,

otolaryngology, pediatric surgery), infection, venous access, vaccines, development, intercurrences, and therapeutic plan.

Concerning the photographic register, the same authors who collected data from the record have shot the photographs with previous written consent by the legal guardians.

Data analysis and treatment

The data was descriptively analyzed through the photographs and information from the patient's record.

Ethical aspects

The project was approved by the Human Research Ethics Committee of the University Hospital Complex of Universidade Federal do Paraná, in accordance with the consolidated opinion n. 3.763.468, dated 12/12/2019, abiding by the ethical precepts of Resolution n. 466/2012 by the National Health Council. The images were authorized for publication by the legal guardian, who has signed a form authorizing use of image.

RESULTS

Case report

The 27-year-old mother was primigravida, had been to five prenatal appointments, and had been pregnant for 29 weeks and 4 days. She was admitted to the obstetric center in 04/24/2020 during labor; inhibitor and two doses of corticoid were administered. In 04/28, inhibitor was suspended, and the mother developed to vaginal delivery with no intercurrences. Her blood type was B+, VDRL and HIV were negative, and she was immune to toxoplasmosis.

The patient E.F.S.J., born on 04/29/20 at 02:40 in a positive overall state, presented heart rate over 100 bpm, appropriate tonus, loud cry, Apgar 7/8, weight of 1.480 Kg, and gestational age of 29 weeks and 5 days; she required no resuscitation procedures. When she was 12 days old (05/11), she progressed to enterorrhagia and was maintained fasted; a systemic treatment with piperacillin was started and the patient received a red blood cell transfusion. The abdominal radiography showed pneumatosis; however, there was no pneumoperitoneum. Due to the absence of a pediatric surgery in the hospital of origin, the children's hospital's NICU was demanded a bed by Paraná's bed referral center and the NB was admitted on 05/13/20 at 19:00.

The following medical diagnoses were established during the hospitalization period: premature NB, appropriate for gestational age, grade I hyaline membrane, hypoglycemic, enterocolitis, short bowel syndrome, hyponatremia, cholestasis, anemia, surgical wound dehiscence, fungal sepsis, grade I peri-intraventricular hemorrhage, hypothermia and, finally, intestinal reconstruction.

In a physical exam during admission, she was shown to be in a regular overall state, ruddy and hydrated, active, having jaundice, and in level 6 pain as per the Neonatal Infant Pain Scale (NIPS). She was kept under mechanical ventilation, presenting symmetrical chest expansion, reduced breath sounds on the left side — but with no respiratory discomfort —, normal cardiac auscultation, distended, tense abdomen, painful upon minimal palpation, no peristalsis, and bilious gastric residual in a medium quantity. Moreover, her lower limbs had no edema and her peripheral tissue perfusion was appropriate. The first procedures were absolute fasting with hydroelectrolytic replacement, laboratory exams, and abdominal radiography. The central venous catheter inserted at the origin was permeable; antibiotic therapy with piperacillin was continued and continuous analgesia with fentanyl was started. The patient was assessed by the pediatric surgery team (PST).

On 05/14, in the morning, clinical and laboratory worsening were observed: metabolic acidosis, hyperkalemia, and thrombocytopenia. The patient needed a vasoactive drug for hemodynamic recovery and indwelling urinary catheterization was performed as preoperative preparation due to the imminent risk of surgery. Abdominal sonography had shown moderate ascites, control radiography had no pneumoperitoneum, but lack of air in abdominal quadrants. She was assessed by PST, which oriented expectant management. In the afternoon, her imaging exam and clinical condition were reassessed by the surgeon and surgical intervention was opted for. The patient was referred to the SC at 16:00 and an exploratory laparotomy was performed, showing NEC from the ileum to the transverse colon, in addition to necrosis of these segments; an enterectomy of the ileum (approximately 20 cm) and of the ascending colon until the transverse colon was performed, followed by ileostomy and colostomy (Figure 1).

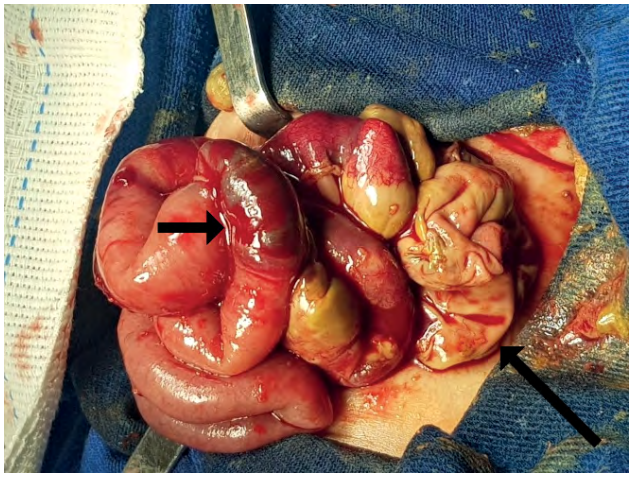

Figure 1 – Intraoperative period. Extensive intestinal involvement and evidence of necrosis with perforation (long arrow). Air bubbles in the intestinal wall resulting of bacterial fermentation (short arrow).

In the intraoperative period, the patient had moderate bleeding which was difficult to localize and hemostasis; red blood cells and platelets were administered. Two anatomic pieces were sent to biopsy, corroborating the clinical diagnosis of NEC. The patient returned to the NICU at 18:45

with hypothermia (35°), accommodated in a warm, moist incubator, was sedated with pancuronium and fentanyl, and received volumetric expansion, but was hemodynamically stable. Metronidazole was associated to piperacillin. The occlusive dressing with sterile gauze and micropore in the abdominal surgical wound was saturated with bloody exudate. Despite the severity, she was stable in the immediate post-operative period (05/14 to 05/15).

In the first two post-operative days (05/16 and 05/17), her abdomen was globose and tense, bowel sounds were absent, and surgical wound edges were hyperemic and with purulent exudate in small amounts; special dressing with Mepitel Transfer was performed instead of gauze, in accordance with an orientation of the institution's skincare commission. During the night duty of 05/17, she developed to worse laboratory results, and it was necessary to escalate the antibiotic therapy to meropenem and vancomycin. In the following days, a gradual increase in signs of inflammation in ileostomy was observed with alteration in ostomy color (ischemia) and drainage of green exudate in moderate amount. On 05/20, PST detected dehiscence of the aponeurosis on this site. Subsequently, on 05/21 the patient was submitted to abdominal re-operation due to ostomy necrosis with release of feces and exudate around it. During the procedure, two new perforations in the small intestine were observed close to the ileostomy; resection of this segment (3 cm) was performed and colostomy was re-elaborated in the supra-umbilical region.

Due to the second surgical intervention and the fact that SSI was already present in the abdominal incision's bed, on 05/25 an inflammatory process stronger than the first one was observed (Figure 2), which culminated into a large amount of purulent exudate and total dehiscence with a risk of evisceration (05/28) (Figure 3). Given this, continuous sedoanalgesia with fentanyl and midazolam was prescribed, orotracheal intubation due to the enhancement of sedation was performed, and minimal manipulation was instituted, so as to optimize healing and reduce the risk of evisceration.

Figure 2 – Surgical site infection on 05/25.

Figure 3 – Worsened SSI with total dehiscence on 05/28.

From 05/26, topical treatment with special dressings with antimicrobial properties (Aquacel®) and non-traumatic dressings (Mepitel Transfer®) was instituted. On that day, the cavity of the surgical wound was filled with Aquacel® and protected with Mepitel Transfer®; only the latter should be changed upon saturation. It was initially necessary to perform four substitutions every 24 hours. Progressively, the lesion was reduced in size, depth, and exudate, in addition to the presence of granulation tissue. After five days of use (06/01), Aquacel® was changed for hydrogel, focusing on chemical debridement of fibrin. After the application of hydrogel, a secondary coverage with sterile dressing and moisture with warm 0.9% saline was performed every four hours to enhance healing. Wound healing was complete after 15 days of topical treatment and the special dressings were suspended on 06/11.

As hospital discharge was imminent, considering the positive clinical condition of the NB and the difficulties of the family with the specific care of ostomy, the PST performed ileostomy closure on 06/25. However, after reversion, the surgical wound progressed again to SSI, but with lower severity. On 07/01, the incision presented a small dehiscence center-wise and an average amount of purulent exudate (Figure 4). Topical treatment with Aquacel® was soon restarted. This time, Mepitel Transfer® was changed for an equally non-traumatic silicone film (Mepitel One®), as there was less exudate. The duration of the treatment of this second SSI was shorter, totaling 8 days (07/09) (Figure 5). All conducts regarding the employed dressings were established bedside by the nurses.

Figure 4 – Second episode of SSI, presenting a small dehiscence on the wound's center.

Figure 5 – End of treatment on 07/09.

The patient was discharged from the NICU to the nursing ward for infants on 07/15 and was discharged from the hospital on 07/17, with a weight of 2.620 Kg, predominantly breastfeeding but with the complement of formula in a baby bottle. Prophylactic antibiotic therapy for short bowel with bactrim, metronidazole, nystatin, and vitamin B12 was prescribed. The patient was referred to the outpatient units for "at-risk infants", clinical nutrition, and pediatric ophthalmology.

DISCUSSION

Despite the consolidated knowledge and the previously established directives for the management of SSI in adults and, more recently, in children, little is known about this clinical condition in NB and infants[11]. Given the scarce evidence-based knowledge on nursing care of SSI in this population, professional practice with this type of lesion and the choice of appropriate dressings tend to reflect the professional experience of nurses and their preferences[12-13].

Also, "in recent years, technologies for treating lesions have evolved considerably, especially in the development of special dressings. Currently, there are many sophisticated products available on the market, which can cause some confusion at the time of choice". This setting demands that neonatal nurses understand the "characteristics of skin that is prone to lesions, the mechanisms of lesions, the physiology of healing, and the factors that affect it". This professional "should also know about the assessment and the treatment of lesions, based on the best evidence to restore function and appearance with a minimum of complications"[14].

In this context, wound management poses a challenge to neonatal nursing[15], but nurses must be protagonists in planning care of SSI within these limitations. Treatment of these lesions, although still considered to be interdisciplinary, is predominantly led by this professional, who develops the nursing process bedside and directly with the patient with specific interventions for wound care[13,15].

By considering SSI as a post-operative complication, one extremely important initial nursing procedure includes "incision dressings, an important measure to avoid contamination and proliferation of microorganisms, and provide the ideal conditions for the wound healing process. Nursing professionals are responsible for dressings, whose purpose is to ensure and assist in the treatment of the wound in such a way as to minimize the risk of infection and promote a favorable environment for the healing process. The nurse supervises this procedure, orients the professional who performs it and evaluates the wound evolution in order to choose the most appropriate dressing for the wound characteristics and the wound bed"[16].

"The ideal dressing for a lesion changes according to the evolution of the lesion itself. The choice of the product depends on the type of tissue that lies on the bed of the lesion, the depth of the lesion, the amount of exudates, and the presence of signs of local infection. It is necessary to select a product that provides an adequate environment for healing by maintaining adequate moisture. The product should also offer protection against bacterial invasion, be easy to apply, adapt and remove, provide patient comfort and not require frequent changing"[14].

In more complex lesions, i.e., containing devitalized tissue and exudate, dressings with functions of autolytic debridement and fighting the infection are recommended. Autolytic debridement, frequently used in neonatal wounds, depends on a warm and moist environment to work, which can only be achieved with the use of special dressings. This capacity enables macrophages to digest necrotic tissue and promotes granulation[15,17]. Hydrogel is a compound that favors this action, presenting favorable results for the neonatal population[12,17].

When choosing the most appropriate dressing, nurses should also consider the presence of exudate. In synergy with hydrogel, dressings containing silver, such as Aquacel®, are appropriate indications for neonatal use, since they absorb the exudate and help promoting a moist wound bed, contributing to autolytic debridement[15].

Adhesive silicon dressings, such as Mepitel One®, are also indicated in neonatology due to resulting in reduced trauma to the NB's skin[17]. When applied as primary dressings, they enable the exudate to be transferred to the secondary dressing, reducing the effect of maceration. Another characteristic which makes them particularly useful in neonatal dressings is their efficacy regarding wounds of uncommon shapes in difficult sites[15].

Despite the lack of publications on nursing care of SSI in neonatology, some experience reports corroborate the association of hydrogel and Aquacel® in treating these lesions. Neonatal nurses reported the use of these special dressings in a premature NB who developed SSI after exploratory laparotomy and ileostomy. In ten days of topical treatment, the dehiscence provoked by the infection was completely solved[17].

Another case report published by a pediatric nurse dealt with nursing care to a child who had developed SSI and intestinal evisceration after ileostomy. The nursing team performed an integral assessment of the child, establishing goals and implementing holistic care. Guided by theories of wound bed preparation and maintenance of a moist environment, a simple negative pressure device conceived by the team and modern dressings were used in different stages to efficiently manage the exudate, remove necrosis and promote granulation and complete wound healing. Through this individualized care, the child was discharged after 32 days of hospitalization[18].

Thus, nursing care based on scientific evidence and on the NB's needs, in addition to the nurse's expertise, composed a triad of the best professional practice, providing for safe care and full recovery of a critically ill NB in at-risk situations, such as deep incisional SSI.

Study limitations

Most studies involving NEC in newborns report complications related to the short bowel syndrome, neurodevelopment, septicemia, and survival of the NB affected by this pathology. However, they seldom report SSI as a complication which is inherent to surgical intervention. Thus, the limitation of this study is shown by the scarcity of scientific publication on SSI as a complication of NEC due to the requirement of surgery, corroborating that the experience of this case report is important to assist other teams in the management of this complication.

Advancements for the nursing area

This case report aims to assist the Nursing professional regarding specific care of SSI in the NEC setting, a remarkably frequent pathology in NICU. Nursing care offered to this particular NB, in addition to being evidence-based, is replicable in other cases and has contributed to care effectivity.

CONCLUSION

The NB hospitalized in NICU present various risk factors which potentialize skin lesions and inherent complications. The objective of this experience report was to describe the main nursing care measures in treating SSI in a neonatal patient. The nursing team was verified to be a protagonist in this practice, led by nurses when they are in charge of managing these lesions. Establishing holistic, systematized, evidence-based care leads the nursing team to success in their therapeutic approach, bringing professional satisfaction and, particularly, the NB's full recovery.

RESUMO

Objetivo: Descrever um caso de infecção de sítio cirúrgico do tipo incisional profunda ocorrido em um hospital infantil do Sul do Brasil, evidenciando os cuidados de enfermagem com o recém-nascido. **Método:** Estudo de caso com coleta de dados em prontuário, aprovado pela Instituição e pelo Comitê de Ética em Pesquisa com Seres Humanos. **Resultados:** A partir do diagnóstico de infecção de sítio cirúrgico, foi estabelecido um plano de cuidados específicos com a lesão, utilizando curativos oclusivos compostos por tecnologias especiais para acelerar o processo de cicatrização por segunda intenção. **Conclusão:** Apesar da gravidade das lesões, o conhecimento científico e a habilidade dos enfermeiros assistenciais no tratamento da infecção de sítio cirúrgico proporcionaram ao neonato a cicatrização completa da ferida operatória e alta hospitalar previamente ao tempo estimado.

DESCRITORES

Recém-Nascido; Infecção da Ferida Cirúrgica; Cuidados de Enfermagem; Curativos Oclusivos; Tecnologia; Relatos de Casos.

RESUMEN

Objetivo: Describir un caso de infección del sitio quirúrgico incisional profunda ocurrido en un hospital infantil del sur de Brasil, destacando los cuidados de enfermería con el recién nacido. **Método:** Estudio de caso con coleta de datos del expediente, aprobado por la Institución y por el Comité de Ética en Investigación con Seres Humanos. **Resultados:** A partir del diagnóstico de infección del sitio quirúrgico, se estableció un plan de cuidados específicos con la lesión, utilizando apósitos oclusivos compuestos por tecnologías especiales para acelerar el proceso de curación por segunda intención. **Conclusión:** A pesar de la gravedad de las lesiones, el conocimiento científico y la habilidad de los enfermeros en el tratamiento de la infección de sitio quirúrgico proporcionaron al neonato una cicatrización completa de la herida operatoria y alta hospitalaria antes del tiempo estimado.

DESCRIPTORES

Recién Nacido; Infección de la Herida Quirúrgica; Atención de Enfermería; Apósitos Oclusivos; Tecnología; Informes de Casos.

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