

# Skin Breakdown Due To A Chlorhexidine-Impregnated Disc In A Premature Infant With Systemic Candidiasis

A Brzenski, M Greenberg

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## Abstract

We report the case of an 820-gram, 26-week premature infant, with *Candida Albicans* sepsis, pneumonia and dermatitis, who developed a skin ulcer directly under the site of his central venous line dressing. The dressing consisted of a foam chlorhexidine-impregnated antimicrobial disc (CIAD) and a transparent dressing. The skin ulcer was in the shape of the foam disc. Upon removal of both the CIAD and the central line, the ulcer was treated with nystatin powder, covered with a silver impregnated antimicrobial dressing. The skin ulcer healed without further incident. One should consider avoiding the use of a CIAD on catheters in neonates with non-intact skin to prevent ulceration.

## CASE REPORT

An 820-gram male infant was born by cesarean section to a 23-year-old woman at 26-weeks post-conception, due to premature rupture of membranes and protrusion of the left arm out of the cervix. The baby required resuscitation at birth and developed respiratory distress, necessitating two doses of surfactant. At two-weeks of age he remained critically ill, and despite antibiotics and mechanical ventilation, he had worsening respiratory function and a new skin rash. Shortly thereafter, respiratory and blood cultures grew *Candida albicans*. Due to a worsening clinical course, and the need for multiple medications, including amphotericin, a left femoral central venous catheter was placed. The femoral site was not ideal as it was showing signs of dermatitis, but it was chosen because the baby was small (<900g) and was on High Frequency Oscillating Ventilation (HFOV). Two days after insertion, during the initial dressing change, the site directly under the CIAD was noted to have an ulcerating wound (figure 1a,b). Given the developing wound, a new central venous catheter was placed in the left subclavian vein and the femoral catheter was removed. On consultation with the burn service, the wound was treated with nystatin powder and covered with a silver impregnated antimicrobial dressing. Over the next two weeks the sepsis resolved and the left groin wound healed without incident (figure 2). The site over the subclavian central line was covered with the silver impregnated antimicrobial dressing and a transparent dressing and never had any skin breakdown. The yeast infection resolved and he

was successfully weaned off mechanical ventilation.

Figure 1 a&b



**Figure 2**



## DISCUSSION

A CIAD consists of circular polyethylene foam with continuous release of chlorhexidine, leading to decreased catheter-related blood stream infections, local infections and skin colonization near central and arterial lines. Chlorhexidine based sponges are increasingly becoming the standard of care for management of vascular access in adult and pediatric patients (1,3). The US Federal Drug Administration does not currently approve chlorhexidine-based products for use in children less than 2 months due to a lack of safety and efficacy data in this population.

In-utero, the epidermis develops and matures from 23 weeks to 34 weeks gestational age, leaving premature neonates with underdeveloped skin. The immaturity of the skin places premature neonates at risk for trauma, secondary to

adhesives and devices placed on the skin. Low birth weight is also a critical risk factor for the development of catheter related blood stream infection(5,6). Given this risk, the majority of neonatal training programs throughout the United States use chlorhexidine-based products (7), including the CIAD, in neonatal patients, although there is no generally accepted best practice in this subgroup of patients. Since a less than ideal location was chosen for the placement of the central venous line in this case, the CIAD was used in hopes to prevent catheter related blood stream infection.

The use of CIAD can lead to local reactions in premature neonates (2). Hypersensitivity reactions, with exudative lesions, have been documented in neonatal patients, leading the manufacturer to make the recommendation against the use of the CIAD in premature neonates. We believe it is extremely unlikely that this patient's wound was caused by a hypersensitivity reaction due to the fact that a 2% chlorhexidine and 70% alcohol prep-stick was used during placement and for dressing changes of the subclavian central line without any skin irritation or breakdown. The application of a tight tegaderm can also cause a wound due to pressure impeding capillary blood flow. However, the wound resulting from a pressure tight application of the transparent dressing is typically non-exudative, with lack of capillary refill. While it is possible that pressure necrosis led to this lesion, we believe it is an unlikely culprit given the exudative nature of the wound. Finally, another possible, but unlikely explanation, was that the transparent dressing itself had caused the wound. However, the wound did not extend to the border of the transparent dressing and the transparent dressing did not have direct contact with the affected skin. In addition, a transparent dressing was also used for the subclavian central line dressing without problems. We believe the most likely explanation for the wound is that the foam disc was directly on skin that was colonized with yeast causing the breakdown and leading to ulceration.

While we have used CIAD before in our NICU, this was the first case of skin ulceration secondary to the product. We have noted in our burn intensive care unit, that adults with burns developed similar ulcerative lesions when the CIAD was used on non-intact skin. A silver based antimicrobial dressing, was used to treat the wound that developed in this neonate, with resolution of the lesion (4). One should consider using a product, which has a silver coating, to

prevent catheter related infections in small infants, especially when skin breakdown or cutaneous infection is present.

Given that the insertion site itself cannot be monitored with a silver impregnated dressing, we would recommend frequent dressing changes to ensure that an infection is not developing at the site of vascular access.

In summary, we suggest avoiding the use of CIAD in premature infants, and considering using an alternate product, such as silver-based dressings, for prevention of catheter related blood infections.

## **References**

1. A Randomized Trial Comparing Povidone-Iodine to a Chlorhexidine Gluconate-Impregnated Dressing for Prevention of Central Venous Catheter Infections in Neonates. *Pediatrics* Vol. 107 No. 6 June 1, 2001: 431 -1436
2. Garland JS, Alex C, Mueller CP, Cisler-Kahill LA (1996) Local reactions to a chlorhexidine gluconate-impregnated antimicrobial dressing in very low birth weight infants. *Pediatr Infect Dis J.* 15:912–914.
3. Adams-Chapman I, Stoll B. Prevention of nosocomial infections in the neonatal intensive care unit. *Current opinion in Pediatrics.* 2002, 14:157-164.
4. Rustogi R1, Mill J, Fraser JF, Kimble RM. The use of Acticoat in neonatal burns. *Burns.* 2005 Nov;31(7):878-82. Epub 2005 Jul 18.
5. de Brito CS, de Brito DV, Abdallah VO, Gontijo Filho PP. Occurrence of bloodstream infection with different types of central vascular catheter in critically neonates. *J Infect.* 2010;60:128-32.
6. Edwards JR, Peterson KD, Andrus ML, Tolson JS, Goulding JS, Dudeck MA, et al. National Healthcare Safety Network (NHSN) Report, data summary for 2006, issued June 2007. *Am J Infect Control.* 2007;35:290-301.
7. Tamma PD, Aucott SW, Milstone AM. Chlorhexidine use in the Neonatal Intensive Care Unit: Results from a National Survey. *Infect Control Hosp Epidemiol.* 2010 August; 31(8): 846-9.

**Author Information**

**Alyssa Brzenski, MD**

Assistant Clinical Professor of Anesthesiology University of California San Diego

San Diego, CA, USA

abrzenski@ucsd.edu

**Mark Greenberg**

Professor of Anesthesiology and Pediatrics University of California San Diego

San Diego, CA, USA

mgreenberg@ucsd.edu