

**Case Report / Olgu Sunusu****MAJOR FULL SKIN THICKNESS BURN INJURIES IN AN INFANT DUE TO AN  
INCUBATOR: A CASE REPORT****Bebekte Kuvöze Bağlı Major Tam Kat Cilt Yanığı: Olgu Sunumu**Ilhan Ciftci<sup>1</sup>, Kemal Arslan<sup>2</sup>, Metin Gunduz<sup>3</sup>

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**Abstract**

Burns in neonates have been reported following the use of water warmers, pulse oximeters, various electrodes, chemical disinfecting agents and phototherapy blankets. Major full skin thickness burn injuries in neonates and infants are very rare reports. This case reports on a burn injury of full skin thickness in male infant who was admitted to the Birth and Children Hospital. The baby's body touched the metal heater. This infant, weighing 4000 g, had an injury of 15% TBSA on his dorsum, arm and buttocks. The infant was transported to the Training and Research Hospital.

Fluid resuscitation, analgesic therapy, and enteral feeding were started immediately. At the seventh day after the injury appeared, surgical procedures began. The eschar was excised, and 7 days after the excision, the wounds were grafted with 0.1 mm thickness skin grafts. 14 days after the grafts, all the grafted wounds were found epithelized.

We conclude that in neonates and infants, relatively low temperatures may cause deep burn injuries. We therefore recommend the delivery of preterm childbirths at well equipped facilities with staff who are qualified to nurse premature neonates.

**Keywords:** burns; infant; iatrogenic burns; major burn injuries

**Özet**

Yenidoğanlarda ısıtıcı, pulse oksimetre, elektrot, kimyasal antiseptik ve fototerapiye bağlı yanıklar bildirilmiştir. Tam kat yanıklar yenidoğan ve erken infantlarda nadir görülmektedir. Makalemizde Doğum ve Çocuk Hastanesinde major yanık oluşan ve başarılı şekilde tedavi edilen olgu sunulmuştur. 4000 gr ağırlığındaki infantta, kuvöz ısıtıcı metalin vücuduna temas etmesi sonucu sırt laterali, kol ve uylukta lokalize total vücut alanının %15'i yanık oluşmuştur. Hasta buradan Eğitim ve Araştırma Hastanesi Yanık Tedavi Ünitesine transfer edilmiş, acilen sıvı-elektrolit, analjezik ve enteral beslenmeye başlanmıştır. Olguya yanık oluştuktan 7 gün sonra skar eksizyonu, 14 gün sonra 0.1 mm. deri greftlemesi yapılarak tedavi edilmiştir. Sonuç olarak, infantlarda ve yenidoğanlarda düşük ısı bile derin yanık oluşturabilmektedir. Bu sebeple, yenidoğan takibinde cihazların kullanımı ve hemşire bakımı dikkatle yapılmalıdır.

**Anahtar Kelimeler:** yanık; bebek; iyatrojenik yanık; major yanık yaralanmaları

### Introduction:

Burn injuries in neonates are very rare complications of medical nursing. Thermal injuries in neonates are often the result of an accident or of the iatrogenic injury that can arise from the use of water warmers, pulse oximeters, various electrodes, chemical disinfecting agents and phototherapy blankets (1-6).

### Case:

45-day infant. The infant, a 36-week-gestation male, was delivered by emergency delivery via Cesarean section on 2009. He had a birth weight of 3500 g, and his Apgar score was 8/8, respectively. He had pneumonia, the infant was placed on an incubator. The incubator temperature was around 36 C.

He remained in this incubator for 8 hours. The baby's body touched the metal heater (Figure 1). After 8 hours following his delivery, contact burn injuries were noticed, presenting as a thick, white necrosis on his dorsum, arm and buttocks. The infant was transferred to the Burn Treatment Unit of the Konya Training and Research Hospital.

Upon arrival at the hospital, the baby was pale, silent and poorly perfused. He had 15% TBSA contact which produced a deep burn that was at least at partial thickness. He was transferred to the newborn intensive care unit at once. Fluid resuscitation and analgesic therapy were started immediately.

Seven days after the accident, the eschar was excised. Seven days after excision, the wounds were grafted with a split-thickness skin graft of 0.1 mm, which was harvested and calibrated by the Air-Zimmer electric dermatome (Zimmer, Inc., Warsaw, IN, USA). Twelve percent of the TBSA was covered with this autograft. Skin grafts, excised wounds and donor sites were dressed with paraffin gauze. Donor sites healed on the seventh day after surgery. Sixteen days after the surgery, all the grafted wounds were found to be epithelized.

The baby stayed in hospitals for 23 days in total. He will return for further plastic surgery to give him a better skin image in the long term.

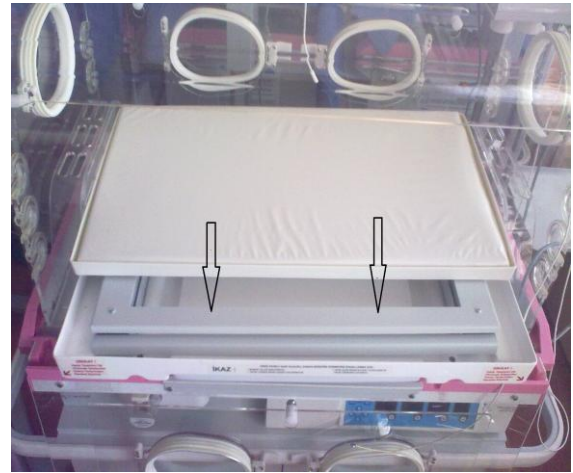


Figure 1. Arrows show the metal heater

### Discussion:

Burn injury poses a high risk for infants (7). During the immediate newborn and early infantile period, major full thickness thermal injuries occur more easily and can result from lower temperature contacts than expected. For the skin of the newborn, some further factors have to be taken into consideration. First, the outer-most protective skin layer appears on a human at the end of the second semester of fetal life and persists to a thickness of only a few layers before birth. Second, cutaneous circulating blood can normally act as a convective heat exchanger of a thermal stimulus, but the cutaneous circulation is disrupted by an imbalance in the autonomic vascular regulation and the vasodilatation of the dependent portion (8-9). These factors become more significant in critically ill newborns and can be caused by low cardiac output, poor circulation, immature skin and poor heat dissemination (10). Fluid resuscitation in children is best based on body surface area by utilizing the Galveston formula (11). Numerous groups support the use of surface area over body weight when calculating fluid volume due to the rapidly changing dimensions of the growing infant (12) with the surface area and weight relationship not constant in these patients.

In 2007, one unit published data on the application and success of early enteral resuscitation and enteral feeding. They found that it was safe and effective and ameliorated the infants' hormonal stress response (13).

In full thickness injuries, definitive closure of burn wounds is the ultimate objective. In the early years, the patient's cosmetically and functionally sensitive areas are the grafting priorities. It is, however, important to achieve maximal eschar removal and skin coverage as soon as is feasible (14-15). As the interval between burn injury and operation lengthens, the vascularity and contamination of the wounds increase and the patients' compensatory mechanisms weaken. The eschar excision should be performed under optimal elective conditions and delayed only until resuscitation is completed. A meta-analysis of six trials shows significant reduction in mortality with early excision of burns when compared to the traditional treatment of those without inhalational injury. The only drawback found to be consistent was the eschar excision procedure's greater volume of blood loss (17).

Excised wounds can be covered in different ways. The current means available are an amnion membrane, fresh or preserved cadaver skin allografts and other biological dressings or skin substitutes (18-19). This technique reduces the systemic response to the burn injury but does not offer the final solution to the problem of wound closure and thus might be recommended in cases of patients in unstable conditions. The best way to offer the final salvage of the wound is to graft the wound with thick split skin grafts. Unfortunately, major burn wounds require major donor sites, which increases the stress of the procedure. Reduction of the donor site area is salvaged by skin graft meshing (17).

This case illustrates the progression of complete epidermal and dermal necrosis of newborn skin after a thermal injury with a commonly used incubator heating metal at a relatively low temperature (around 40 C). We provided immediate fluid resuscitation with aseptic wound care followed by early enteral nutrition for optimal wound healing. In addition, we successfully performed autografting for 12%

of the TBSA immediately. The topical medications and paraffin gauze applied to the wound had no adverse effects.

Despite the recommended policy of not using bare metal with heated babies warm. In addition, education of nurses can take place.

We conclude that the skin of preterm newborns and infants are extremely susceptible to injury. In neonates, relatively low temperatures may cause deep injury. We recommend the delivery of preterm childbirths at well equipped facilities with staff who are qualified in the nursing of premature neonates. If the surface temperature cannot be measured, a warming metal should not be used in incubator.

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