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**Thermal Injury Due to Use of a Forced Air Warming Blanket during Cardiac Catheterization**

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**Introduction:**
Intra-operative hypothermia has been shown to have a deleterious effect on several measures of postoperative outcomes. Therefore, warming devices are used routinely during anesthesia to keep patients normothermic. We report a case of serious thermal injury from a Bair Hugger© forced air warming unit and blanket used in a 10 month-old boy who underwent interventional cardiac catheterization.

**Case report:**
B.T. had Tetralogy of Fallot diagnosed as a newborn infant and underwent placement of a Blalock-Taussig shunt at 6 days of age. He had complete repair of his TOF at 6 months of age including placement of a valved conduit from RV to PA. His past medical history was remarkable for renal tubular acidosis and placement of a gastrostomy tube. A followup echocardiogram revealed severe bilateral pulmonary artery stenosis with RV dilation and dysfunction. After mask induction and intubation, a "Pediatric Long" Model 530 Bair Hugger© warming blanket was placed around the patient from the feet towards the head and attached to a Bair Hugger© 505 forced air warming unit. The included plastic sheets were placed over the legs and torso. For about 3 hours, the warming unit was set at high (43°C). Bilateral pulmonary artery stents were placed via a left femoral venous sheath. During the case, signs of low cardiac output were progressively noticed. After resuscitation and removal of the drapes, burns to both legs were noted, left worse than right. The burn injury worsened in appearance over the ensuing 24 hours as cardiac output was re-established. It was initially felt the burns constituted 5% BSA, were $2^{nd}$ and $3^{rd}$ degree, and would require debridement and grafting. The post-operative course was complicated by thrombosis of the LPA. The patient he received daily dressing changes only for his burns. The burns were observed without surgical intervention as per plastic surgery consultation and the burns healed remarkably after 2 weeks with virtually no scarring. Evaluation of the warming unit by a biomedical technician revealed the unit to be functioning properly.

**Comment:**
Normally, heat produced locally by a forced air warming unit is removed by local blood flow and redistributed to the rest of the body by the circulation. Our patient's thermal injury was likely due to a severe, low blood-flow state in the lower extremities combined with using the high setting (43C°) for the warming unit. The causes of our patient's low blood-flow state in his lower extremities included bilateral femoral artery occlusion, acute-on-chronic cardiac failure, and presence of a large sheath placed in the left femoral vein for the procedure. Also, pressure to the left groin was applied for 20 minutes at the end of the case with the patient still draped and the warming unit still active.

The manufacturer of the Bair Hugger warming device includes adequate warnings in its instructions regarding the dangers of low-perfusion states. We suspect that most anesthesiologists have not read the instructions included with forced air warming devices and may not be familiar with the risk of thermal injury from their use in patients such as ours. Anesthesiologists practicing mainly in the general OR might easily become complacent that forced air warming units are safe in all anesthetized patients.

Patients in the cardiac catheterization lab may be at high risk for thermal injury in the lower extremities from poor perfusion due to multiple factors. Appropriate steps should be taken to minimize the potential for this injury, such as placement of the warming blanket from the head down (with the blanket not reaching the lower extremities), limiting the maximum temperature setting to 38ºC, and placing cloth blankets between the warming blanket and lower extremity skin. Lastly, should injury occur, consultation with a burn specialist should be obtained and conservative management considered until normal blood flow is re-established and the true severity of burn can be accurately ascertained.

Figure 1

Figure 2

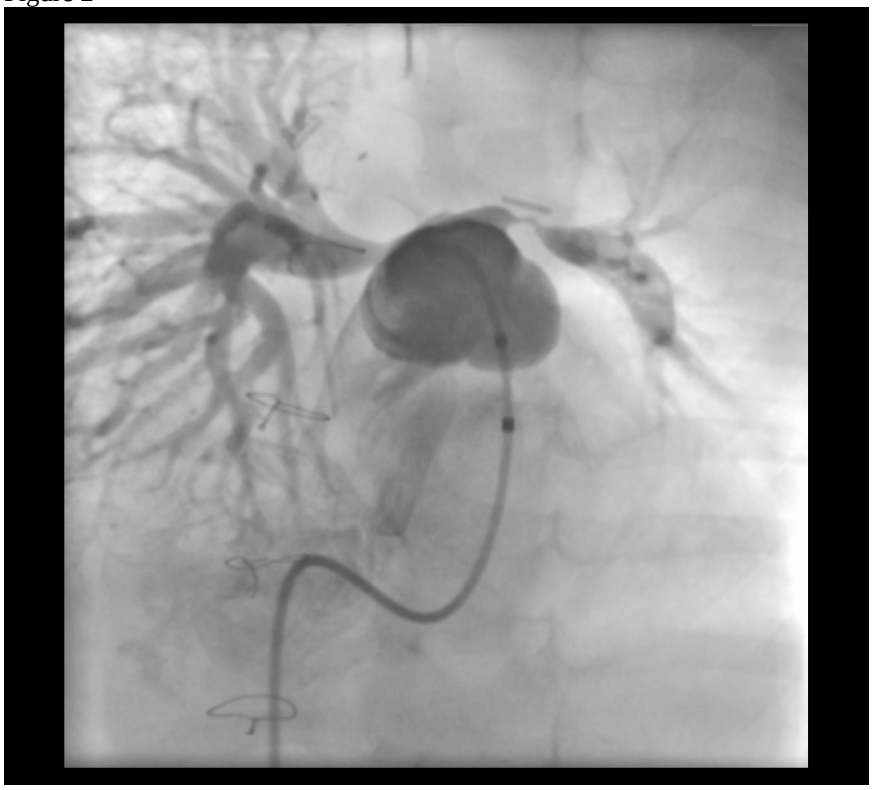

Figure 3

Figure 4