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## **Circulating-Water Garment Alone Maintains Normothermia in *Micropremies* Undergoing Major Surgery**

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**Background:** Maintaining normothermia in micropremies (less than 1000 g at birth) during extensive surgery is more difficult than in term neonates. This is due to their higher surface/volume ratio, thin skin, large head, high fluid requirement and decreased heat production. The efficacy and safety of the various methods currently employed are not satisfactory. We had previously evaluated a novel temperature regulation system (Allon 2001) using a circulating-water garment (ThermoWrap") in infants, and found it safe and effective. It seemed prudent to apply this device for these challenging cases, even though the smallest size is designed for patients above 2500 g.

**Methods:** The Allon 2001 system consists of two thermistors (one placed on the skin and one centrally), an algorithm driven heat pump supplying warm or cold water to a flexible water-channeled garment (ThermoWrap") worn by the patient in such way that it is in close contact with 40-70 per cent of the patient's skin surface area. We applied the smallest size garment to cover the back, the head and parts of the limbs of the patients. Operating Room temperature was kept between 21.0 and 22.0°C.

**Patients:** We used the Allon 2001 system as the sole thermoregulation method during three cases of exploratory laparotomy and small intestine resection due to necrotizing enterocolitis. Case # 1: Patient was born at 25 weeks, third of triplets, birth weight 540 g. On day 21 of life (546g) underwent partial resection of terminal ileum and ileostomy due to covered perforation. The patient died 72 days after the surgery. Case # 2: Patient was born at 25 weeks, birth weight 500 g. (Maternal syphilis.) On day 18 of life (666g) underwent resection of perforated segment of proximal ileum (43 cm) and Mikulich ileostomy. Case # 3: The same patient as in Case # 2, on day 25 of life (720g) underwent re-laparotomy, adhesiolysis, suture of iatrogenic jejunal perforation and neoileostomy.

**Results:** In Case # 1 preparation for surgery (line placement and positioning) lasted 59 minutes. During this period core temperature dropped from 36.1°C to 34.8°C despite the infrared heater we used. Core temperature rose to 36.0°C 18 minutes after the Allon 2001 system was activated and remained normal during surgery. The procedure lasted 76 minutes. In Case # 2 preparation lasted 25 minutes, and core temperature dropped to 35.6°C. Ten minutes after the Allon 2001 system was activated, core temperature rose to 36.6°C and the patient remained normothermic all through the surgery. In Case # 3 setting up the patient for surgery took 51 minutes. Although we used infrared heater, core temperature dropped from 36.4°C to 34.3°C. We activated the Allon 2001 system 42 minutes after the patient was on the table, however, we did not cover the head and the limbs. Temperature continued falling to a minimum of 34.1°C. The patient's head and limbs then were covered with ThermoWrap" and surgery was started. Core temperature returned to normal (36.0°C) after 44 minutes. The length of the surgery was 102 minutes. Apart from the hypothermia at the beginning, the patient was normothermic during this period of time. No adverse skin reactions or any

other complications related to the use of the circulating-water garment were noted.

**Conclusion:** The ThermoWrap"-Allon 2001 system seemed to be effective, safe and simple to use in these demanding cases.

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