

A TECHNIC FOR THE PREVENTION OF SEVERE HYPOTHERMIA DURING SURGERY ON INFANTS*

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THE DIFFICULTY of maintaining a steady body temperature is a well recognized problem in the surgery of infants.^{2, 4, 5} This does not imply that the temperature must be kept at 98.6°F, but it is desirable to prevent it from falling to dangerously low levels. Many methods of maintaining temperature have been suggested, but they are not completely satisfactory. Surrounding the infant with hot water bottles is the most common method of dealing with this problem, but recently, heated operating tables have been devised which are said to work well.^{1, 3} The Neurosurgical Service of the Children's Hospital has developed a technic for positive temperature control which utilizes a constantly recording thermometer and an electric blanket.

The recording thermometer consists of a Brown Electronic Strip Chart Recording Potentiometer (Model No. 153X10W-X-20)† connected to a nickle resistance thermometer bulb. This thermometer bulb has been especially designed for use as a rectal thermometer in infants and children because the usual thermocouples were either too large or insufficiently sensitive for this purpose. The range of the instrument is 90°F. to 110°F. This narrow range is important because it brings out small fluctuations in temperature; one degree change of temperature causes over a half inch move-

ment of the recording pen. The recording chart is shown in Fig. 1.

The electric blanket is a General Electric Company experimental model especially constructed for operating room use in the presence of explosive gases. It is covered with a conducting material which is grounded through the power supply cable. The temperature, which has a maximum slightly over 110°F., is controlled by a ten step regulator switch. The switch, although shockproof, is placed well away from explosive gases. The blanket measures 40 x 22 inches over all, but is designed to be folded in the middle and can be closed with snap buttons on two sides. This allows it to be used as a bottom or top blanket or to cover the patient on all sides. The open side and end allow access to the patient for intravenous tubes, thermometer wire or other apparatus, and for any examination required during the procedure.

At operation, the patient is appropriately placed in or on the electric blanket as dictated by the size of the patient and the nature of the operation; the recording thermometer bulb is placed in the rectum and the operation proceeds in the usual manner. The blanket temperature is regulated throughout the operation as indicated by the patient's temperature. Overheating is prevented by turning off the blanket as the temperature approaches the desired level. This technic has been used routinely in all neurosurgical procedures on infants for

* Submitted for publication October, 1952.

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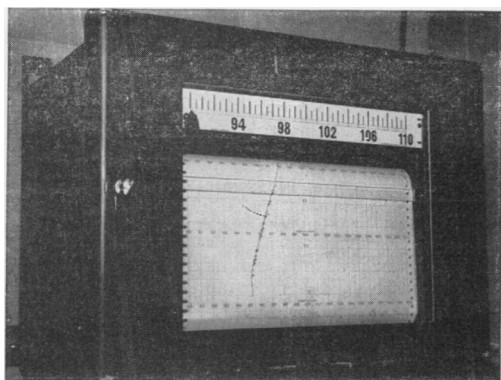


FIG. 1.—The Recording Potentiometer. The temperature is constantly recorded on the moving chart below the indicator on the large scale.

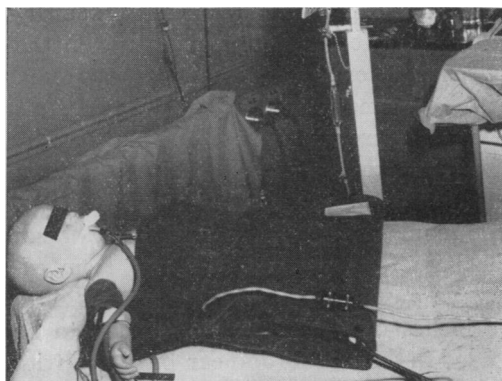


FIG. 2.—Infant in position for frontal craniotomy with the electric blanket in position. The wire from the thermometer bulb in the rectum is shown emerging from the lower right hand corner of the blanket.

more than a year with no unfavorable results (Fig. 2).

A striking example of the efficacy of this technic is demonstrated by comparing temperature recordings from infants undergoing arachnoid-ureterostomy⁶ for the treatment of hydrocephalus. Before obtaining the electric blanket, eight such operations were done using hot water bottles to maintain the body temperature. In all but two of these infants the temperature dropped during the operation to about 93°F. to 94°F., and reached 90°F. or lower in three cases. In 13 such operations, the electric

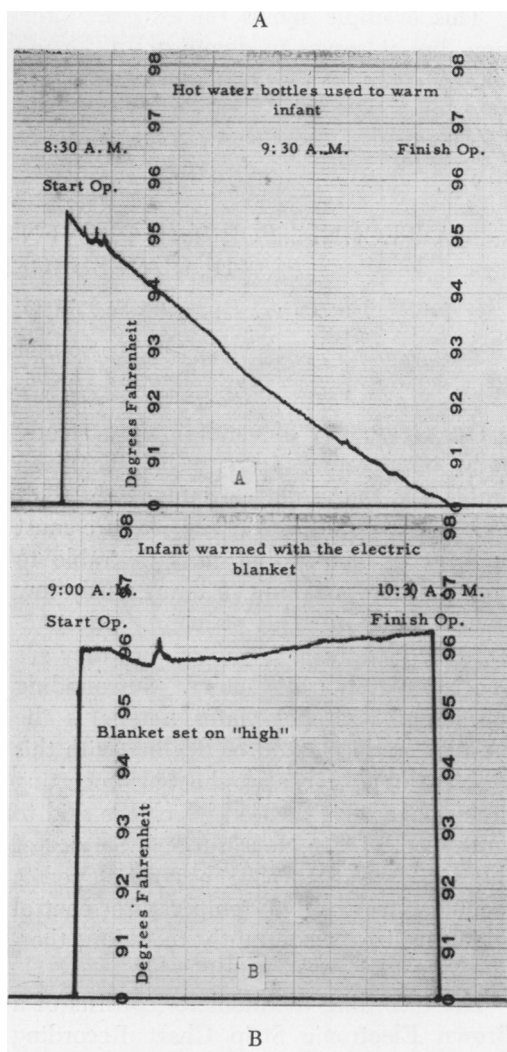


FIG. 3.—Temperature charts of two infants undergoing arachnoid-ureterostomy for the treatment of hydrocephalus. A is the chart of an infant warmed by hot water bottles. B is the chart of an infant warmed by the electric blanket.

blanket has prevented such appalling drops of body temperature, and when infants were hypothermic before the operation, they were slowly warmed during the procedure. Figure 3 shows the temperature charts of two infants undergoing arachnoid-ureterostomy; one patient was heated by hot water bottles and the other was heated by the electric blanket.

This example shows the extreme situation, but it serves to demonstrate the efficacy of the method. The smaller temperature fluctuations of other procedures are handled just as easily. There is no question that the early postoperative recovery of infants undergoing all types of major neurosurgical procedures has been uniformly and strikingly accelerated when severe hypothermia has been obviated.

We are very grateful to the General Electric Company and especially Mr. R. G. Holmes of the Automatic Blanket Division for their efforts in developing the blanket.

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