

ing, especially in infected cases, and the pain from edema can be controlled by this cooling. Pneumonia is a complication to be avoided after this procedure.

In summary, the conclusions of the author are: it is doubtful that refrigeration anesthesia can be used "in lengthy reconstruction operations upon normal limbs" or the repair of injured limbs; lack of care in use of the tourniquet in conjunction with cold may cause irreparable changes in muscle and nerve tissue; use of the tourniquet on an injured extremity adds the effect of tissue anoxia to trauma; cold tends to have a constricting effect on the present collateral circulation and may "retard the development of new collateral channels;" refrigeration anesthesia is of great advantage "in control of shock, hemorrhage, and infection if sacrifice of the limb has been decided upon"; . . . "the dangers of spreading thrombosis or embolism are obviated"; . . . "pneumonia postoperatively, must be cautiously avoided."

C. S. H.

O'NEIL, E. E.: *The Use of Refrigeration in Amputations and Peripheral Vascular Disease*. New England J. Med. 230: 209-216 (Feb. 24) 1944.

"During the last three and a half years, an attempt has been made at the Boston City Hospital to evaluate the role of reduced temperatures in the treatment of various types of peripheral vascular disease. Particular interest has been directed toward the employment of refrigeration as an anesthetic agent in amputations of the extremities for gangrene due to primary arterial disease. In addition, the effects of localized chilling of tissues in states of impending ischemia, due to sudden arterial occlusion, sepsis and venous thrombosis, have been observed. . . . It appears that the use of ice as an anesthetic agent might be of par-

ticular value in a group of poor-risk patients, in whom mortality in major amputations has always been appallingly high. . . . On the other hand, it is probable that, except in rare cases, the method of refrigeration has little to offer in groups of selected patients watched carefully by organized groups of physicians and surgeons. . . . In the ten-year period from 1930-1939, there were at the Boston City Hospital 162 cases of major gangrene of the extremities from different causes that were deemed inoperable, either because of the spread of the disease itself or because of other factors, such as old age and cardiorenal, cerebral or other complications. The mortality rate was 100 per cent. . . . In addition, the mortality rate on 270 cases of major gangrene operated on at this hospital between 1930 and 1939 was 53 per cent. . . . Fifty-four patients were refrigerated. Of these, 50 came to amputation and 4 died before operation. The latter were moribund on entry. . . .

"The immediate salutary effect of chilling of tissues on the more prominent signs and symptoms was most striking. Relief of pain was observed in every case and without the aid of the customary medication. . . . Shock has always been an outstanding and disturbing feature of thigh amputations, both during and after operation. In addition to operative trauma, general and spinal anesthesia, particularly the latter with its frequent attendant fall in blood pressure, contribute greatly to secondary surgical shock. This phenomenon is not observed in refrigeration operations. . . . The progress of gangrene and sepsis was notably inhibited in 48 cases by the application of cold. . . . In 50 cases of amputation, there were 16 deaths, a mortality of 32 per cent, and a salvage, in terms of 1930-1939 figures for unoperated cases, of 68 per cent. In addition, by this method there has been a

reduction of 21 per cent in mortality from the figure of 53 per cent on operated cases during the ten-year period 1930-1939. . . . Two patients died from gas-bacillus infection in the stump. . . . The other 14 deaths were due to various manifestations of cerebrovascular accidents, sudden cardiac failure or pulmonary embolism. Despite the lack of apparent relation to the anesthetic agent, these deaths must statistically be held against the operative procedure.

"In a more recent study of 33 consecutive cases of major gangrene at the Boston City Hospital, taken as they came to the surgical services, including both good and bad risks, there was a total of 4 deaths, a mortality of 12 per cent—a decided contrast, although in a much smaller series, to the 1930-1939 mortality rate of 52 per cent. . . . Local chilling of tissues without application of the tourniquet was attempted in a series of cases in which there was some factor of circulatory insufficiency that had not progressed to the point where loss of the limb was indicated. . . . This series is too small for the results to be convincing, but it nevertheless suggests certain important trends in the therapy of these conditions. In some of these cases, the results were extremely gratifying; in others, they were frankly disappointing. . . . In the presence of frank gangrene of the extremities, with or without sepsis, refrigeration definitely retards the progress of gangrene and infection. In no cases in our experience, however, has reduction of temperature averted amputation when devitalization of a part had once occurred. It has been interesting to observe that when gangrenous limbs are exposed to ordinary room temperatures after refrigeration, gangrene progresses rapidly. A return to decreased temperature slows the process. Several patients with deep venous throm-

bosis of the lower extremities, all candidates for ligation and division of the femoral vein, according to the usual requirements for such a procedure, were treated by local chilling of the tissues. All improved without further treatment. This observation is not particularly convincing, since many such cases improve with rest alone. It may be of value, however, in suggesting that prolonged cold, without freezing, inhibits thrombosis. Our preference in the treatment of deep venous thrombosis, we hasten to add, is still for interruption of the proper deep venous channels." 6 references.

J. C. M. C.

MILLER, J. A.: *Simplified Method of Continuous Caudal Analgesia in Obstetrics*. New York State J. Med. 44: 497-499 (Mar.) 1944.

"The original technic of Hingson and Edwards of caudal analgesia can be simplified by the use of a caudal needle adapter. . . . This simplified technic is as follows: Step 1: Using a 3 inch malleable needle with a Luer hub, the caudal canal is entered. Facility in getting the needle point into the canal can only be attained by constant practice. . . . However, on the assumption that the needle is safely in the caudal canal, we come to Step 2: The stilet is removed and the needle hub is watched for evidence of any escaping spinal fluid. If fluid escapes, the needle is removed and the case considered not applicable for caudal analgesia. Should blood escape from the hub the stilet is reinserted and the needle gently moved to a new position. The stilet is again removed and the previous observations again made. All conditions being favorable, we approach Step 3: The caudal adapter is fixed into the caudal needle hub. This adapter is a 2 inch rubber tube closed flatly at one end, the other end having a metal needle adapter which fits se-