EARLY EXPERIENCES WITH LOCAL AND GENERALIZED REFRIGERATION OF THE HUMAN BRAIN *

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The clinical benefits from the use of local cold applications to the cutaneous surfaces of the body and head have been known to the profession for many centuries.

As far as I am aware, capsules housing refrigerated solutions were first introduced into the tissues of the human skull and brain in 1938 at Temple University Hospital in Philadelphia, on the author's Neurosurgical Service.

The original apparatus devised for local refrigeration of an area was crude (Fig. 1). Ice water was circulated by the method of gravity. An old water cooler, some rubber tubing and a discarded CO₂ gas capsule ("sparklet") with two small metal tubes soldered into its neck (Fig. 2b) was all the apparatus available at first. A large pan to receive the drainage was placed under the bed.

Metal capsules (Fig. 2), with connecting tubing, were properly sterilized and introduced into the brain through a trephine or craniotomy opening of the skull, adjacent to the lesion (Figs. 3 and 8).

In cases of cerebritis or brain abscess, sterile refrigerated saline, boric acid or Dakin's solution was irrigated directly into the area of infection. Periosteal and chronic osteomyelitic involvement of the skull responded very satisfactorily.

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The sterile solution (suspended in a burette) passed through a water jacket (laboratory condenser) of refrigerated brine, which chilled the medicated solution before it reached the intracranial tissues.

The system was sealed off and contoured to its desired size by thick walls of petroleum jelly (Vaseline) which stiffened to hold its shape under the reduced temperatures of the area. The excess of irrigating solution was picked up by a Babcock sump pump located beneath the bed (Fig. 4).

Fig. 2. Instruments devised for application of local refrigeration. (Reproduced from Surgery, Gynecology and Obstetrics.9)

Fig. 3. Pneumoencephalogram (G.M., April 22, 1940) showing large postoperative decompressive craniotomy with refrigeration capsule in place. Note depth of capsule. The tumor involved the temporal lobe below the thalamic structures. The capsule was implanted at the periphery of the tumor in order to determine the direct effect of hypothermia upon the normal brain tissue and adjacent malignant cells (see Fig. 7).