Continuous Spinal Drainage in the Treatment of Postoperative Cerebrospinal-Fluid Fistulæ

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The development of a cerebrospinal-fluid fistula within the dural envelope of the nervous system after an operation creates a dangerous situation. Surface pathogens or established infection of the wound may gain quick entrance to the leptomeningeal spaces, and patient and surgeon are faced with the grave consequences of an established leptomeningitis or cerebritis.

Postoperative cerebrospinal-fluid fistulæ are fortunately unusual since very early in the development of operations on the nervous system surgeons realized there was no substitute for primary healing of the wound. This became routine with the use of stringent asepsis, gentle and meticulous surgical technique, debridement and the closure in layers of a clean dry wound. Special attention was devoted to careful dural closure whenever possible. However, the occasional development of a cerebrospinal-fluid leak in a disrupted surgical wound demands urgent treatment. General surgical principles again dictate the drainage of established infection of the wound and removal of dead tissue and foreign bodies to encourage delayed secondary healing. Clean disrupted wounds should be closed immediately but this rarely was possible with infected wounds. Great difficulty often attends the closure of a clean, but disrupted, laminectomy wound for the tissues are edematous and friable, making closure of layers impossible. Large through-and-through sutures may be the only means of approximation, tearing and strangulating large portions of muscle and fascia. A persevering cerebrospinal-fluid fistula flooding the wound retards the natural events of healing of the wound.

Diversion of the stream is the basic principle promoting closure of fistulæ when direct closure is not possible. Formerly, this principle had been used in the case of cerebrospinal-fluid leaks by repeated lumbar puncture, large quantities of fluid being removed in the hope of reducing the head of pressure.

For several years now continuous spinal drainage has been used in the treatment of postoperative spinal-fluid fistulæ. This has proven uniformly successful and without serious complication.

Method

The avoidance of infection is the main problem in establishing cerebrospinal-fluid drainage for a period of 1 to 2 weeks. It seemed most easily solved by using a long length of tubing between the lumbar subarachnoid space and the atmosphere and ensuring that the spinal fluid moved outward only. This has been achieved with articles available in most hospitals. Using the standard Tuohy technique, a 48-inch length of vinyl tubing* is inserted into the subarachnoid space through a suitable lumbar interspace. An excess of 4 to 5 cm. is put in to permit changes in the position of the tip of the catheter. To provide more efficient drainage the vinyl tubing is then connected to tubing of larger size† (Fig. 1). In order not to encroach upon the narrow lumen of the small-bore tubing the connection is made by pushing a 16-gauge needle through the proximal site of injection of the Venotube, feeding the small-bore tubing through this and leaving it firmly gripped by the rubber diaphragm of the site of injection when the 16-gauge needle is withdrawn. This connection is air-tight and withstands the slight negative pressure produced by the column of fluid in the dependent tubing. This joint may be

* Becton-Dickinson VX090.
† Abbott Twin-Site Venotube.
taped to prevent accidental separation, and the 16-gauge needle can be immobilized with adhesive at the same time. Finally, the male adaptor of the Venotube is pushed into the airvent of a freshly emptied Baxter intravenous solution bottle, displacing the straw to form a sterile collection chamber.

malleable 18-gauge spinal needles and a split mattress has been valuable, but this must be set up prior to the beginning of the operation.

Case Reports

The following brief case reports are presented to demonstrate the use of this simple


Case 1. In January 1959 a 79-year-old man had acute otitis media 3 days after division of the sensory trigeminal root in the cerebellopontine angle. On the 6th day cerebrospinal fluid began to drain from a small opening in the now inflamed craniotomy wound. In spite of antibiotics a purulent staphylococcal leptomenigitis developed 2 days later. Immediately, the lateral half of the wound was reopened and an attempt was made to close the leak in the dural suture line. Primary closure of the wound was followed by persistence of the fistula and after 2 more days continuous spinal drainage was established by the method described above and maintained for 9 days. The

Fig. 1. See text.