Persistent cerebrospinal fluid rhinorrhea treated by lumboperitoneal shunt

Technical note

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Two cases of persistent cerebrospinal fluid rhinorrhea were successfully treated by lumboperitoneal shunts. One case was of spontaneous origin, and the other was associated with a basilar skull fracture. The authors emphasize the value of this procedure when the source of the leak cannot be found or when more direct methods of treatment have failed.

Key Words - cerebrospinal fluid - intractable cerebrospinal rhinorrhea - lumboperitoneal shunt

In patients with cerebrospinal fluid (CSF) rhinorrhea, occasionally the CSF will continue to leak despite many diagnostic and therapeutic procedures. We have recently treated two such cases. The leaks were successfully stopped by lumboperitoneal shunts, after multiple cranial procedures had failed. The idea behind the use of CSF shunting procedures in these patients was to create artificial "pressure sinks," which would divert CSF flow away from the fistulas and thereby allow them to heal.

Method

The patients were placed in the left lateral position. Lumbar and abdominal dissections were carried out simultaneously. Small hemilaminectomies were performed at L3-4 in Case 1 and at L4-5 in Case 2. Silastic tubing was inserted caudally through small dural slit holes to lengths of 3 to 4 inches. The abdominal ends were placed through small incisions in the right lower quadrants. The tubings were passed subcutaneously to meet over the iliac crests and connected there to a Hakim valve. The proximal end of the shunt was placed in the lumbar subarachnoid space rather than in the ventricles, on the admittedly unproven theory that this might provide better drainage of the basilar cisterns. This placement also avoids further manipulations of a brain that has already suffered several surgical intrusions.

Case Report

Case 1

A 41-year-old white woman was admitted to the Hospital on June 23, 1969, with a 4-day history of spontaneous right CSF rhinorrhea. A RISA (I\textsuperscript{131}) cisternogram demonstrated abnormal downward passage of isotope from the basal area posterior to
Lumboperitoneal shunt for persistent rhinorrhea

the cribiform plate and slightly to the right. A fluid level was also seen in the sphenoid sinus. Following a pneumoencephalogram the leak stopped but recurred in 3 months. Over the course of the next 12 months she underwent three right frontal craniotomies with multiple packings of the sphenoid sinus and inspection of all suspicious areas. When a repeat RISA study suggested flow through the left lateral extension of the sphenoid sinus, intra- and extradural exploration of the medial greater wing of the left sphenoid was carried out through a middle fossa approach.

After each of these procedures the leak would stop for several weeks, but then recur. When the left middle fossa exploration proved unsuccessful, we felt that we should find some way to take advantage of the temporary blockage of the fistula apparently caused by the postoperative inflammatory reaction. Accordingly, on November 3, 1970, 16 months after the first admission, a lumboperitoneal shunt was established using a low-pressure Hakim valve. Three weeks later the valve had to be changed to a high-pressure valve because of persistent postural headaches. There were also some intermittent complaints of left sciatica which we attributed to irritation of a lumbar root by the shunt tubing. Both of these symptoms have completely subsided, and at the last outpatient visit (July, 1972) she had had no CSF rhinorrhea for 20 months.

Case 2

This 17-year-old boy sustained a fracture of the right petrous pyramid in an automobile accident on September 4, 1971. In addition to the fracture, skull films showed an air-fluid level in the sphenoid sinus and air in the chiasmatic cistern. Bloody drainage from the left ear stopped after a few hours, but CSF rhinorrhea developed on the second hospital day. There was no evidence of infection in a spinal tap, but he was given ampicillin prophylactically. Ten days after his accident he underwent intra- and extradural exploration of the right petrous ridge through a temporal craniotomy. Nothing abnormal was found, and the leak continued, though at a slower pace. A RISA cisternogram showed isotope activity in the sphenoid sinus, but no evidence of drainage from either internal auditory canal. On September 28 a total right facial nerve decompression was performed through a mastoid approach by an otolaryngologist. This procedure demonstrated a fracture line in the roof of the petrous portion of the temporal bone, extending between the vestibule and the cochlea.

The leak persisted and further radiographic and isotope studies were not helpful. On October 8, 34 days after the injury, a right lumboperitoneal shunt was performed using a high-pressure Hakim valve. The rhinorrhea stopped promptly. However, a pseudomeningocele developed along the subcutaneous tract of the tubing. This was attributed to the fact that the dural opening had not been closed around the Silastic tubing because of the very short length of the dural incision. The complete shunt apparatus was removed in December, 1971, 2 months after its insertion. There has not been any further CSF leakage.

Discussion

Shunts have been used in the past to treat CSF rhinorrhea due to lesions causing obstruction of CSF pathways and raised intracranial pressure. Usually, these have been Torkildsen procedures, although other types have been described more recently. Kaufman mentions a patient with an "empty sella" whose rhinorrhea was apparently stopped by a ventriculojugular shunt. Our idea of creating a diversionary pathway around an unlocalized fistula appears to have been justified by the outcome in our two patients. This was particularly true in Case 2, where the beneficial effects have remained, even though the shunt itself had to be removed 2 months after its insertion.

The idea of an artificial pressure sink carries with it a theoretical difficulty. If the fistula does not close, contaminated extracranial air or fluid might be drawn inward and cause iatrogenic meningitis. The fact that this has not happened in two cases is certainly no guarantee for the third. This theoretical risk must be weighed against the possibility that meningitis may also ensue if nothing is done.
Our second patient clearly benefitted by our experience with the first. Indeed, it might be argued that at least one more intracranial exploration was indicated in Case 2, perhaps with packing of the sphenoid sinus. Certainly we are not advocating lumboperitoneal shunts as a primary mode of treatment for CSF rhinorrhea. The first line of attack must be to find the abnormal pathway and obliterate it. The use of shunting procedures in persistent leaks is very much a matter of judgment. When is it no longer reasonable to propose that one more cranial procedure is likely to cure the problem? At that point the surgeon's choice is not an easy one, and we offer our experience as a possibility for consideration.

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References


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