CEREBROSPINAL RHINORRHEA—SURGICAL REPAIR*

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CEREBROSPINAL RHINORRHEA is a relatively common complication of craniocerebral injuries in the frontal region, especially when the site of impact is near the glabella.† Spontaneous arrest of the rhinorrhea may be expected within ten days in a large percentage of patients, and Adson¹ has noted spontaneous recovery as long as eight weeks after the injury. The problems and methods of surgical treatment of acute cerebrospinal rhinorrhea have been discussed by Dandy,⁴ Teachenor,¹¹ Munro,⁵ Cairns² and Coleman.³ Cairns² report leaves no doubt concerning the serious potentialities of chronic leak of cerebrospinal fluid into the nose. A series of twenty-one cases from the literature was reviewed by Johnston;¹⁵ injury was an etiologic factor in six instances. The rhinorrhea persisted in nine cases and the patients were alive at the time of report; the flow had ceased in six cases. Six of the patients were dead when the reports were published.

Chronic cerebrospinal rhinorrhea may appear after an interval of several weeks following the injury. Gissane and Rank⁶ designated this type as “delayed post-traumatic cerebrospinal rhinorrhea.” Such a delayed onset was noted in each of the four traumatic examples in the present report. Two of these patients had recovered from pneumococcus meningitis, under intensive chemotherapy; the rhinorrhea was apparently unaltered by the meningeal infection. One instance of rhinorrhea from a nasal encephalocele is included in the present report, the nasal leak appearing after a considerable interval following intranasal “snare” excision of a “tumor.” Intracranial pneumatocele was noted in one of the traumatic cases.

At present there is unanimity of opinion concerning the advisability of surgical repair of chronic cerebrospinal rhinorrhea. The methods of repair have varied considerably: Insertion of an iodoform gauze wick beneath the dural defect has been advised by Peet;¹⁰ direct suture of the dural defect or fascia lata graft has been used by Cairns;² plugging the bone defect with bone wax was suggested by Graham;⁷ interposition of a free periosteal graft from the tibia, between the bone defect and the dura, was successful in Gissane and Rank’s case.⁶ Adson¹ described a method of direct dural suture, involving bifrontal exposure, ligation of the longitudinal sinus, elevation of the dura from the floor of both anterior fossae, interposition of a muscle graft in the suture line and plugging the bone defect with bone wax which is covered with Luken’s animal membrane. This procedure was used successfully in eight cases. The methods so far described depended upon extradural

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† Cairns⁸ states this type of injury is not infrequent in aeroplane accidents.
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exposure of the dural defect. Eden described successful closure of cerebrospinal fistulae in two cases by fascia lata graft, applied by intradural operation.

The site of the fistula is of considerable importance in the selection of the most appropriate method of surgical repair. Anterior fistulae into the frontal sinuses can be readily exposed by the extradural approach and repaired by direct suture or suitable grafts. However, defects at the cribriform plate appear to be at least as frequent as those in the frontal sinuses; all five patients in the present report had fistulae through the cribriform plate. The extradural approach to fistulae through the cribriform plate is much more difficult because of the thin dura with its firm attachments to the bone and the tendency for these fistulae to be located more posteriorly. Extradural repair of such defects is subject to the further handicaps of the small working-space available at the side of the crista galli and the limitation of direct visualization of the dural defect by the overhanging frontal lobe. These handicaps apparently may be overcome, to a large extent, by Adson's procedure. The chief reason for avoiding an intradural repair has been the potential source of meningeal infection at the fistulous site. At present, the availability of adequate chemotherapy materially reduces this hazard.

The purpose of the present report is to present a simple method of intradural repair of cerebrospinal rhinorrhea which has been used successfully for the past five years. The method of Adson was not available when the first case in this series was treated in 1938. It appeared that the ideal form of repair should be one in which a dural flap could be utilized to cover the defect in the cribriform plate; the dura covering the crista galli suggested itself as the logical source for this flap. Repair was readily effected in this manner, even in the limited space available in a child of eleven months.

DURAL-FLAP METHOD OF REPAIR

A frontal osteoplastic bone flap is elevated on the side corresponding to the nasal leak and the dura opened along the anterior margin of the exposure. The frontal lobe is gently retracted until the floor of the anterior fossa can be seen. The site of the fistula may be identified by the attachment of the adjacent cerebrum to the dural defect. This attachment was composed of meningocortical scar in the four traumatic cases in this series. The scarred cerebral parenchyma may be herniated through the defect; this is probably an important mechanism, preventing spontaneous closure. The attachment is divided with an electro-surgical unit and the meningocortical scar may be excised if desired. A dural flap (Fig. 1) is then constructed from the dura covering the crista galli and this flap may be continued to include the anterior portion of the falx, if considerable dura is required. The flap is hinged at the base of the crista galli, folded across the defect in the cribriform plate and sutured to the dura at the lateral aspect of the defect, using small curved needles and fine silk. In two cases it was necessary to use a supplementary procedure, due to an extensive dural defect lateral to the fistula. In one in-