The Management of Cerebrospinal Fluid Shunt Infections
A Clinical Experience

By

H. E. James*, J. W. Walsh**, H. D. Wilson***, and J. D. Connor****

Summary

Fifty patients with infected cerebrospinal fluid shunts were treated by one of three forms of treatment:

a) Twenty-two patients had shunt removal, systemic antibiotic treatment, and either external ventricular drainage or intermittent ventricular taps for decompression and antibiotic administration.

b) Seventeen patients had removal and immediate replacement of the shunt with intrashunt and systemic antibiotics.

c) Eleven patients received intrashunt and systemic antibiotics without shunt removal.

In the first group, antibiotics were given for a period of one week; in the second and third groups, intravenous antibiotics were administered for a minimum period of three weeks, and intraventricular antibiotics twice daily for two weeks. In all patients ventricular CSF was obtained and cultured 48 hours after cessation of antibiotic therapy, and cultures were repeated within four months after completion of therapy. Twenty-one of 22 patients in the first group, as well as 11 of 13 of the second group, were successfully treated. In the third group only four of the 11 patients responded to treatment.

Keywords: CSF shunt; infections; therapy.

Introduction

There are three currently-employed methods of treatment for the management of cerebrospinal fluid (CSF) shunt infections. All employ a combination of intravenous and intraventricular antibiotics because of the unpredictable concentrations of some antibiotics in ventricular fluid. In one method the shunt assembly is not
removed, and the antibiotic is administered through the shunt two weeks along with systemic antibiotic treatment for weeks. A second method consists of removal of the shunt and immediate insertion of a new shunt, followed by two weeks of intrashunt and three weeks of intravenous antibiotic treatment. Some authors have reported that the shunt assembly may be removed, an external ventricular device or a reservoir inserted, and systemic and intraventricular antibiotics administered for a period of time. When the infection has been eliminated, a new shunt may then be inserted.

In a previous report the authors presented their experience in a prospective randomized study of 30 children with infected CSF shunts and the previously-described three methods. This prospective study could not be continued as it was felt by the authors of the study that the high incidence of failures in one of the treatment regimes made the continuation of its application unjustified. Accordingly, patients who subsequently presented with infected shunts were no longer submitted to the randomization process. Here we report our experience in the management of 50 patients with shunt infections.

**Materials and Methods**

The patients were treated in the period from September 1975 to September 1980. Infection was documented by identification of bacterial organisms on culture of CSF obtained from the shunt. Thirty-nine patients also had simultaneous cultures of blood and urine as part of their preliminary evaluation. Thirty of the 50 patients formed part of the previously-reported study, and the method of selection of the therapeutic modality in each patient is described elsewhere. In the remaining 20 patients the parents or guardians were told the objectives, advantages, disadvantages, risks, and complications of all three modes of therapy, and informed consent for treatment was obtained in all cases.

After appropriate cultures were obtained, intravenous antibiotic therapy was started pending identification and antibiotic susceptibility of the organism. When these results were available, the most appropriate antibiotic was instituted and definitive therapy was begun. In 22 patients the shunt was removed, external ventricular drainage (EVD) was instituted, with twice daily antibiotic doses administered through the EVD (seven patients). In another 15 patients no EVD was placed, but intermittent once daily ventricular punctures through the anterior fontanelle were performed for decompression and antibiotic administration. In each case a total of seven days of intraventricular and intravenous antibiotic therapy was administered. Following one or two days of intravenous antibiotic therapy 17 patients underwent shunt removal, with insertion of a shunt at the same procedure. The remaining 11 patients did not have shunts removed. In both of these groups antibiotics were given twice daily through the shunt reservoir for a minimum period of two weeks, and by the intravenous route for three weeks. Dosages for intraventricular and intravenous antibiotics are listed in Table 1. The concentration of antibiotics in ventricular...