CSF Withdrawal for the Treatment of Intracranial Hypertension in Acute Head Injuries

By

I. Papo, G. Caruselli, and A. Luongo

Summary

Long-term ICP recording was carried out in 151 acute head injury patients—131 comatose patients admitted to ICU, and 20 non-comatose patients harbouring intracerebral mass lesions (lacerations or haematomas) in whom a decision to operate was doubtful. CSF withdrawal was used in 39 cases: by intermittent subtraction in 23 patients, and by continuous ventricular drainage (VD) in the remainder. In the acute stage, within 72 hours of injury, CSF subtraction proved of little use in influencing ICP or clinical time course. Conversely, at a latter stage, CSF withdrawal either by repeated intermittent subtraction or by continuous VD could very often control raised ICP. However, some patients had to undergo permanent shunting eventually. Elevated ICP was also safely controlled in four out of eight patients with intracerebral mass lesions and stationary symptoms. Such patients recovered quickly, and operation was avoided.

Keywords: Head injuries; intracranial pressure; intracranial hypertension; ventricular drainage.

Intermittent CSF subtraction and continuous ventricular drainage (VD) are often used for lowering raised intracranial pressure (ICP) in acute head injuries in cases in which other antihypertensive therapies have previously failed. However, all reports concerning the management of acute head injuries confine themselves to quoting CSF withdrawal, by different techniques, among other methods aiming at reducing elevated ICP. Thus, only little attention has been paid to this therapy which has not so far been dealt with in a thorough manner. As far as we know, only Auer\(^1\)–\(^3\) has repeatedly stressed the peculiar role that external VD may play in the treatment of acute head injuries.

On these grounds, we have reviewed our series of patients suffering from acute head injuries in whom long-term ICP monitoring...
was performed, in order to analyse the effects of different modalities of CSF subtraction and to try to outline the indications for such therapy.

**Clinical Material and Methods**

Long-term ICP recording was carried out in 151 patients (Table 1)—131 comatose patients who were admitted to our ICU, and 20 patients with intracerebral mass lesions and less severe disturbances of consciousness. In the latter, ICP was monitored to obtain additional information for making a surgical decision. In all patients ICP was measured by Lundberg's intraventricular technique.

<table>
<thead>
<tr>
<th>Table 1. Patients Submitted to Long-Term ICP Monitoring</th>
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<tbody>
<tr>
<td>Comatose ICU patients</td>
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<tr>
<td>Diffuse lesions</td>
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<tr>
<td>Mass lesions *</td>
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<tr>
<td>Non-comatose patients (intracerebral masses)</td>
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<td><strong>Total</strong></td>
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* All patients remained in a coma state after the removal of intracranial masses.

CSF withdrawal by different methods was undertaken in 39 patients. In 23 patients CSF subtraction was intermittent, but in 4 of them it was repeated so as to keep ICP below 20 mm Hg.

In the remaining 16 patients continuous VD was established. Intermittent subtraction was used on unselected patients in the first phase of our experience, whenever osmotic drugs and hyperventilation had failed to reduce raised ICP. More recently, we have been performing only continuous VD on selected patients according to particular criteria. Exit pressure was 10 to 15 mm Hg in 9 patients, while in the last 7 patients we raised the pressure to 20–25 mm Hg. At present all drainages irrespective of the cause of intracranial hypertension are set at levels which definitely exceed normal ICP.

**Results**

The overall results are summarized in Table 2.

Intermittent CSF withdrawal was done mostly in the very acute stage of head injuries in deeply comatose patients who had proved insensitive to conventional therapies for lowering intracranial hypertension. In 10 patients out of 19 a transient reduction (1 to 5 hours) in ICP was obtained, and in the remainder, from whom small amounts of fluid could be removed, no effect on ICP was noticed.

In four patients exhibiting less severe disturbances of consciousness who were treated at a later stage repeated subtraction of CSF was carried out so as to keep ICP below 20 mm Hg. Altogether