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Management of T.B.M. Hydrocephalus - Role of Shunt Surgery

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Abstract

Tuberculous meningitis is often associated with impaired CSF circulation and formation of hydrocephalus. It is mostly due to basal adhesions, aqueductal and fourth ventricular outlet block being responsible for nearly a fifth of the cases. Shunt insertion has been found to be extremely useful specially in children whose sensorium was not much affected. There was good return of power in hemiparetic limbs and of vision in many a child. Results were poor in semicomatose and comatose patients. Those with aqueductal and fourth ventricular outlet block and with dense fibrous basal adhesions became shunt dependent and needed shunt revisions.

Key words -
Tuberculous Meningitis,
Hydrocephalus,
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Post-Infective hydrocephalus,
Post TBM hydrocephalus
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It is now well known that Tuberculous meningitis is often associated with impairment of CSP circulation. This in turn leads to formation of hydrocephalus and raised intra-cranial tension with resultant increase in morbidity and mortality [1], [2], [3], [4], [5], [6], [7]. Reduction of this raised intra-cranial tension does lead to amelioration of many of its manifestations. Where medical management alone is not enough, insertion of ventriculo-atrial or peritoneal shunt is carried out. A study of 114 cases of TBM in children in whom shunt was inserted in last 10 years at the Department of Neurosurgery of Grant Medical College & Sir J.J. Group of Hospitals, Bombay, is carried out to determine the role of shunt surgery in the management of hydrocephalus associated with TBM.

Of these 114 children, most were in the first decade, majority being in 0-5 years of age group. There were 81 male and 33

female children.

Table I - Age & Sex Distribution

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They were divided into 5 grades according to the severity of the disease, the level of sensorium and the extent of neurological deficit, grade III being drowsy with deficit, grade IV being semicomatose and grade V being comatose with decrebrate rigidity. There were 39 patients in grade III, 54 patients in grade IV and 6 patients in grade V of the disease.

Table II - Grading of Patients

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These patients were referred from pediatric services of various hospitals after having antitubercular line of treatment, steroids and medical measures to reduce intra-cranial pressure, the same having failed to improve the child's condition. Many of these children had clinical signs of raised intra-cranial pressure. Macewen's sign was positive in 30, head had shown enlargement in 4, sutural separation was present in 73 whereas sella was decalcified in 11 children.

Table III - Signs of Raised Intracranial Pressure

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The manometric pressure was raised on Lumbar puncture in 16 and on ventric puncture in 50 children.

Ventriculography was performed in all except 13 children who were in such a poor state that they were shunted without prior air-study. There was aqueductal stenosis in 4, fourth ventricular outlet block in 18 and basal block ill 63 children. In 9, besides basal block, some air was seen over the cortical surface, suggesting a block with impairment of CSF absorption over the cortex as well. Records were not traceable in 7 children. RISA study has shown that the block can be multifactorial. Occasionally, there may be septa formation within the ventricular system with enlargement of some of the loculii.

Table IV - Causes of Hydrocephalus

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Initially we used to insert ventriculoatrial shunt in all children. Of late, we prefer to use a peritoneal shunt as the incidence of septicemia gets markedly reduced. Twenty-two children had V.P. shunt insertions whereas 92 had ventriculoatrial shunt insertions.

Table V - Types of Shunt Procedure

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Table VI - Results of Shunt Insertion

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Of these 114 children, 50 showed a good improvement, 21 remained unchanged, 1 deteriorated whereas 42 died.

Results seemed to vary directly with the clinical condition of the patient, maximum number of children having shown a good improvement when in grades I-III of the diseases. The worst results were grade. V of the disease, not a single child having improved or survived.

The improvement was noticed mainly in the sensorium hemiparesis and vision. Of 19 children who presented with

hemiparesis, 10 survived. Of these 10 children, 6 showed a significant improvement in the hemiparesis.

Table VII - Improvement in Hemiparesis

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Table VIII - Relationship between size of Third Ventricle, Visual Impairment and Visual Improvement

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Of 29 children who were unable to see at all, 8 showed improvement in vision whereas 21 failed to improve. The visual loss was secondary to primary optic atrophy, papilloedema or secondary optic atrophy. Study from the Department of Neurosurgery, Vellore, [8] had suggested that the visual impairment was related to the size of the third ventricle, the enlarged ventricle causing a direct compression of the optic nerves and chiasma. Our study, however, fails to support this view. There did not seem to be any correlation between the size of the third ventricle and visual impairment; a fairly large number of children with marked enlargement of third ventricle had normal vision, whereas many with only mild enlargement had visual impairment.

It was felt that mortality was higher than what it should have been in grades II & III of the disease. An analysis of the causes of death in these children showed that vast majority of these deaths could have been averted with more vigilant care. Four children died of aspiration of the vomitus, 1 of laryngeal obstruction, 1 of broncho-pneumonia, 1 of severe convulsion and 3 of blocked shunts.

Table IX - Causes of Death in Grades II & III

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Four children with ventriculo-atrial shunt developed infection and septicemia which could not be controlled Had these children been salvaged, results of shunt surgery for grades I-III would have been excellent.

Suwamvela [9] has reported a case of abdominal spread of the disease following peritoneal shunt insertion. However, none of our cases showed either a miliary or abdominal spread of the disease as determined clinically and on autopsy examination. On autopsy, 2 of the children showed the presence of associated tuberculoma, in the right cerebral hemisphere in one and multiple small ones in the posterior fossa in the other.

Table X - Revision of V. A. Shunt

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There were 16 children with atrial shunt and 2 with peritoneal shunt who needed revision of ventricular, atrial or peritoneal ends. Ventricular end was revised in 10, atrial and in 4, both ventricular and atrial ends in I and peritoneal ends in 2 children. These 2 peritoneal shunts were then converted into atrial shunts. There were 2 revisions in 3 children who were obviously shunt dependent.

Table XI - Maximum Revisions

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It would be worthwhile knowing as to which child is shunt dependent and which one can do without a shunt. RISA study of CSF circulation alone would give us some clue regarding shunt dependency of these children. Those who are shunt dependent need to be followed carefully as failure to revise a blocked shunt would lead to hazardous consequences. One would expect shunt dependency in children with aqueductal stenosis, block of outlet foramina of fourth ventricle and where dense fibrous adhesions have caused a basal block.

A critical evaluation of this study as well as those published earlier does show that shunt surgery has a definite role in the management of tuberculous meningitis associated with hydrocephalus. Patients in the earlier grade of the disease who are not semicomatose or comatose show a very significant improvement following shunt surgery and quite a few of them have regained vision and power in hemiparetic limbs. Shunt may be inserted even in an active stage of the disease without fear of dissemination. A careful follow-up of these patients is advisable as revision of shunt is needed in shunt dependent children.

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