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Influence of CSF protein content on revision rate in neonatal hydrocephalus

Matthias Preuß, Robin Wachowiak, Jürgen Meixensberger, Ulf Nestler

University Leipzig, Germany

Initial CSF diagnostics have been available for 19 patients with a very longterm follow-up of >25 years and shunt surgery performed between 1972 and 1987. Mean age of the patients was 32 years at last available follow-up. All microbiological CSF examinations proved sterile conditions at time of primary insertion. Average protein content was 1283 mg/dl (range 160-6180mg/dl).

13 patients with a low protein level (<1000mg/dl, mean 544) required 12 shunt revisions within the first year whereas the 6 patients with a high protein level (>1000 mg/dl, mean 2887) needed 22 revisions. All 6 patients with high CSF protein levels had received valveless shunts at first surgery. 8 patients did not need first-year revision and all had CSF protein concentrations below 1700 mg/dl. 3 patients had protein concentrations over 2000 mg/dl and each received 4 or more revision operations in their first year.

From a statistical point of view, the number of patients needing a shunt revision during the first year after shunt implantation (low: 7 (54%), high: 4 (67%)) is not significantly different between the two groups, nor the number of patients who got along with only one revision during the first year (low: 4, high: none, two tailed chi square test). This is probably due to the small size of these subgroups.

When considering the number of revision operations in each group (low: 12 in 13 patients, high: 22 in 6 patients) or the number per patient of revisions (low: 1.7, high: 5.5) and re-revisions per patient (low: 0.7, high: 4.5) the difference is statistically highly significant ($p < 0.0003$ for the three items, two tailed chi square test).

This means, among the children who have to undergo a shunt revision in the first year, the risk to need multiple operations is higher when the CSF protein concentration is 1000 mg/dl or more, even when a valveless system has been implanted. Protein content did not influence social, educational or neurologic outcome between the two groups.