Hydrocephalus after posterior fossa decompression for Chiari type 1 deformity

Hydrocephalus may be seen in association with Chiari type 1 deformity, likely because of disruptions in normal CSF flow. Although patients sometimes demonstrate evidence of hydrocephalus during their initial presentation for CM-I, a subset of patients appear to develop hydrocephalus only after posterior fossa decompression. These patients may present with evidence of raised intracranial pressure, ventricular dilation on imaging, or persistent cerebrospinal fluid leakage postoperatively. To date, there are no reports in the literature investigating what factors are associated with the need for CSF diversion after PFD is performed to treat CM-I.

Guan et al. performed a retrospective clinical chart review of all patients who underwent PFD surgery and duraplasty for CM-I at the Primary Children's Hospital in Utah from June 1, 2005, through May 31, 2015. Patients were dichotomized based on the need for long-term CSF diversion after PFD. Analysis included both univariate and multivariable logistic regression analyses.

The authors identified 297 decompressive surgeries over the period of the study, 22 of which required long-term postoperative CSF diversion. On multivariable analysis, age < 6 years old (OR 3.342, 95% CI 1.282-8.713), higher intraoperative blood loss (OR 1.003, 95% CI 1.001-1.006), and the presence of a fourth ventricular web (OR 3.752, 95% CI 1.306-10.783) were significantly associated with the need for long-term CSF diversion after decompressive surgery.

Younger patients, those with extensive intraoperative blood loss, and those found during surgery to have a fourth ventricular web were at higher risk for the development of CRH. Clinicians should be alert to evidence of CRH in this patient population after PFD surgery. 1 2.

Elton et al. present three patients who developed infratentorial supracerebellar hygromas causing acute hydrocephalus after posterior cranial fossa decompression 3).

A 34-year-old woman presented with strain-related suboccipital headache and myelopathy for 6 months. Imaging revealed tonsillar herniation up to C2 level and cervical syringomyelia. A standard FMD, C1 posterior arch removal, and tonsillar reduction was performed. After an initial uneventful postoperative course, she had 2 readmissions with headache, vomiting, and ataxia. Imaging showed a tense pseudomeningocele and concomitant supratentorial and infratentorial (initially right-sided, followed by left-sided) SDHs with ventriculomegaly. She was conservatively managed with antiedema measures and had excellent relief of symptoms. For the literature review, only cases with concomitant supratentorial and infratentorial SDHs with hydrocephalus were searched online and analyzed.

Including this, 10 cases have been reported. Mean age was 25.3 years. The male-to-female ratio was 1:2.3. Symptoms appeared an average of 12.6 days postoperatively. Treatment was with conservative management in 3 cases, and 3 cases required permanent cerebrospinal fluid diversions. Mean follow-up duration was 9.4 months (range, 1-27 months).

Coexistent supratentorial and infratentorial SDHs with hydrocephalus after Chiari decompression is a very rare occurrence. Treatment needs to be individualized based on the predominant symptomatic lesion, and surgical options need to be judiciously considered. Good prognosis is the rule in most cases 4).
A 2-year-old girl with the Chiari 1 malformation underwent FMD, including suboccipital craniotomy, C1 laminectomy and durotomy without opening the arachnoid.

After initial postoperative improvement, the patient deteriorated, developing subdural hygromas and hydrocephalus. These were treated successfully with observation and acetazolamide.

Subdural hygromas may complicate FMD. A slit valve opening in the arachnoid might be part of the pathophysiology. While surgical intervention may be necessary in some circumstances, non-operative measures may be effective as well 5).


