# Shunt dysfunction case series

## 2022

T56 pediatric patients who underwent surgeries for the treatment of shunt failure were retrospectively reviewed. Patients were divided into 2 groups simple SR (Group A) and NEL+SR (Group B). Demographic characteristics, co-morbidities, surgical interventions, cerebrospinal fluid (CSF) analyses, and complications were recorded and statistically compared for both groups.

Results: Among the 56 patients, 51 of them presented with shunt dysfunction due to infectious debris or clots at different times. 28 of 51 patients (54.9%) were female and 23 (45%) were male. The mean age was 7.3 months. Simple SR was performed in 30 cases (Group A), and NEL and simultaneous SR were performed in 21 patients (Group B). The risk of shunt dysfunction was significantly lower in Group B (p 0.05). The risk of infection was high in Group A, but this was not statistically significant (p 0.05).

Simultaneously endoscopic lavage and shunt revision are effective methods in the treatment of shunt dysfunction in children. It is also superior to simple shunt revision for the risk of shunt dysfunction. More clinical studies are needed to verify this outcome [1)].

## 2020

Shunt malfunction was identified in 40 cases (16.1%). Imaging report demonstrated a lower Akaike information criterion than the Brainlab fusion and is therefore a better fitting model. While sensitivity is similar for the two models, 0.94 (0.90 to 0.97, 95% CI) for imaging report, and 0.95 (0.91 to 0.98, 95% CI) for Brainlab, the specificity was significantly different, 0.50 (0.37 to 0.63, 95% CI) and 0.33 (0.24 to 0.44, 95% CI) respectively.

Data indicate that an increased ability to detect subtle changes in ventricular size does not translate to improved accuracy, but instead leads to decreased specificity, and therefore an overdiagnosis of shunt malfunction in children with normally functioning shunts. While imaging continues to play a prominent role in the identification of shunt malfunction, neurosurgical clinical evaluation remains crucial to the final diagnosis [2)].

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Secondary Endoscopic Third Ventriculostomy can be defined as either a redo endoscopic third ventriculostomy done after primary ETV stoma closure or that done in cases presenting with shunt malfunction.

The aim of a study of Shaikh et al., was to evaluate the role of secondary ETV in the pediatric age group patients.

This was a retrospective analysis of 36 children (<18 years) who underwent ETV after shunt malfunction and 4 children with ETV done after previous ETV stoma closure from 2004 until 2018. In all patients, the obstructive pattern suggesting aqueduct outflow obstruction was observed on MRI. Patients were followed up for a mean period of 4.25 years.

ETV was considered successful if the patient avoided a shunt insertion later on in their life. Considering this definition, a success rate of 72% was observed with secondary ETV for shunt malfunction whereas a success rate of 75% was observed after primary ETV failure without any major side effects in any of the patients.

ETV can be considered a primary treatment modality in children with shunt malfunction and has a good success rate in cases presenting with closure of previously performed ETV stoma [3].

**2016**

A total of 1036 children underwent initial CSF shunt placement between April 2008 and December 2011. Of these, 344 patients experienced shunt failure, including 265 shunt malfunctions and 79 shunt infections. The mean and median length of follow-up for the entire cohort was 400 days and 264 days, respectively. The Cox model found that age younger than 6 months at first shunt placement (HR 1.6 [95% CI 1.1-2.1]), a cardiac comorbidity (HR 1.4 [95% CI 1.0-2.1]), and endoscopic placement (HR 1.9 [95% CI 1.2-2.9]) were independently associated with reduced shunt survival. The following had no independent associations with shunt survival: etiology, payer, center, valve design, valve programmability, the use of ultrasound or stereotactic guidance, and surgeon experience and volume.

This is the largest prospective study reported on children with CSF shunts for hydrocephalus. It confirms that a young age and the use of the endoscope are risk factors for first shunt failure and that valve type has no impact. A new risk factor-an existing cardiac comorbidity-was also associated with shunt failure [4]

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Of 1176 patients discharged home from the Emergency Department (ED) after shunt function evaluation, 101 (8.6%) returned to the ED within 7 days. Of the 134 patients admitted to the neurosurgery service for observation only, 8 (6.0%) returned to the ED within 7 days of discharge. Of the 199 patients admitted to hospital services other than neurosurgery, 13 (6.5%) returned to the ED within 7 days of discharge. The reasons for ED revisits vary (total of 122 visits combining the 3 groups), but at least 60% of the revisits were clearly unrelated to shunt function. A younger age, daytime arrival to the ED, and living within the metropolitan area were identified as risk factors for ED revisits.

Children with CSF shunts are medically complex and use ED services often. After an index ED visit at which shunt function was deemed to be the chief concern, the purpose of the subsequent return to the ED within 7 days was often for complaints unrelated to shunt function. Caution is warranted when attempting to classify these complex patients as having potential preventable return-to-system events [5].

**1979**

Five patients with shunt dependency were observed to have apparently normal ventricular size despite marked increases in ventricular pressure after shunt malfunction. Elastance (dP/dV) was determined in four of these patients by removing increments of cerebrospinal fluid and measuring the resulting pressure. These patients without ventricular enlargement and with markedly increased

ventricular pressure had high elastance. This group of patients with “normal volume” hydrocephalus had distal shunt occlusions, in contrast to previously reported patients with cephalic shunt obstructions after ventricular decompression. Initial shunting in early infancy, prolonged shunt dependency, and lack of recent shunt revision were common factors in these patients. Markedly elevated pressure with normal volume is a threatening clinical entity, requiring prompt surgical intervention [6].

1)
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