Outcome of Chiari-Associated Syringomyelia after Hindbrain Decompression in Children: Analysis of 49 Consecutive Cases

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Objective: Chiari I malformation is complicated by syringomyelia in many cases. First line surgical treatment remains hindbrain decompression, however, the incidence, time course, and predictors of syrinx resolution remain unclear. We set out to determine predictors of syrinx improvement after hindbrain decompression for Chiari I associated syringomyelia.

Methods: Forty-nine consecutive pediatric patients undergoing posterior fossa decompression for Chiari I-associated syringomyelia were followed with serial MRI evaluations postoperatively. Clinical, radiological, and operative variables were assessed as predictors of syrinx improvement as a function of time via Kaplan-Meier plots and log-rank analysis.

Results: Mean patient age was 11±5 years. Syringomyelia was symptomatic in 39 (80%) and asymptomatic in 10 (20%) cases. 27 (55%) patients experienced radiographic improvement in syringomyelia (median: 14 months post-operatively, Figure 1). 21 (54%) experienced symptom resolution (median: 4 months post-operatively (Figure 2). Among patients with sensory deficits, dysesthesias were 3-fold more likely to improvement [OR(95% CI); 3.12 (1.13-14.35), p=0.032] versus symptoms of parasthesia or anesthesia (Figure 3a). Motor symptoms were twice as likely to improve after hindbrain decompression [OR(95% CI); 2.35 (1.12-11.49), p=0.031] versus all other symptoms (Figure 3b).

Conclusion: In our experience, half of patients with Chiari-associated syringomyelia will demonstrate clinical and radiographic improvement following hindbrain decompression. Median time to radiographic improvement lagged clinical improvement by 10 months. Motor symptoms were most likely to improve with hindbrain decompression. Parasthesia or anesthesia symptoms were least likely to improve with hindbrain decompression. These findings may help guide surgical decision making and aid in patient education.
**Figure 1.** Kaplan-Meier plot of improvement in syringomyelia (resolution or decreased in axial diameter of at least 20%) as a function of time after hindbrain decompression for pediatric Chiari I malformation. Median time to improvement was 14 months. By 6 months, 25% had improvement on MRI.

**Figure 2.** Kaplan-Meier plot of improvement in syrinx-related symptoms as a function of time after hindbrain decompression for pediatric Chiari I malformation. Symptoms include dysesthesia, parasthesia/anesthesia, weakness, gait/balance problems, incontinence, and scoliosis. Median time to symptom improvement was 4 months, and 61% demonstrated symptom improvement at 1 year postoperatively.

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Figure 3. Kaplan-Meier plot of improvement in syrinx-related symptoms as a function of time after hindbrain decompression for pediatric Chiari I malformation. (A) Dysesthesia versus parasthesia/anesthesia (p=0.032) and (B) motor symptoms versus all other symptoms (p=0.031) were more likely to improve following hindbrain decompression.