The Origin of Syrinx Fluid

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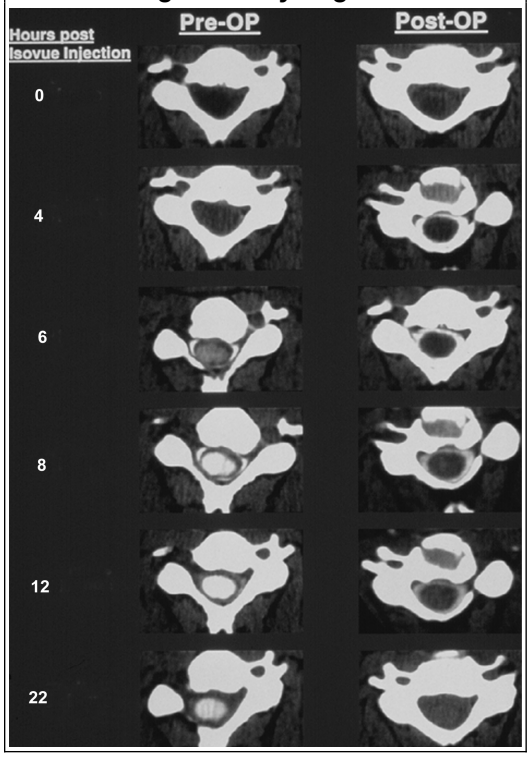
Introduction

To elucidate the origin of syrinx fluid, we performed a prospective study using CT-myelography to evaluate transport of CSF into the syrinx in different kinds of syringomyelia.

Methods

Patients with Chiari I-type syringomyelia (N=19) or primary spinal syringomyelia (N=11) were studied before and 1 week after decompressive surgery, and patients with intramedullary hemangioblastoma (N=8) were studied only before tumor removal. CT scans were performed through the syrinx before and 2, 4, 6, 8, 10 and 22h after dye injection.

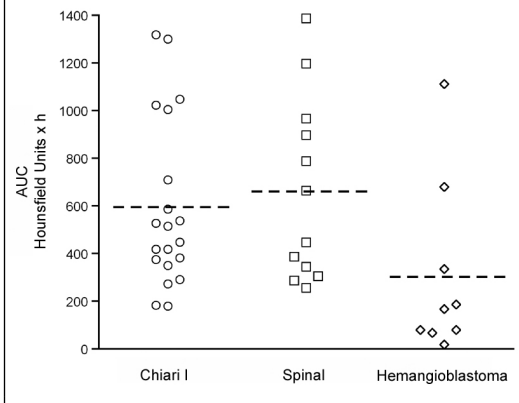
Fig. 1 CT-myelogram



Results

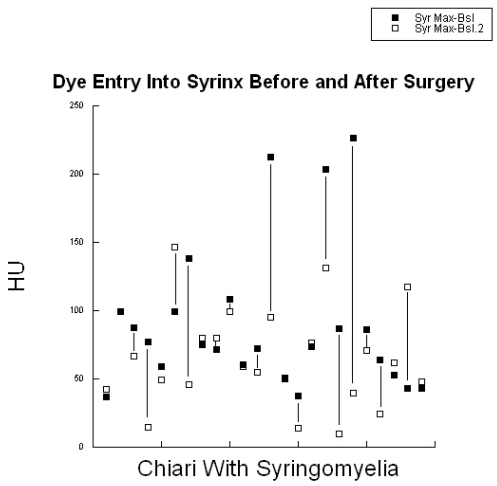
Dye density within the subarachnoid space and syrinx was measured in Hounsfield Units (HU). Maximal measurements in the syrinx in Chiari I -related (114+/-14 HU, mean+/-SE) and primary spinal syringomyelia (132+/-18) were greater than in tumor-related syringomyelia (69+/-20; p=0.017; p=0.006; respectively, unpaired t test). Dye accumulated in the syrinx over time (Figs.1,2). Dye transport into the syrinx 1 week after surgery (Chiari I, 86+/-12 HU; primary spinal, 65+/-17) was less than before surgery (p=0.04; p=0.03; respectively, paired t test) (Figs.1,3,4). In addition, after surgery less contrast entered the spinal cord interstices.

Fig. 2 Dye Passage from the Subarachnoid Space to the Syrinx in Various Types of Syringomyelia



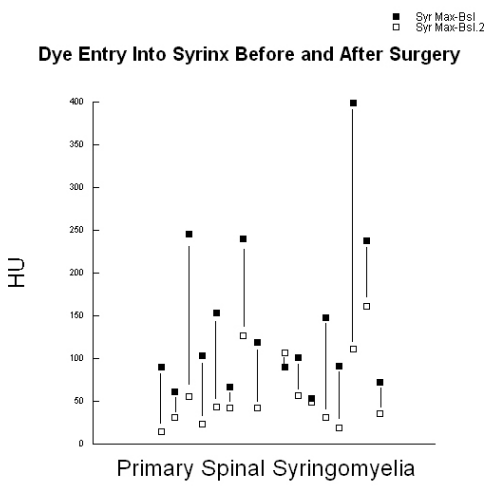
More dye accumulates in Chiari I and Primary Spinal Syringes than in Tumor-Related Syringes.

Fig. 3



Solid marks indicate values from before surgery and open marks are from after surgery.

Fig. 4

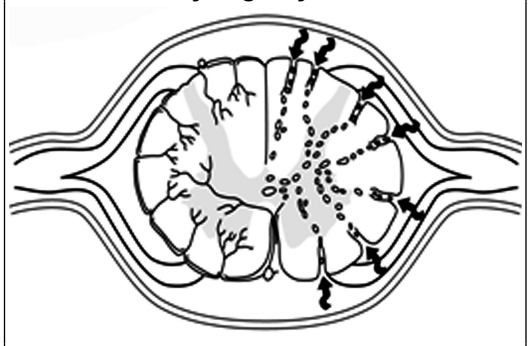


Solid marks indicate values from before surgery and open marks are after surgery.

Conclusions

Dye transport into the syrinx in cases associated with obstruction of CSF pathways (Chiari I and primary spinal) was far greater than in syringomyelia associated with intramedullary tumor. Opening of obstructed CSF pathways reduced transmural passage of CSF into the syrinx and resolved Chiari I-type and primary spinal syringomyelia. Tumor-related syringomyelia resolved with tumor removal. These findings are consistent with syrinx fluid originating from the subarachnoid space in Chiari I-type syringomyelia and primary spinal syringomyelia, and from the tumor in tumor-related syringomyelia (Fig. 5).

Fig. 5 Chiari I & Primary Spinal Syringomyelia



Virchow-Robin spaces transmit CSF.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the types of conditions that are associated with the development of syringomyelia, 2) Discuss, in small groups, the origin of syrinx fluid, 3) Identify effective treatments for various kinds of syringomyelia.