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Tailored foramen magnum decompression for the treatment of Chiari I malformation using intra-operative ultrasound

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Introduction: Foramen magnum decompression is widely accepted as the treatment of choice for Chiari I malformation. However, important surgical details of the procedure are still controversial. This study describes the use of ultrasonography for performing patient-specific foramen magnum decompressions.

Methods: Surgery for Chiari I Malformation consisted in all cases of C1 laminectomy and minimal to extended suboccipital craniectomy. After the bony decompression, intraoperative ultrasound was performed: the dura was opened only in case of no CSF flow at the junction and/or no tonsils pulsation.

Results: Between June 2011 and December 2012, 19 patients with Chiari I Malformation underwent ultrasound-guided foramen magnum decompression. The mean age was 8 years; 53% demonstrated syringomyelia at diagnosis. A simple bony decompression without additional steps was found to be appropriate in 45% of cases. In all other cases, dura opening and arachnoid dissection were necessary. The effectiveness was confirmed by postoperative neuroimaging, in terms of reduction of syringomyelia, and CSF flow at the cervical junction, and pre-operative symptoms improvement.

Conclusion: Ultrasonography is a useful tool that allows a tailored Chiari I malformation surgery according to patient-specific variables.