

Cranial vs. Cervical Spine MRI in Adult CM-1 diagnostics: Is There a Difference in Tonsil Ectopia Length?

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Abstract

Background: Chiari malformation type 1 (CM-1) diagnosis is based on measurement of the cerebellar tonsils on cranial or cervical spine MRI. However, imaging parameters of cranial and cervical spine MRIs could differ because spine MRIs have greater resolution.

Methods: We conducted a retrospective chart review of 161 patients of a single neurosurgeon for Adult CM-I consultation between February 2006 and March 2019. Patients were selected based on receiving both cranial and cervical spine MRIs within a month of each other to determine tonsillar ectopia length for CM-1. Ectopias were measured to determine if differences in values were statistically significant.

Results: From the 161 total patients, 81 had cranial and cervical spine MRIs for a total of 162 tonsil ectopia measurements (81 cranial and 81 spinal). Average ectopia length on a cranial MRI was 9.1 mm (± 5.2 mm); average ectopia length on a spinal MRI was 8.9 mm (± 5.3 mm). Average cranial and spinal MRI values were found to be less than 1 standard deviation apart. Two-tailed, non-equal variances t-test determined that differences between the cranial and spinal ectopia measurements were insignificant ($P = 0.2403$).

Conclusion: This study confirmed that the added resolution offered by spine MRIs did not make better or more refined measurements over cranial MRIs that could lead to measurement differences, which can instead be attributed to chance. Cranial and cervical spine MRIs can be used to determine the degree of the tonsil ectopia.

Keywords: Arnold-Chiari malformation; cerebellar tonsils; ectopia; foramen magnum; magnetic resonance imaging.