

## Clivus Length Differentiates Between Low Lying Tonsils and Symptomatic CMI in Adult Women

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### Purpose

While the traditional definition of Chiari (CMI) is 5mm or more of tonsillar descent, many people with smaller herniations have symptoms and even undergo surgery. At the same time, with the widespread use of MRIs, low-lying tonsils (herniations < 5mm without symptoms) are being found more frequently in healthy people. This study looked for other brain and skull measurements that could distinguish between different groups of subjects with and without symptoms, and with different levels of herniation.

### Methods

Two hundred ten adult females with symptomatic CMI and 90 age and body mass index matched asymptomatic female controls were compared using seven morphometric measures from MRIs. The subjects were divided into four subgroups based on the tonsillar position (TP): group 1 was made healthy controls with normal TP; group 2 was healthy controls with low-lying TP (1–5 mm); group 3 symptomatic CMI patients with low-lying TP (1–5 mm); group 4 was CMI patients with severe tonsillar descent (6–13 mm). In addition, 24 self-reported symptoms, related conditions, surgical history, and neuropsychological assessments were compared between the two CMI groups.

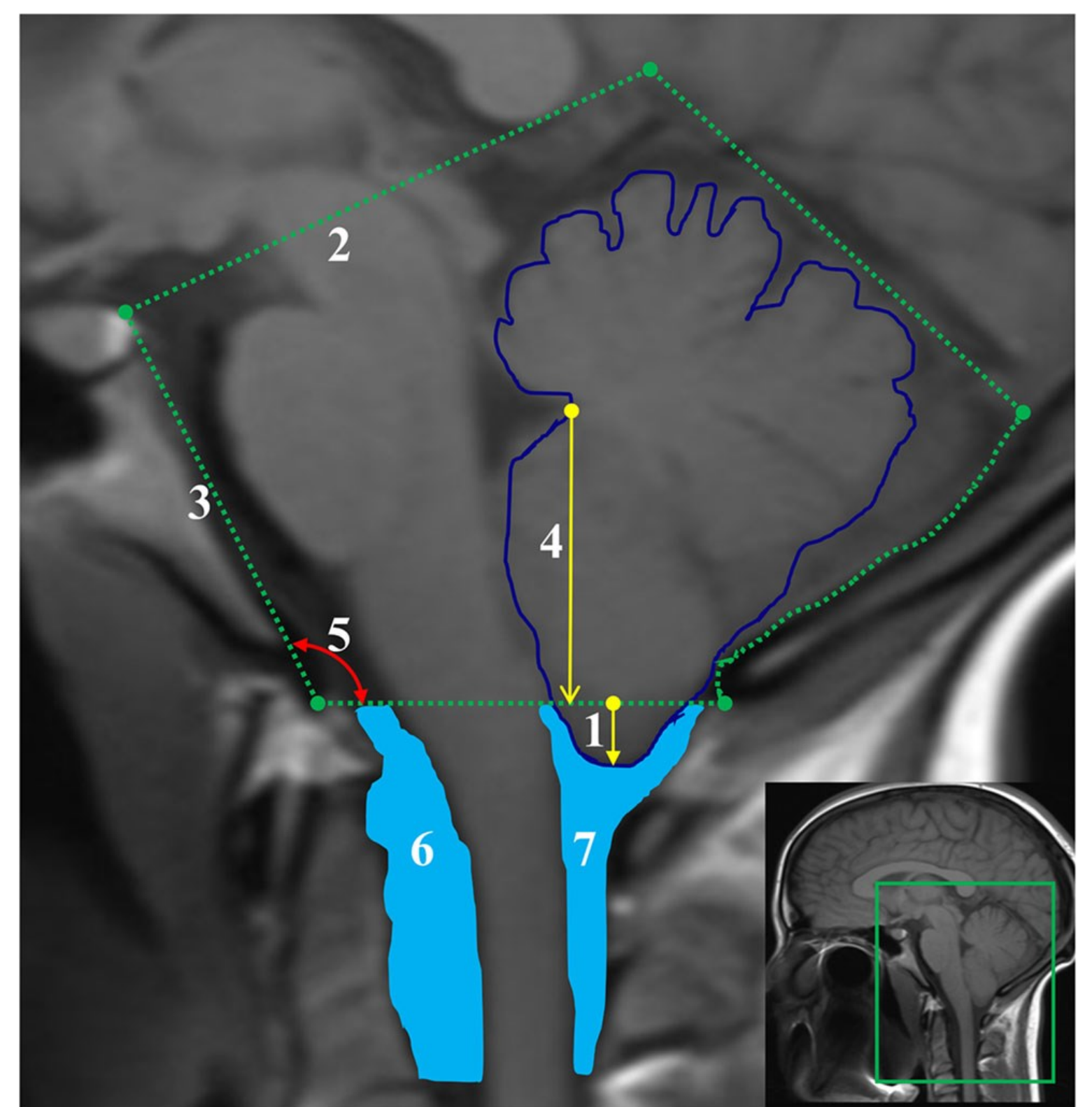
### Results

All seven morphometric measures for the CMI group with TP>5 were significantly different than both control groups. The CMI group with low-lying TP was significantly different for four measures when compared to controls with normal TP. However, only clivus length was statistically different between the CMI and control groups with low-lying tonsils (TP<5mm). There were no significant differences in any of the 24 clinical parameters between the two CMI groups. In addition, TP was not correlated to any of the clinical parameters.

### Conclusions

This study showed that clivus length can differentiate between symptomatic and asymptomatic adult females with low-lying tonsils (TP<5mm). It also showed that in terms of symptoms, related conditions, surgical history, and neuropsychological impact, CMI patients with TP<5mm are essentially the same as patient with TP>5mm. Finally, TP is not correlated with symptoms or symptom severity in CMI patients.

### Morphometric Measurements Used in Study



(1) tonsillar position, (2) PCF area, (3) clivus length, (4) fastigium height, (5) Boogard angle, (6) anterior CSF area, (7) posterior CSF area

### Self-Reported Clinical Parameters (24)

*Clinical History:* Symptom severity, Surgery, Surgical outcome

*Symptoms:* Neck pain, Seizures, Upper back pain, Numbness, Weakness, Blurred vision, Double vision, Sensitivity to light

*Related Conditions:* Syringomyelia, EDS, Pseudotumor cerebri, Migraines, Cervical instability

*Scales:* Hypermobility, Depression, Anxiety, Stress, Loneliness, Immediate recall, Long-term recall, Pain