

Preoperative [computed tomography](#) (CT) evaluation of patients with [nonsyndromic craniosynostosis](#) (NSC) has focused on the bony cranial vault while ignoring the surrounding soft tissues.

CT-derived temporal muscle and temporal fat pad morphometrics (tissue thickness, area, and volume) can be used to calculate temporal morphomic indices (TMIs), which are unique to each NSC subtype (metopic, coronal, and sagittal) and divergent from normal individuals.

High-throughput image analysis was used to reconstruct the 3-dimensional anatomy and quantify a TMI. These steps were completed in a semiautomated method using algorithms programmed in MATLAB v13.0. Differences in TMI across various craniosynostosis subtypes were assessed using Wilcoxon nonparametric tests for both patients with NSC and a control cohort of patients with trauma.

Using preoperative CT images, the evaluation of 117 children with NSC from the University of Michigan Health System and 50 age-matched control patients between 1999 and 2011, indicate significant differences in TMI among the normal and NSC groups, with normal patients having significantly higher TMI values than patients with metopic, sagittal, and coronal synostosis. In addition, significant differences were found to exist between each craniosynostosis category.

Patients with craniosynostosis demonstrate diminished temporalis muscle and overlying fat pad volume and thickness compared with control patients. The unique changes in temporal morphometrics demonstrate not only that the bony calvaria is affected by craniosynostosis but also that there exist quantifiable aberrations in the temporalis muscle and temporal fat pad. The methodologies described offer a novel methodology to use pre-existing CT scans to glean additional preoperative information on the soft tissue characteristics of patients with craniosynostosis <sup>1)</sup>.

<sup>1)</sup>

Rinkinen J, Wang L, Zhang P, Lisiecki J, Enchakalody B, Holcombe S, Dombrowski A, Wang SC, Buchman SR, Levi B. Use of temporal morphomic indices as a clinically important variable in the diagnosis of nonsyndromic craniosynostosis. *Ann Plast Surg.* 2014 Jul;73(1):86-91. doi: 10.1097/SAP.0b013e31826caf8d. PubMed PMID: 24918738.

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