

# Spring-mediated cranioplasty

Variables that can predict [craniosynostosis outcome](#), including [bone](#) thickness, are important for surgical decision-making, yet are incompletely understood. Recent studies have demonstrated [relative risks](#) and benefits of surgical techniques for correcting head shape in patients with [nonsyndromic sagittal craniosynostosis](#). The purpose of this study was to characterize the relationships between [parietal bone](#) thickness and perioperative outcomes in patients who underwent [spring-mediated cranioplasty](#) (SMC) for [nonsyndromic sagittal craniosynostosis treatment](#).

Patients who underwent craniectomy and SMC for nonsyndromic sagittal craniosynostosis at a quaternary pediatric hospital between 2011 and 2021 were included. [Parietal bone thickness](#) was determined on patient preoperative CT at 27 suture-related points: at the suture line and at 0.5 cm, 1.0 cm, 1.5 cm, and 2.0 cm from the suture at the anterior parietal, midparietal, and posterior parietal bones. Preoperative skull thickness was compared with intraoperative blood loss, need for intraoperative transfusion, and hospital length of stay (LOS).

Overall, 124 patients with a mean age at surgery  $\pm$  SD of  $3.59 \pm 0.87$  months and mean parietal bone thickness of  $1.83 \pm 0.38$  mm were included in this study. Estimated blood loss (EBL) and EBL per kilogram were associated with parietal bone thickness 0.5 cm ( $p = 0.376$ ,  $p < 0.001$  and  $p = 0.331$ ,  $p = 0.004$ ; respectively) and 1.0 cm ( $p = 0.324$ ,  $p = 0.007$  and  $p = 0.245$ ,  $p = 0.033$ ; respectively) from the suture line. Patients with a thicker parietal bone 0.5 cm (OR 18.08,  $p = 0.007$ ), 1.0 cm (OR 7.16,  $p = 0.031$ ), and 1.5 cm (OR 7.24,  $p = 0.046$ ) from the suture line were significantly more likely to have undergone transfusion when controlling for age, sex, and race. Additionally, parietal bone thickness was associated with hospital LOS ( $\beta$  0.575,  $p = 0.019$ ) when controlling for age, sex, and race. Patient age at the time of surgery was not independently associated with these perioperative outcomes.

Parietal bone thickness, but not age at the time of surgery, may predict perioperative outcomes including [transfusion](#), Estimated blood loss (EBL), and length of stay (LOS). The need for transfusion and EBL were most significant for parietal bone thickness 0.5 cm to 1.5 cm from the suture line, within the anticipated area of [suturectomy](#). For patients undergoing craniofacial surgery, the parietal bone thickness may have important implications for anticipating the need for intraoperative transfusion and hospital length of stay (LOS) <sup>1)</sup>.

1)

Villavisanis DF, Cho DY, Shakir S, Kalmar CL, Wagner CS, Cheung L, Blum JD, Lang SS, Heuer GG, Madsen PJ, Bartlett SP, Swanson JW, Taylor JA, Tucker AM. Parietal bone thickness for predicting operative [transfusion](#) and [blood loss](#) in patients undergoing spring-mediated cranioplasty for nonsyndromic sagittal craniosynostosis. J Neurosurg Pediatr. 2022 Jan 28:1-8. doi: 10.3171/2021.12.PEDS21541. Epub ahead of print. PMID: 35090136.

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