CRANIOSYNOSTOSIS: RISK FACTORS FOR DELAYED PRIMARY SURGERY AND PREDICTORS OF EARLY OPERATION

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Background: Patients with craniosynostosis often undergo delayed primary surgery, defined as primary operations performed after 12 months of age, which places them at a higher risk of complications compared to patients who are treated earlier. Past studies have investigated risk factors related to delayed presentation for craniosynostosis management. Given the wide variability between time of presentation and time of surgery, however, patient age at time of surgery would be a better metric for assessing these risk factors for delay. The purpose of this study is to elucidate risk factors for delayed surgical correction of craniosynostosis and to identify factors associated with younger patient ages at the time of operation.

Materials/Methods: Retrospective chart review was conducted from November 2011 to September 2018 on patients with a documented diagnosis of craniosynostosis presenting for primary surgical management. We analyzed nineteen risk factors potentially associated with delayed primary surgical intervention. A Wilcoxon rank sum test was used to determine p-values for comparisons between patients in different age cohorts at time of surgery. Logistic regression was used to model the relationship between potential risk factors and patient age at surgery. A p-value of < 0.05 was considered statistically significant.

Results: In total 123 of 208 patients met final inclusion criteria. The majority of patients were male (68.3%). We found that a higher percentage of white patients received surgery before 12 months of age compared to non-white patients (58.5% vs 41.5%, $p = 0.046$). Patients with sagittal craniosynostosis were more likely to receive surgery before 12 months of age, whereas patients with unilateral coronal and multisuture craniosynostosis were more likely to receive surgery after 12 months of age. Patients with syndromic craniosynostosis and congenital anomalies were significantly more likely to receive surgery after 12 months of age ($p = 0.019$; $p = 0.007$). Syndromic status and type of craniosynostosis were highly correlated with age at surgical intervention (OR = 0.11, CI 0.01-0.94, $p = 0.04$; OR = 0.20, CI 0.08-0.50, $p < 0.01$).

Conclusions: Non-white patients with syndromic, unilateral coronal, or multisuture craniosynostosis and comorbidities were more likely to undergo surgical intervention after one year of age. Understanding these risk factors can drive evidence-based interventions designed to promote earlier presentation conducive to safer, less invasive surgical treatments.