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abstract

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abstract

Time to Surgery as a Predictor of Outcomes Following Spine Tumor Resection in Pediatric Patients: A Retrospective Study in an LMIC

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Introduction: Primary spinal cord and column tumors, and metastatic spine disease (MSD) can lead to low back pain, reduced ambulation, and other debilitating symptoms in adults and children. Surgical resection serves as a key intervention for primary spinal tumors and the gold standard for MSD 7. Literature from high-income countries shows varying results of time-to-surgery (TTS) (interval from diagnosis to surgery) on mortality and morbidity following spinal and other tumor resection, with a dearth of literature from LMICs, particularly in pediatric patients. This study evaluates whether shorter TTS improves outcomes following surgical resection for primary spinal tumors and MSD in pediatric patients.

Methodology: A retrospective cohort study was conducted on children under 18 years who underwent resection for primary spinal cord tumors, primary vertebral column tumors, or metastatic spine disease from January 2000 to July 2025. We compared neurological outcomes using the Modified McCormick Scale (MMS) between the Early and Delayed TTS groups using Fisher's Exact Test. Multivariable logistic regression was performed to identify independent predictors of postoperative neurological outcomes (change in postoperative MMS). All data analysis was performed using SPSS v27, with statistical significance defined as $p < 0.05$.

Results: A total of 33 children (median age 10 years, range 3–17; 17M, 16F) underwent resection of

of spinal tumors. Tumor types included 14 primary spinal cord (42.4%), 17 primary vertebral columns (51.5%), and 2 metastatic spinal disease (6.1%) cases. Median time to surgery (TTS) was found to be 110 days, stratifying patients into Early (≤110 days, n=17) and Delayed (>110 days, n=16) groups. Delayed TTS was associated with a higher rate of neurological worsening on MMS compared to Early TTS (43.8% vs 11.8%), but did not reach statistical significance (Fisher's Exact p=0.137). On multivariable logistic regression, TTS was not a significant predictor of poor functional outcome (OR 1.29, 95% CI 0.90–1.85, p=0.152). Tumor location was significant, with vertebral and metastatic tumors predicting worse outcomes than primary spinal cord (OR 0.01, 95% CI 0.00–0.62, p=0.033). Other variables were not significant; model fit was adequate (Nagelkerke R^2=0.699, accuracy 84.8%). At 1-year follow-up, 32/33 patients were alive (97%).

Conclusion: Primary vertebral column tumors and metastatic spinal disease predict worse postoperative outcomes than primary spinal cord tumors. Early time to surgery is not a statistically significant predictor of functional recovery. Trends suggest earlier surgery may still improve neurological outcomes.

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