Outcomes After Decompressive Craniectomy in Pediatric Patients

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Abstract

Decompressive craniectomies are neurosurgical procedures performed to reduce intracranial hypertension. This study examined the outcomes of various etiologies of decompressive craniectomies in the pediatric population. The hypothesis is that patients who undergo the operation for accidental trauma and infection will have better outcomes than those whose etiologies are non-accidental trauma, strokes, and ruptured vascular malformations. The study was conducted via a retrospective records review with a study sample from Akron Children's Hospital. The results indicated that patients presenting with stroke, ruptured arteriovenous malformation, and non-accidental trauma were more likely to die and have unfavorable outcomes post craniectomy.

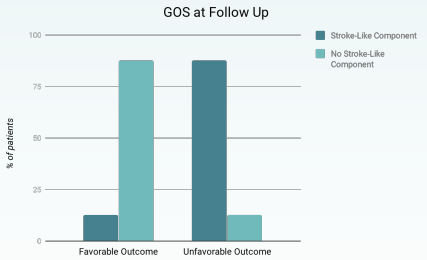
Introduction

Decompressive craniectomies are procedures frequently performed in the pediatric population for intracranial hypertension. These surgeries are primarily performed to decrease intracranial pressure and increase cerebral blood flow. Head injuries are a major cause of death in the pediatric population rendering the significance of this study. Previous literature for decompressive craniectomy in pediatrics is insufficient with small study populations despite the frequency of traumatic brain injury. While some studies have shown better outcomes for patients receiving decompressive craniectomies, others have found that the outcomes do not differ significantly. The objective of this study is to determine if there is any difference in morbidity or mortality between the various indications for decompressive craniectomy in pediatric patients.

Methodology

This was a retrospective records review, utilizing a convenience sample from Akron Children's Hospital. The following variables were collected and analyzed: patient demographics, indication for craniectomy, clinical variables, mortality rate/cause of death, and Glasgow Outcome Score (GOS) at last follow-up exam. Statistical analyses was completed using SAS 9.4 / 14.2 ©.

Results



	Stroke-Like	Other Etiologies
Age (yr)	2.1	10.1
Length of Surgery (min)	115.0	153.0
GOS at f/u	3.0	5.0

Discussion

This study included 135 patients of which 52 underwent a craniectomy. The study sample was significantly different based on their baseline characteristics. Patients who had a stroke component were 4.23 times more likely to die following the craniectomy and were 21 times more likely to have unfavorable Glascow Outcome Scores (GOS) after the surgery. The median GOS was 3, indicating severe disability, for stroke-like patients at their most recent follow-up while a 5, low disability, for non-stroke-like patients. This indicates that patients who suffer from strokes tend to have more severe brain damage as opposed to infections and trauma. This is most likely due to the disruption of blood flow to areas in the brain affected by the stroke which can cause a loss of normal function that will more likely be permanent. Due to secondary complications that arise from stroke, pediatric patients are more likely to have unfavorable permanent outcomes when compared to other indications for craniectomies.

	Age	ISS	Length of surgery	Hospital LOS	ICU LOS
Median value	8.2	26	131	32.3	11

Conclusion

Decompressive craniectomies in pediatric populations are frequently performed procedures for a variety of reasons to reduce intracranial hypertension. This study found that patients who presented with a stroke-like component were more likely to die and have unfavorable GOS following the surgery. The secondary complications from a stroke leave these patients more vulnerable to poorer outcomes following surgery. Future studies should investigate how early interventions in these patients can improve outcomes and decrease mortality and can impact discussions with families regarding prognosis.

Limitations

Limitations encountered include a limited (though relatively large) sample size, inherent bias in retrospective chart reviews and potentially ungeneralizable results

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Sources

1. Kan P, Jr GLW, Walker ML. Outcomes after decompressive craniectomy for severe traumatic brain injury in children. J Neurosurg. 2006;105:6.
2. Jacob AT, Heuer GG, Grant R, et al. Decompressive Hemicraniectomy for Pediatric Traumatic Brain Injury: Long-Term Outcome Based on Quality of Life. Pediatric Neurosurgery. 2011;47(2):81-86. doi:10.1159/000329624
3. Jagannathan J, Ahmed H, Sr JAJ. Outcome following decompressive craniectomy in children with severe traumatic brain injury: a 10-year single-center experience with long-term follow up. J Neurosurg. 2007;106:8.