

Clinical Surgery

Comparative effectiveness of treatment strategies for severe splenic trauma in the pediatric population



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Abstract

BACKGROUND: Splenic angioembolization (SAE) is increasingly used in the management of splenic injuries in adults, although its value in pediatric trauma is unclear. We sought to assess outcomes related to splenectomy vs SAE.

METHODS: The National Trauma Data Bank was queried for patients 0 to 15 years of age from 2007 to 2011. Subgroup analysis of splenectomy vs SAE was performed for high-grade injuries using propensity analysis and inverse probability weighting.

RESULTS: Of 11,694 children presenting with splenic trauma, over 90% were treated nonoperatively. Adjusted analysis of high-grade injuries included 265 children who underwent splenectomy and 199 who underwent SAE. The Injury Severity Score, number of transfusions, and complications rates were not significantly different between the 2 groups. Overall adjusted mortality for children with high-grade injuries was 13.4% following splenectomy and 10.0% following SAE ($P = .31$)

CONCLUSION: Patients undergoing SAE for high-grade splenic trauma have comparable morbidity and mortality with splenectomy.

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The spleen is a commonly injured organ in children with blunt abdominal trauma.¹ For several decades, nonoperative management of most children with blunt splenic injury has been considered the standard of care.^{2–5} Such an approach has obviated the need for splenectomy in over 90% of pediatric patients who sustain blunt splenic injury, avoiding the risk of overwhelming postsplenectomy sepsis.^{6,7} Moreover, splenic preservation after blunt injury has been associated with reductions in blood transfusion requirement, healthcare resource utilization, and postinjury mortality rates.^{8,9}

Splenic angioembolization (SAE) has emerged as an alternative to splenectomy for patients with blunt splenic injury who have failed or who are anticipated to fail nonoperative management. Although successful use in adult patients with splenic injury has been widely demonstrated, descriptions of its application in children have been limited to small, single-center case series.^{10–15} The objective of our study was to use a large, national dataset to define current treatment strategies and outcomes of children with splenic trauma, and compare the outcomes of SAE with splenectomy.

Methods

Data source

The National Trauma Data Bank is a database maintained by the American College of Surgeons and contains adult and pediatric data from over 900 US trauma centers. Data are organized in de-identified Research Datasets for use by investigators.

Study population

The Duke University Institutional Review Board determined this study exempt from review. The National Trauma Data Bank (version 7.2) was queried for all children aged 0 to 15 years who presented from 2007 to 2011 with a splenic injury (International Classification of Disease [ICD-9] code 865). Patients were then categorized by management

strategy as follows: nonoperative, splenic repair (ICD-9 code 41.95), splenectomy (ICD-9 code 41.5), or embolization (ICD-9 codes 38.91, 39.79, 39.77, and 88.47). For the

Table 1 Demographics, injury characteristics, and outcomes of all patients presenting with splenic trauma from 2007 to 2011

Variable	n (%)
Median age (years) (IQR)	12 (7–14)
Female	3,288 (28.2%)
Pediatric trauma level	
I	4,967 (42.5%)
II	1,391 (11.9%)
Other	5,336 (45.6%)
Race/ethnicity	
White	7,987 (72%)
Black	1,100 (9.9%)
Hispanic	1,325 (11.9%)
Other race	687 (6.2%)
Splenic AIS	
2	5,269 (45.1%)
3	2,073 (17.7%)
4	3,330 (28.5%)
5	956 (8.2%)
ISS	
Mild (≤ 8)	2,245 (20.1%)
Moderate (9–14)	3,359 (30.1%)
Severe (15–24)	3,002 (26.9%)
Extremely severe (≥ 25)	2,550 (22.9%)
GCS total	
15	8,829 (80.5%)
9–14	794 (7.2%)
≤ 8	1,347 (12.3%)
Mechanism of injury	
MVC	5,961 (51%)
Fall	2,517 (21.5%)
Struck	1,392 (11.9%)
Stab	51 (.4%)
GSW	142 (1.2%)
Other	1,622 (13.9%)
Transfusion	
RBC	691 (5.9%)
Platelet	108 (.9%)
Complications	
None	4,562 (86.4%)
ARF	22 (.4%)
ARDS	188 (3.6%)
Wound infection	57 (1.1%)
DVT	39 (.7%)
PE	6 (.1%)
Pneumonia	196 (3.7%)
Sepsis	49 (.9%)
Median LOS (IQR)	4 (2–6)
Mortality	472 (4%)

AIS = Abbreviated Injury Score; ARDS = acute respiratory distress syndrome; ARF = acute renal failure; DVT = deep venous thrombosis; GCS = Glasgow Coma Score; GSW = gunshot wound; IQR = interquartile range; ISS = Injury Severity Score; LOS = length of stay; MVC = motor vehicle collision; PE = pulmonary embolism; RBC = red blood cells.

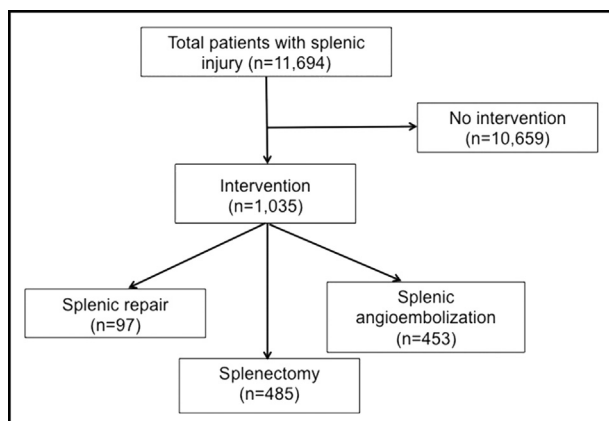


Figure 1 Diagram summarizing the number of patients for each intervention.

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