



Adult Solid Organ Injury: Who Needs Admission?

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Background

Non-operative management (NOM) of blunt intra-abdominal solid organ injury (SOI) has become the standard of care in hemodynamically stable trauma patients and has traditionally consisted of admission to the hospital for 24-72 hours for observation. However, research has shown that admission to a monitored unit and serial hemoglobin measurement does not change outcomes. Recent pediatric trauma literature has even questioned the need for hospital admission for pediatric trauma patients with low-grade blunt solid organ injury. The aim of the current study is to evaluate the rate of hospital-based intervention for adults with low-grade intra-abdominal SOI and to identify variables associated with need for hospital-based intervention

Population

Adult trauma patients who presented to a single urban level I trauma center from January 1st, 2013 to December 31st, 2022 with low-grade intra-abdominal solid organ injuries

Learning Objectives

- Apply statistical analysis of a large dataset, including data clean-up and building an appropriate regression model
- Analyze the statistical analysis of a large dataset to answer a research question
- Evaluate the results in order to create clinical criteria that would necessitate the need for admission vs discharge of adult patients with low-grade SOI

Activities

Retrospective chart review of MetroHealth Medical Center trauma registry and analysis of dataset

Deliverables

- Updated literature review of the current management of low-grade SOI
- Data set of low-grade SOI
- Clinical data regarding patients who may not benefit from admission to hospital for low-grade SOI
- Adding depth to the trauma literature regarding low-grade SOI

Methods

Retrospective chart review was performed on all adult trauma patients who presented to a single urban level I trauma center from January 1st, 2013 to December 31st, 2022 with low-grade intra-abdominal solid organ injuries. Patients were included if they were ≥ 18 years old, underwent CT-scan with IV contrast as part of initial trauma work-up, and had a hospital length of stay ≥ 24 hours. Primary outcome was incidence of intervention, defined as surgery or angioembolization (AE), for low-grade solid organ injury, as well as analysis of variables associated with need for intervention. Post-hoc sub-group analysis of patients without other major injuries and without blush or pseudoaneurysm on CT scan was performed with a composite primary outcome of need for intervention or need for blood transfusion. Descriptive statistics were used to analyze primary and subgroup outcomes

Results

486 patients met criteria for analysis. 34 (7.0%) of patients underwent intervention in the form of surgery or angioembolization, for their low-grade SOI. Variables associated with need for intervention were contrast blush or pseudoaneurysm on CT scan ($p < 0.00$) and hypotension in the ED ($p < 0.00$). On post-hoc analysis of subgroup, 9.6% of patients required either intervention or blood transfusion. On multivariate analysis, age and ED hypotension were associated with need for intervention or blood transfusion

Primary Outcome

Surgical intervention or AE (n, %)	34 (7%)
AE (n, %)	28 (5.8%)
Surgery (n, %)	6 (1.2%)
Age (median, IQR)	48.5 [IQR 31.3 – 56.8]
Multiple SOI (n, %)	3 (8.8%)
Mechanism, penetrating (n, %)	3 (8.8%)
INR ≥ 2 (n, %)	1 (2.9%)
Anti-platelet (n, %)	5 (14.7%)
Dual anti-platelet (n, %)	1 (2.9%)
DOAC (n, %)	2 (5.9%)
Blush or PSA on CT scan (n, %)	27 (79.0%)
ED Hypotension (n, %)	16 (47.1%)
Median day of intervention (IQR)	1 [IQR 1- 1]
Variables associated with need for intervention (χ^2 , p-value)	
Blush or PSA on CT scan	$\chi^2 = 285.23$, $p < 0.01$
ED Hypotension	$\chi^2 = 17.59$, $p < 0.01$

Variables Associated with composite outcome on Post-hoc analysis

Univariate regression		
Variable	Composite Outcome (OR; 95% CI)	p-value
Age	1.03; 1.01 – 1.05	0.01
Anti-platelet agent	3.06; 1.03 – 8.06	0.03
ED hypotension	16.77; 6.73 – 43.18	< 0.01
Multivariate regression		
Variable	Composite Outcome (OR; 95% CI)	P-value
Age	1.04 (1.01 – 1.07)	0.02
ED hypotension	19.36 (6.94 – 58.35)	<0.01

Lessons Learned

Low-grade intra-abdominal SOI in adults require intervention at a low rate. Only 7% of patients required an intervention in the form of surgery or AE. Post-hoc analysis shows the composite outcome occurred at a rate of 9.6%, with only 1.1% of patients undergoing an intervention by way of surgery or AE. Only age and ED hypotension were found to be associated with composite outcome on multivariate analysis. The results of the current study give ED physicians and surgeons taking care of trauma patients with intra-abdominal SOI evidence with which to base decisions regarding need for ≥ 24 -hour hospital admission vs a shorter period of observation

Public Health Implications

Intra-abdominal solid organ injury represents a significant healthcare burden, as the standard of care is admission for observation. Identifying a subset of patients that may not benefit from admission would decrease healthcare costs and relieve already overburdened hospitals from unnecessary admissions.