

Solid Organ Pseudoaneurysms in Patients with High Grade Traumatic Injuries: A Case Series

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Background

Rationale:

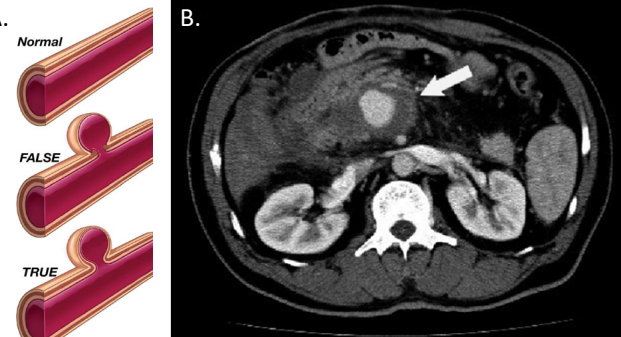
- Blunt abdominal trauma affects 25% of all patients admitted with traumatic injuries
- Although relatively rare (occurring in 2-10% of cases of solid organ injury), development of solid organ (splenic, hepatic, or renal) pseudoaneurysms (PSAs), particularly after initial imaging poses significant risk to patients. If untreated, these PSAs may rupture and lead to life-threatening hemorrhage.
- Despite risk, use of follow-up imaging after initial CT for blunt abdominal trauma remains controversial and has not widely been embraced

Objective:

- Case series conducted to capture experience of missed solid abdominal organ PSAs at two hospitals, a level 1 and level 2 trauma center
- Overall goals were to explore variables, to develop hypothesis for case-control study, & to inform screening guideline development

Figure 1. A. Arterial cross-sections of a normal vessel, a false aneurysm (pseudoaneurysm) with disruption of the intimal and medial layers of the arterial wall, and a true aneurysm with all three arterial wall layers intact.

B. Axial CT image of the abdomen shows a pseudoaneurysm (arrow).



Participant Data

Table 1. Patient Demographics, Injury Characteristics

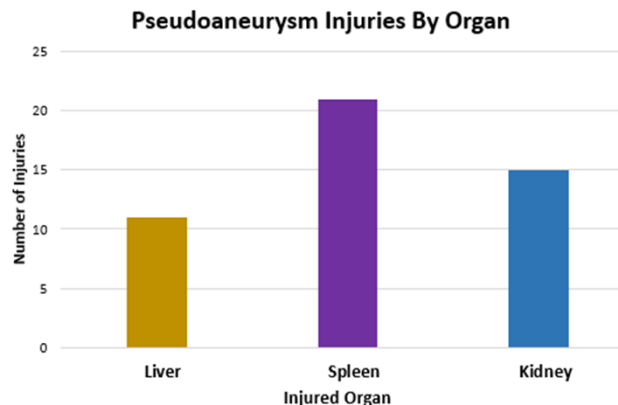
Age, (Median in Years)	34
% Female	68.3
% Penetrating	23.4
ISS (Median)	24.5
AAST Grade (Median)	4
Hospital LOS (Median, in Days)	9
% Readmitted for PSA	6.38
% Mortality	14.89

Methods

- Created database from retrospective longitudinal data across 5 platforms to include all adult patients between 2012 and 2020 with traumatic solid organ injuries of an AAST grade 3 or higher
- Performed quality control and comprehensive review to identify patients with PSAs, their demographic characteristics, and their clinical outcomes
- Statistical analyses were performed after controlling for outliers and performing 5-tiered checks of AAST grade level, data input, and interpretation of imaging data raw files as well as Surgery and IR medical notes

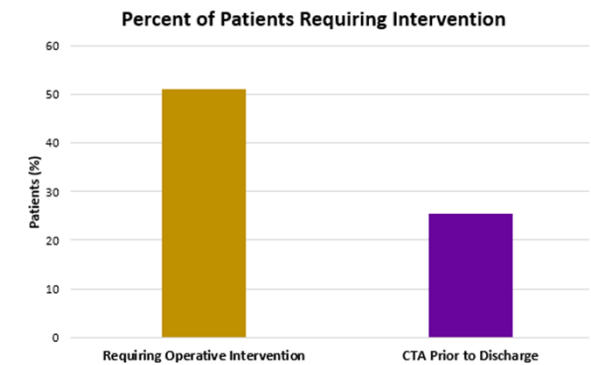
Results: Figure 2

Figure 2. Number of hepatic, splenic, and renal PSAs accounted for from Jan 2012 – August 2022 across 2 major trauma centers.



Results: Figure 3

Figure 3. Percent of patients who did not undergo PSA surveillance after admission and later required interventions due to ruptured PSA.



Conclusions

- Incidence of PSAs consistent with in previously published literature, but previous literature has excluded patients with penetrating trauma
- Given our population's ↑ percentage of penetrating trauma, this may be a focus for future research
- Now all patients with AAST grade 3 or higher solid organ injuries are now undergoing CTA surveillance prior to discharge to screen for PSAs
- Further studies needed to determine whether this change in screening guidelines affects incidence of PSAs and patient outcomes

References & Acknowledgments

- Wallen TE, Clark K, Baucom MR, Pabst R, Lemmink J, Pritts TA, Makley AT, Goodman MD. Delayed splenic pseudoaneurysm identification with surveillance imaging. *J Trauma Acute Care Surg.* 2022 Jul 1;93(1):113-117.
- Kittaka H, Yagi Y, Zushi R, Hazui H, Akimoto H. The investigation of posttraumatic pseudoaneurysms in patients treated with nonoperative management for blunt abdominal solid organ injuries. *PLoS One.* 2015;10(3):e0121078.
- Wagner ML, Streit S, Makley AT, Pritts TA, Goodman MD. Hepatic pseudoaneurysm incidence after liver trauma. *J Surg Res.* 2020;256:623-628.
- Kozar RA, Crandall M, Shanmuganathan K, Zarzaur BL, Coburn N, Cribari C, et al, AAST Patient Assessment Committee. Organ injury scaling 2018 update: spleen, liver, and kidney. *J Trauma Acute Care Surg.* 2018;85(6):1119-1122.

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