

## INTESTINAL TRANSPLANTATION FOR ABDOMINAL TRAUMA

Cal Matsumoto, MD; Christine Trankiem, MD; Erin C. Hall, MD;  
Sukanya Subramanian, MD; Brian Nguyen, MD; Alexander Kroemer, MD;  
Yuri Genyk, MD; Thomas Fishbein, MD; Gabriel Gondolesi, MD  
Georgetown University Hospital

**Introduction:** Abdominal trauma may lead to intestinal failure (IF) through multiple pathways. A direct injury to the superior mesenteric vasculature may render a patient with immediate IF with short gut syndrome (SGS). Alternatively, a severe complex abdominal injury may result in multiple operative procedures, enterocutaneous fistula (ECF), a frozen abdomen, and consequently IF. Intestinal transplantation (ITx)- either isolated intestine (iTx) or multivisceral (MVTx), has emerged as a life-saving intervention for these patients when conventional total parenteral nutrition (TPN) fails due to complications like central venous thrombosis, catheter-related sepsis, or intestinal failure associated liver disease (IFALD). ITx is a rare procedure with less than 75 adult cases per year performed in the last two decades in the U.S, and thus many surgeons may not be familiar with the current outcomes of ITx.

**Methods:** Retrospective analysis of all adult ITx performed at a single transplant institution with the etiology of IF from abdominal trauma.

**Results:** From November 2003 to December 2025, 385 ITx have been performed. 16 (4.2%) transplants were performed for IF from abdominal trauma at a median time of 3.02 years (range 1.07-26.07 years) after traumatic event. Mean age at time of transplant was  $37.4 \pm 7.5$  years, 12/16 (75%) were male sex, mean recipient BMI was  $23.6 \pm 6.23$ . 9/16 (56%) were due to penetrating trauma (7 gunshot, 1 stab, 1 bomb blast in Iraq) and 7/16 (44%) from blunt injury (4 MVA, 2 MCA, 1 assault). 9/16 (56%) were due to direct vascular injury (6 SMA; 2 SMA/SMV; 1 SMA+Aorta). 7/16 (43.7%) had IF complicated by chronic ECF.

Grafts included 11 iTx+colon, 4 iTx, and 1 MVTx. Mean donor age was  $19.4 \pm 11.5$  years, 9/16 (56%) donors were male sex, mean donor BMI  $18.7 \pm 2.6$ . Mean case time was  $6.42 \pm 1.48$  hours, and mean LOS was  $34.9 \pm 24.8$  days. All graft survivors achieved full TPN independence with mean postop TPN duration of  $21.1 \pm 11.6$  days. 1- and 5-year patient survival was 87.5% and 80.2%. 2 of the 3 deaths were on POD 0: 1 intraoperative death (MVTx) from massive transfusion (127 units pRBC) and intracardiac thrombus/PE, and 1 from sudden massive hemorrhage in ICU 6 hours post-transplant. The third death occurred 2.54 years post-transplant from cervical cancer. 1 graft loss occurred at 298 days post-transplant due to refractory cellular rejection from non-compliance with immunosuppressants.

**Conclusion:** Transplantation of the intestine is a rare transplant procedure and is infrequently performed for abdominal trauma. Despite the high complexity of these cases, excellent outcomes, including TPN independence, can be achieved, offering a return to normal life for survivors of severe abdominal trauma.

## **TIMING MATTERS: DELAYED SURGERY INCREASES MORTALITY FOR BLUNT HOLLOW VISCUS INJURY**

Peter D. Nguyen, MD; Jeffry Nahmias, MD, MHPE;  
Michael de Virgilio, MD; Matthew Dolich, MD; Michael Lekawa, MD;  
Sebastian Schubl, MD; Michelle Hough, MD; Areg Grigorian, MD  
University of California, Irvine

**Introduction:** Immediate surgical exploration is recommended for suspected hollow viscus injury (HVI) following blunt trauma. However, diagnostic uncertainty can lead to delayed operative management. We aimed to evaluate if delayed bowel resection (DBR), defined as >8 hours after emergency department arrival, was independently associated with increased mortality in blunt trauma patients. We also sought to identify clinical factors associated with DBR.

**Methods:** The TQIP database (2017-2023) was queried for admitted adults with blunt abdominal trauma (abbreviated injury scale grade >2) who underwent bowel resection. Patients who died or were discharged within 8 hours were excluded. Patients undergoing early bowel resection <8 hours (EBR) were compared to patients undergoing DBR (>8 hours).

Multivariable logistic regression evaluated the association between DBR and mortality, controlling for age, injury severity score (ISS), severe head injury, and intubation within 1 hour of arrival. A sensitivity analysis excluded patients with severe head injury.

**Results:** Of 10,939 patients, 4,556 (41.6%) underwent DBR. Compared to EBR patients, the DBR cohort had a higher median ISS (24 vs. 19) and increased incidence of brain (19.3% vs. 15.3%), and solid organ injuries including the liver (24.7% vs. 17.7%), spleen (29.1% vs. 19.8%), and kidney (12.1% vs. 6.0%) (all  $p<0.001$ ). DBR had increased mortality (17.2% vs. 8.1%,  $p<0.001$ ) and was independently associated with increased mortality (OR 1.81, 95% CI 1.58-2.06,  $p<0.001$ ), including a subgroup analysis of patients without severe head injury (OR 2.30, 95% CI 1.96-2.70,  $p<0.001$ ).

**Conclusion:** Delayed operative management for blunt HVI occurs more often in patients with solid organ injuries and is independently associated with increased mortality. These findings highlight the importance of early detection and timely surgical management of HVI.

## LAPAROSCOPY IN TRAUMATIC ISOLATED COLORECTAL INJURIES IS A SAFE OPTION: A PROPENSITY MATCHED ANALYSIS

Henry Olivera Perez, MD; Henry Olivera Perez, MD;  
Anna Huang Perez, MD; Andrea Gochi, MD, MS; Adam Gutierrez, MD;  
Genna Beattie, MD; April Mendoza, MD; Naveen Balan, MD  
University of California, San Francisco - East Bay

**Introduction:** Laparoscopic management of colorectal trauma is challenging in the acutely injured patient and risks include missed or inadequately managed injuries.

We hypothesized that laparoscopic management of isolated colorectal injuries would be associated with an increased rate of return to the operating room.

**Methods:** The National Trauma Data Bank (NTDB) was queried from 2021-2023 for patients who underwent colon or rectum surgery with no other intra-abdominal injury. Patients were then propensity matched into laparoscopic or open surgery by trauma type, injury severity score (ISS), and comorbidities. Clinical characteristics and outcomes including unplanned return to the operating room (uROR), mortality, were compared.

**Results:** The propensity matched sample had 1410 patients with 705 patients in each group. Median age, ISS, Abbreviated Injury Score (AIS) Abdomen, and mechanism were similar between the two groups. The laparoscopic group had similar resection (53% vs 51%,  $p = 0.5$ ) and repair (45% vs 47%,  $p=0.5$ ) rates compared to the open group. uROR (10% vs 14%,  $p=0.01$ ) and mortality (4% vs 9%,  $p<0.001$ ) were lower in the laparoscopic group compared to the open group. Median hospital length of Stay (23 [22] vs 25 [30],  $p<0.001$ ) and ICU length of stay (10 [12] vs 12 [13],  $p=0.02$ ) was lower in the laparoscopic group. On multivariate regression, laparoscopic surgery (OR 0.5, 95% CI 0.3-0.8  $p=0.01$ ) and penetrating mechanism (OR 0.6, 95% CI 0.4-0.9,  $p=0.02$ ) independently predicted lower odds of uROR. Predictors of higher odds of uROR were higher ISS (OR 1.03, 95% CI 1.01-1.05  $p <0.001$ ), creation of colostomy (OR 2.7 95% CI 1.7– 4.2,  $p<0.001$ ), and resection during surgery (OR 1.9 95% CI 1.1– 3.3,  $p=0.01$ )

**Conclusion:** Laparoscopic surgery for isolated traumatic colorectal injuries is associated with lower rates of uROR and in-hospital mortality and decreased ICU and hospital length of stay compared to open surgery. Laparoscopy should be considered when managing isolated traumatic colon injuries in stable patients.

## ANGIOEMBOLIZATION FOR SOLID ORGAN INJURY IN PENETRATING ABDOMINAL TRAUMA: A SINGLE CENTER EXPERIENCE FROM A HIGH VOLUME TRAUMA CENTER

Hernán Esteban Munevar Castañeda, MD;

Juan Pablo Carbonell Caicedo, MD; Mateo Betancourt Cajiao, MD, MSc;

Lidy Paola Vila Martinez, MD; Nathalia Fajardo Alban, MD;

Maria Astudillo Echeverri, MD; Carlos Alberto Ordoñez Delgado, MD;

Juan Carlos Puyana, MD; Alberto F García, MD, MSc

Fundación Valle del Lili

**Introduction:** Angioembolization(AE) is increasingly utilized to control hemorrhage in solid organ injuries within nonoperative management (NOM) strategies. While extensively validated in blunt abdominal trauma, evidence supporting AE in penetrating trauma remains limited. We evaluated the AE for solid organ hemorrhage control in a population with a high proportion of penetrating trauma(PT).

**Methods:** Retrospective cohort study of patients >14 years with abdominal solid organ injuries who underwent AE between 2022 and 2025 at a Level I trauma center with 24/7 interventional radiology. Data included demographics, injury severity, CT findings, embolized organs, complications, therapeutic success rate, and in-hospital mortality

**Results:** 115 patients were included: median age 26 years (IQR 22-36), 77.4% male. PT occurred in 56.5%. Median ISS was 26 (IQR 18-35). CT was performed in 95.7% of cases, revealing active contrast extravasation (59.1%), vascular transection (14.6%), and pseudoaneurysm (10.9%). Embolized organs were liver (53.9%), kidney (45.2%), and spleen (27.0%), with organ distribution and therapeutic success stratified by trauma mechanism shown in Table 1. Therapeutic success was 74.8%. Laparotomy was performed in 37.4% (before AE: 62.8%; after AE: 37.2%). Re-embolization rate was 6.1%. Post AE laparotomy (17.4%) was mainly indicated for hollow viscus perforation (40.0%). Complications occurred in 7.8% (organ ischemia, abscesses). In-hospital mortality was 7.8%. Median hospital stay was 9 days (IQR 6-21).

**Conclusion:** AE is safe and effective for hemorrhage control in solid organ injuries, including PT. Concomitant hollow viscus injury limits NOM. These findings support integrating AE into hemorrhage algorithms and highlight the need for endovascular skills training among trauma surgeons in high-volume penetrating trauma settings.

**Table 1. Organ embolized and therapeutic success according to trauma mechanism**

| Trauma mechanism   | Liver, n (%) | Spleen, n (%) | Kidney, n (%) | Success, n/N (%) |
|--------------------|--------------|---------------|---------------|------------------|
| Penetrating (n=65) | 43 (66.2%)   | 9 (13.8%)     | 32 (49.2%)    | 60 / 84 (71.4%)  |
| Blunt (n=50)       | 18 (36.0%)   | 22 (44.0%)    | 17 (34.0%)    | 46 / 57 (80.7%)  |

# BEYOND "EARLY VS LATE": DEFINING OPERATIVE TIMING THRESHOLDS AFTER BLUNT INTESTINAL INJURY

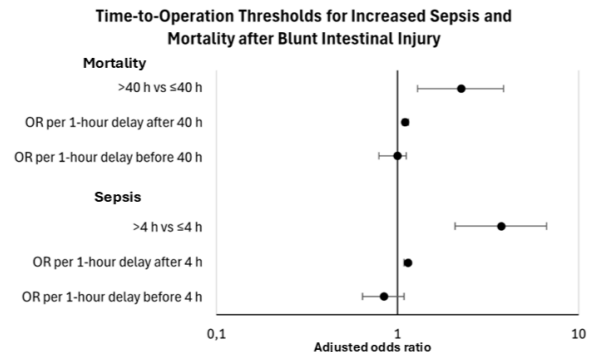
Ioannis Karikis, MD; Yasmin Arda, MD; Mary Leech, MD;  
 Matthew Bartek, MD; Michael DeWane, MD; Casey Luckhurst, MD;  
 Jonathan Parks, MD; Jessica Ramadei, FNP-C; John Hwabejire, MD;  
 Joshua Ng-Kamstra, MD; Ali Salim, MD; Haytham Kaafarani, MD, MPH;  
 George Velmahos, MD, PhD; Lydia Maurer, MD  
 Massachusetts General Hospital

**Introduction:** Blunt intestinal injury is rare and difficult to diagnose clinically or radiographically. While delayed recognition worsens outcome, it is unclear whether initial watchful waiting is safe. We aimed to study how much time delay results in worsening outcomes.

**Methods:** Using ACS-TQIP data from 2017 to 2020, adult ( $\geq 18$  years) blunt trauma patients with small or large bowel injury who underwent intestinal resection or repair were identified. Time to operation was measured in hours from ED arrival to the first bowel procedure. Clinical outcomes included sepsis and in-hospital mortality. Mixed-effects logistic regression models were adjusted for demographics, comorbidities, injury severity score (ISS), and hospital factors. Time was modeled using a prespecified two-slope function, selecting the best-fitting inflection point (1–48 hours) by Akaike Information Criterion.

**Results:** Out of 4,005,762 patients, 2,268 were included. Median age was 36 years, median ISS was 22, median time to surgery was 2.57 hours (IQR 1.32–7.78) and 75% underwent intestinal resection. The best-fitting inflection point after which the risk for sepsis increased significantly was 4 hours. Surgery more than 4 hours after ED presentation was associated with significantly higher odds of sepsis compared to surgery sooner (aOR 3.71, 95% CI 2.09–6.58), with each additional hour of delay associated with 5% increased odds of sepsis (per-hour aOR 1.05, 95% CI 1.03–1.06). For mortality, the best-fitting inflection point was 40 hours, after which there was more than double the odds of in-hospital mortality (aOR 2.23, 95% CI 1.30–3.80) (Figure).

**Conclusions:** Although surgeons are mindful of the risks of delaying operative intervention in blunt intestinal injury, this work is the first to identify intrinsic, data-driven 4- and 40-hour marks for increased sepsis and mortality. These marks can be used as process measures for benchmarking the quality of care.



**DELAYED LAPAROTOMY AND MORTALITY AFTER MOTOR VEHICLE CRASHES: A NATIONWIDE ANALYSIS OF HOSPITAL OWNERSHIP USING PROPENSITY SCORE MATCHING**

Himani Bhatt, MBBS; Madison Porras; Nancy Y. Orduno Villa, MD;  
Jayant Kumar, MD; Deep Vakil, MD; Gary Curcio, MD;  
Andrew Rosenthal, MD; Rishi Rattan, MD; Joshua Parreco, MD  
Memorial Regional Hospital

**Introduction:** Investor-owned hospitals treat a growing share of trauma patients, yet prior studies report shorter stays and higher readmission rates at these facilities. Whether hospital ownership influences the timeliness of definitive surgical intervention and patient survival after motor vehicle crashes remains unclear. We hypothesized that patients at investor-owned hospitals experience higher rates of delayed laparotomy and mortality.

**Methods:** Using the Nationwide Readmissions Database (2016-2022), we identified patients  $\geq 15$  years of age undergoing laparotomy after motor vehicle crashes. Primary outcome: mortality during index admission or readmission. Secondary outcome: delayed laparotomy ( $>5$  days post-admission). Propensity score matching (1:1, nearest-neighbor, caliper 0.2 SD) compared investor-owned to non-investor-owned hospitals, controlling for demographics, injury severity, and comorbidities. Delayed laparotomy occurring during readmission to a different hospital was analyzed as a separate subgroup to capture inter-facility transfer delays.

**Results:** Among 26,339 patients, overall mortality was 17.31%; delayed laparotomy occurred in 8.19%. Before matching, investor-owned hospitals (10.78% of cohort) showed higher mortality (19.20% vs 17.08%,  $p < 0.01$ ), more delayed laparotomies (10.71% vs 7.89%,  $p < 0.01$ ), and increased delays during readmission to different hospitals (11.51% vs 5.72%,  $p < 0.01$ ). After 1:1 propensity matching ( $n=5,678$ ), investor-owned hospitals maintained significantly higher mortality (OR 1.21, 95% CI 1.05–1.38), delayed laparotomy (OR 1.27, 95% CI 1.06–1.52), and delayed laparotomy during readmission to a different hospital (OR 2.32, 95% CI 1.20–4.49).

**Conclusion:** Even after propensity score matching, investor-owned hospitals demonstrated higher rates of delayed laparotomy and mortality, with the strongest association seen among patients readmitted to a different hospital for surgery. Quality improvement initiatives targeting timely operative intervention and coordinated inter-facility transfers are needed across all hospital types.

**ALCOHOL AND PSYCHOACTIVE SUBSTANCE USE DO NOT DELAY  
SURGICAL INTERVENTION, NOR ALTER THE OUTCOMES IN  
PENETRATING ABDOMINAL TRAUMA. A PROSPECTIVE  
BICENTRIC COHORT STUDY**

Alberto F García, MD, MSc; Helmer Palacios, MD;  
Mateo Betancourt Cajiao, MD, MSc; Ilich A. Zuñiga, MD;  
Julián Chica Yanten, MD; María Antonia Quintero, MD;  
Claudia Valentina Valderrama, MD; Daniela Barranco, MD;  
Juan Carlos Puyana, MD  
Fundación Valle del Lili

**Introduction:** Penetrating abdominal trauma (PAT) frequently occurs in patients under the influence of alcohol or psychoactive substances (SPA). It may influence the reliability of the physical exam, potentially delaying surgical decision-making, resulting in increased morbidity and mortality. The impact of substance use on time-to-surgery and surgical outcomes remains poorly characterized. We hypothesized that alcohol/SPA use is not associated with delayed surgical intervention, nor with surgical outcomes.

**Methods:** Adults with PAT admitted to two Level I trauma centers, where surgical decision-making is guided by hemodynamic stability, clinical findings, and CT in selected cases, were prospectively enrolled from 2020 to 2025. A similar evaluation protocol was followed, independent of the intoxication status. For the analysis, patients were stratified by alcohol/SPA use at admission. The time from admission to surgical decision was analyzed using Cox proportional hazards regression, adjusting for relevant covariates. Prespecified sensitivity analyses were performed. The study was registered at ClinicalTrials.gov (NCTXXXX).

**Results:** Among 277 patients (135 alcohol/SPA users, 142 non-users), injury severity scores were similar between groups. Substance users sustained more gunshot wounds (76.3% vs 65.5%,  $p=0.05$ ). The proportion of patients operated on was similar in the alcohol/SPA users and the non-users (67.4% vs 69.0%,  $p=0.589$ ). Time to surgical decision was equivalent between groups (median 118 vs 121 minutes,  $p=0.854$ ). Alcohol/SPA use was not associated with surgical decision timing in adjusted analysis (HR 1.02, 95%CI 0.75-1.37,  $p=0.917$ ), and results were consistent across all sensitivity analyses. Non-therapeutic interventions were less frequent in substance users (12.1% vs 21.4%), but the difference did not reach statistical significance ( $p=0.087$ ). The rates of intraabdominal infection (15.4% vs 11.2%,  $p=0.399$ ), multiorgan failure (MOF) (2.2% vs 2.1%,  $p=1.00$ ), and mortality (1.5% vs 2.1%,  $p=1.00$ ) were similar in alcohol/SPA users, and non-users.

**Conclusion:** Alcohol/SPA use in PAT patients did not delay surgical decision-making. Infectious complications, MOF, and mortality were not affected. Concerns that intoxication impairs clinical assessment and delays surgical decision are not supported by our data.