The University of Arkansas for Medical Sciences
Trauma Clinical Practice Management Guideline

SUBJECT: Solid Organ Injury Management Guideline (Spleen, Liver, Kidney)

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PURPOSE: To determine when non-operative management of liver, kidney, and spleen injuries is indicated.

DEFINITIONS:

SPLEEN INJURIES:

Grade I	Subcapsular hematoma, <10% surface area Parenchymal laceration < 1 cm in depth Capsular tear
Grade II	Subcapsular hematoma, 10-50% surface area Intraparenchymal hematoma <5 cm in diameter Parenchymal laceration 1-3 cm in depth
Grade III	Subcapsular hematoma,>50% surface area or expanding Ruptured subcapsular or intraparenchymal hematoma ≥5 cm Parenchymal laceration >3 cm in depth
Grade IV	Any injury in the presence of a splenic vascular injury or active bleeding confined within the splenic capsule. Parenchymal laceration involving segmental or hilar vessels producing >25% devascularization
Grade V	Any injury in the presence of a splenic vascular injury with active bleeding extends beyond the spleen into the peritoneum. Shattered spleen

LIVER INJURIES:

Grade I	Subcapsular hematoma <10% surface area Parenchymal laceration <1 cm in depth
Grade II	Subcapsular hematoma 10-50% surface area Intraparenchymal hematoma <10 cm in diameter Parenchymal laceration 1-3 cm in depth and ≤10 cm in length
Grade III	Subcapsular hematoma >50% surface area or expanding Ruptured subcapsular or parenchymal hematoma Intraparenchymal hematoma >10 cm Parenchymal laceration >3 cm in depth Any injury in the presence of a liver vascular injury or active bleeding contained within the liver parenchyma
Grade IV	Parenchymal disruption involving 25-75% of a hepatic lobe Active bleeding extending beyond the liver parenchyma into the peritoneum

These guidelines were prepared by the UAMS Trauma/EGS Service. They are intended to serve only as a guideline based on current review of the medical literature and practice. They are neither policies nor protocols. Their use is at the discretion of the managing physician.

Grade V	Parenchymal disruption involving >75% of the hepatic lobe
	Juxtahepatic venous injuries to include retrohepatic vena cava and/or central major hepatic veins

RENAL INJURIES:

Grade I	Subcapsular hematoma and/or parenchymal contusion without laceration
Grade II	Perirenal hematoma confined to Gerota's fascia
	Parenchymal laceration ≤1 cm in depth without urinary extravasation
Grade III	Parenchymal laceration >1 cm in depth without collecting system rupture or urinary extravasation
	Any injury in the presence of a kidney vascular injury or active bleeding contained within Gerota's fascia
Grade IV	Parenchymal laceration extending into the urinary collecting system with urinary extravasation
	Renal pelvis laceration and/or complete ureteropelvic disruption
	Segmental renal vein or artery injury
	Active bleeding beyond Gerota's fascia into the retroperitoneum or peritoneum
	Segmental or complete kidney infarction(s) due to vessel thrombosis without active bleeding
Grade V	Main renal artery or vein laceration or avulsion of hilum
	Devascularized kidney with active bleeding
	Shattered kidney with loss of identifiable parenchymal renal anatomy

CRITERIA:

1. **Splenic Injuries**
   A. Non-operative management of splenic injuries can be considered when all of the following conditions have been met:
      1. Diagnosis of injury on CT scan/FAST
      2. Hemodynamic stability
      3. Grade 1-4 injury
      4. No other major intra-abdominal injury
      5. No other major sources of blood loss
      6. Available for monitoring except for short operative procedures
      7. No other pre-morbid illnesses that suggest the patient could not tolerate blood loss (e.g., severe ischemic heart disease)
      8. Willingness to receive a blood transfusion
      9. Consider intervention for those with moderate-to-severe TBI to avoid hypotension
   B. All patients with Grade 4-5 injuries should be evaluated for an urgent or emergent angiogram with embolization within 1 hour of presentation.
   C. Admit all Grade 4-5 injuries to the SICU for close hemodynamic monitoring.
   D. Consider repeating the CTA in 48-72 hours after injury to evaluate for a

pseudoaneurysm.

E. UAMS Trauma Registry data indicate patients >60 are at high risk for failed non-operative management.
F. **Immunizations:** Please refer to the "Post-Splenectomy Vaccines" Guideline for proper management.
G. **Thromboprophylaxis:** Please refer to the "Venous Thromboembolism Prophylaxis (DVT/PE)" Guideline for management.

2. Liver Injuries

A. Non-operative management of liver injuries can be considered when all of the following conditions have been met:
    1. Liver injury diagnosed on CT scan with normalizing vital signs, Grade I to IV
    2. Injury not into the hilum
    3. A rim of blood around the liver
B. Admit all Grade 4 or higher liver lacerations to the ICU
    1. Monitor hourly vital signs
    2. Bedrest
    3. NPO
    4. Serial Hgb/Hct q 6 hours until stable
C. Bile Leaks
    1. If <300ml/day at time of diagnosis, then observe or manage with percutaneous drainage alone for up to 14 days.
    2. If >300ml/day at the time of diagnosis, proceed with ERCP and sphincterotomy, or if the above treatment fails to resolve the leak within 14 days.
D. Consider repeating the CTA in 48-72 hours from the injury to evaluate for a pseudoaneurysm.
E. **Thromboprophylaxis:** Please refer to the "Venous Thromboembolism Prophylaxis (DVT/PE)" Guideline for management.

3. Renal Injuries

A. Non-operative management of kidney injuries can be considered when all the following conditions have been met:
    1. No other indication for exploration
    2. Any grade in a hemodynamically stable patient
B. Consider admitting all grade 4 or higher kidney injuries to the ICU

REFERENCES:

1. Stassen NA, Bhullar I, Cheng JD, Crandall ML, Friese RS, Guillamondegui OD, Jawa RS, Maung AA, Rohs Jr TJ, Sangosanya A, Schuster KM. Selective nonoperative management of blunt splenic injury: an Eastern Association for the Surgery of Trauma practice management guideline. Journal of Trauma and Acute Care Surgery. 2012 Nov 1;73(5):S294-300.
2. Kozar RA, Crandall M, Shanmuganathan K, Zarzaur BL, Coburn M, Cribari C, Kaups K, Schuster K, Tominaga GT; AAST Patient Assessment Committee. Organ injury scaling 2018 update: Spleen, liver, and kidney. J Trauma Acute Care Surg. 2018 Dec;85(6):1119-1122.

3. Crichton JCI, Naidoo K, Yet B, Brundage SI, Perkins Z. The role of splenic angioembolization as an adjunct to nonoperative management of blunt splenic injuries: A systematic review and meta-analysis. J Trauma Acute Care Surg. 2017 Nov;83(5):934-943.
4. Chehab M, Afaneh A, Bible L, Castanon L, Hanna K, Ditillo M, Khurrum M, Asmar S, Joseph B. Angioembolization in intra-abdominal solid organ injury: Does delay in angioembolization affect outcomes? J Trauma Acute Care Surg. 2020 Oct;89(4):723-729.
5. Scarborough JE, Ingraham AM, Liepert AE, Jung HS, O'Rourke AP, Agarwal SK. Nonoperative Management Is as Effective as Immediate Splenectomy for Adult Patients with High-Grade Blunt Splenic Injury. J Am Coll Surg. 2016 Aug;223(2):249-58.
6. Aoki M, Onogawa A, Matsumoto S, Matsushima K. Recent trends in the management of isolated high-grade splenic injuries: A nationwide analysis. J Trauma Acute Care Surg. 2023 Feb 1;94(2):220-225.
7. Schellenberg M, Ball CG, Owattanapanich N, Emigh B, Murphy PB, Moffat B, Mador B, Beckett A, Lee J, Joos E, Minor S, Strickland M, Inaba K; TAC Bile Leaks Study Group. Diagnosis and management of bile leaks after severe liver injury: A Trauma Association of Canada multicenter study. J Trauma Acute Care Surg. 2022 Dec 1;93(6):813-820.
8. Radding S, Harfouche MN, Dhillon NK, Ko A, Hawley KL, Kundi R, Maddox JS, Radowsky JS, DuBose JJ, Feliciano DV, Kozar RA, Scalea TM. A pseudo-dilemma: are we over-diagnosing and over-treating traumatic splenic intraparenchymal pseudoaneurysms? J Trauma Acute Care Surg. 2023 Aug 21.