

**5. INTRA-ABDOMINAL INJURIES**  
**A. Solid Organ Injuries**

**OBJECTIVE:** Define therapeutic guidelines for the non-operative management of solid organ injuries (SOI)

This guideline does not take into account concomitant injuries.

Patients with ongoing hemodynamic instability despite resuscitation and concern for hemorrhage for solid organ or intraabdominal injury as the source of that instability, i.e., free fluid on FAST, SOI, or hemoperitoneum on CT should be rapidly triaged to the operating room for laparotomy.

All patients with peritonitis on physical exam should receive prompt surgical exploration (laparotomy or laparoscopy) regardless of hemodynamic status or injury grade.

**Therapeutic Anticoagulation and Antiplatelet Agents:**

For SOI patients taking pre-injury therapeutic anticoagulation,

Grade 1 and 2 SOI – consider reversal of anticoagulation

Grade 3-5 SOI – recommend reversal of therapeutic anticoagulation.

Routine administration of platelets or DDAVP for patients on antiplatelet agents is not recommended; however, it may be considered in patients requiring blood transfusion.

**VTE Prophylaxis:**

**See SOI section of VTE prophylaxis guideline.**

**Repeat Imaging for Delayed Vascular Malformation, Age  $\geq 18$ :**

Patients treated with angioembolization or with grade 1 or 2 injuries do not require routine further imaging.

Grade 3 SOI - repeat imaging at the discretion of the Attending Trauma Surgeon.

Grade 4 and 5 - routine repeat imaging on hospital day 4 is recommended.

Recommend CTA with arterial and delayed venous phase as the imaging modality of choice.

**Activity Restriction:**

Patients should refrain from strenuous physical activity, physical education class, and contact sports for the AAST Grade of the Injury + 2 weeks. For example, a patient with a grade 2 liver injury should be restricted for 4 weeks (2+2).

**Follow Up:**

Patients with Grade 1 and 2 injuries can follow up on an as needed basis

Patients with Grade 3 and above injuries should follow up in 2 weeks with a CBC and BMP for kidney injuries and hepatic function panel for liver injuries prior to the appointment.

**Vaccination:**

Only patients who undergo splenectomy require vaccination for encapsulated organisms.

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**Special Populations:**

Consideration for earlier intervention, operative, or angiographic should be given to patients who:

- Decline blood transfusion.
- Geriatric patients, as the failure rate of nonoperative management is higher in older patients.

**Patients < 18 Years of Age with Blunt Liver/Spleen Injury**

**Updated APSA Blunt Liver/Spleen Injury Guidelines**

**Admission**

- **ICU Admission Indicators**
  - Abnormal vital signs after initial volume resuscitation
- **ICU**
  - Activity - Bedrest until vitals normal
  - Labs – q6hour CBC until vitals normal
  - Diet – NPO until vital signs normal and hemoglobin stable
- **Ward**
  - Activity - No restrictions
  - Labs - CBC on admission and/or 6 hours after injury
  - Diet – Regular diet

**Procedures**

- **Transfusion**
  - Unstable vitals after 20 mL/kg bolus of isotonic IVF
  - Hemoglobin < 7
  - Signs of ongoing or recent bleeding
- **Angioembolization or Operative Exploration**
  - Signs of ongoing bleeding despite pRBC transfusion
  - Angioembolization is not indicated for contrast blush on admission CT without unstable vitals
  - Operative exploration may be indicated when additional procedures or information needed

**Set Free**

- Based on clinical condition **NOT** injury severity (grade)
- Tolerating a diet
- Minimal abdominal pain
- Normal vital signs

**Aftercare**

- **Activity Restriction**
  - Restricting activity to grade plus 2 weeks is safe
  - Shorter restrictions may be safe but there is inadequate data to support decreasing these recommendations
- **Follow up Imaging**
  - Routine imaging is not indicated in asymptomatic patients with low grade injuries
  - Consider imaging for **symptomatic** patients with prior high grade injuries

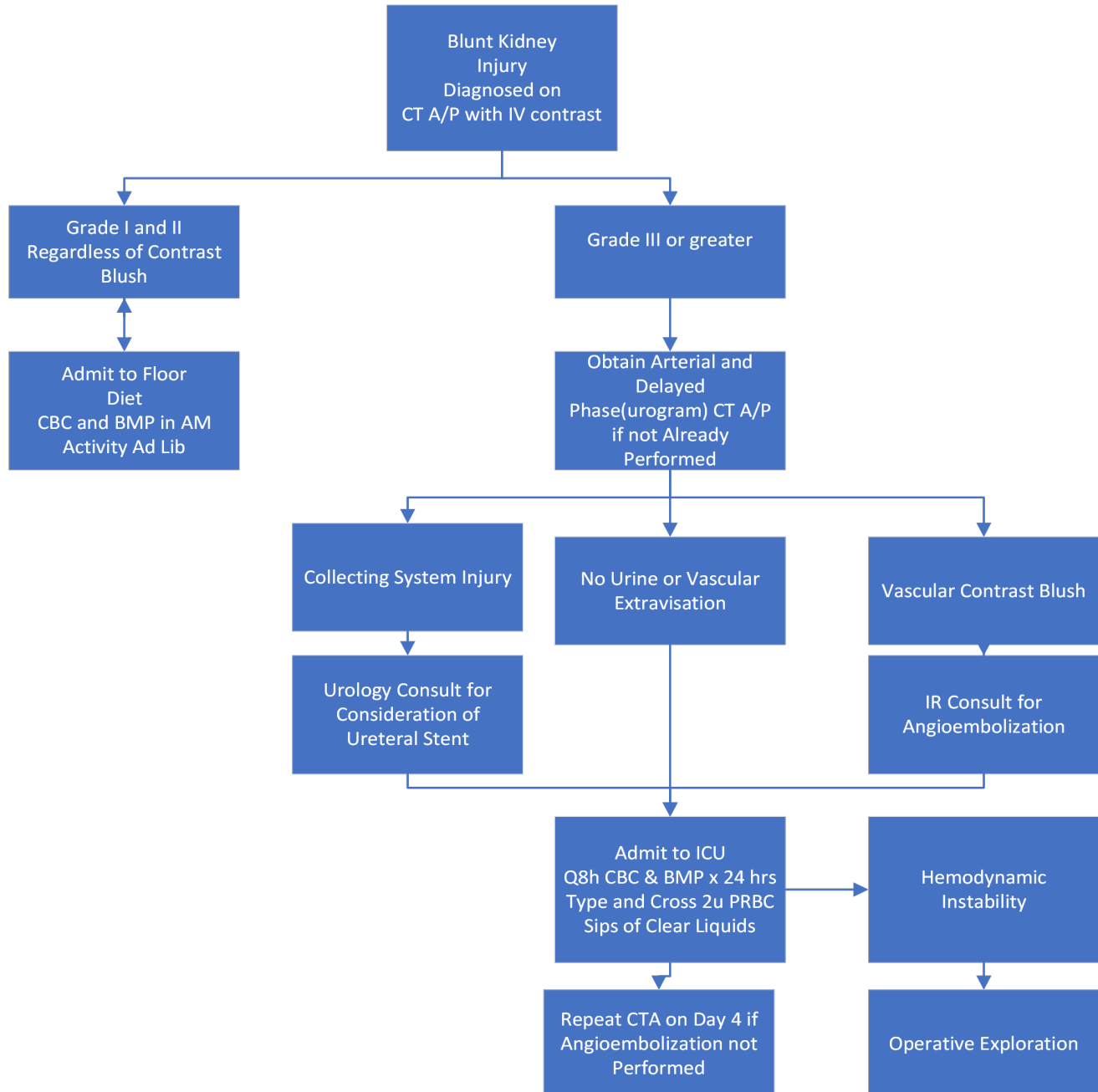
**References**

1. Williams RF, Grewal H, Jamshidi R, Naik-Mathuria B, Price M, Russell RT, Vogel A, Notrica DM, Stylianou S, Petty J. Updated APSA Guidelines for the Management of Blunt Liver and Spleen Injuries. J Pediatr Surg. 2023 Aug;58(8):1411-1418. doi: 10.1016/j.jpedsurg.2023.03.012. Epub 2023 Mar 23. PMID: 37117078.



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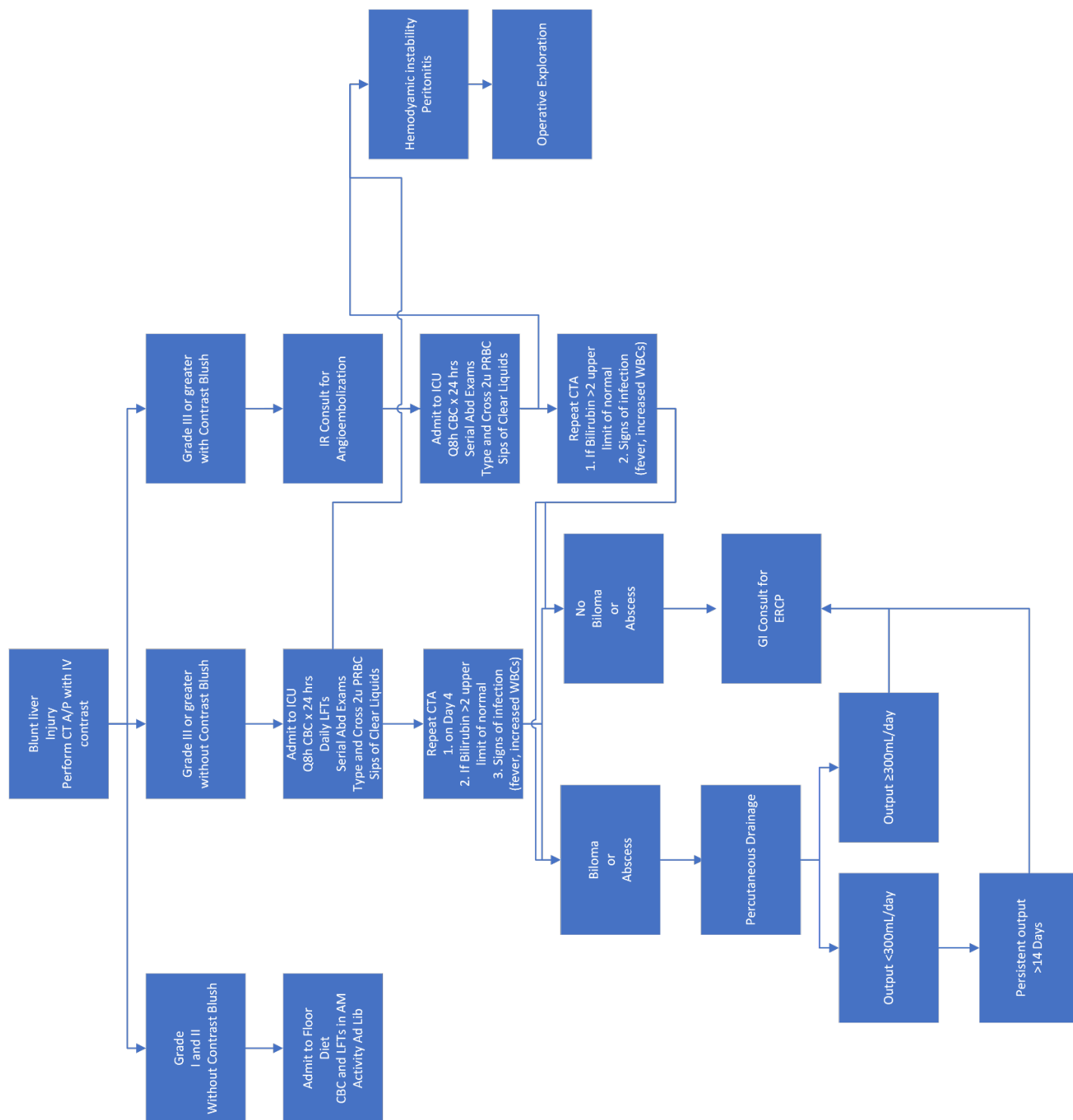
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**AAST Kidney Injury Scale (2018 revision)**

|           |                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grade I   | Subcapsular hematoma and/or parenchymal contusion without laceration                                                                                                                                                                                                                                                                                                                       |
| Grade II  | Perirenal hematoma confined to Gerota fascia<br>Parenchymal laceration $\leq 1$ cm depth without urinary extravasation                                                                                                                                                                                                                                                                     |
| Grade III | Parenchymal laceration $> 1$ cm depth without collecting system rupture or urinary extravasation<br>Any injury in the presence of a kidney vascular injury or active bleeding contained within Gerota fascia                                                                                                                                                                               |
| Grade IV  | Parenchymal laceration extending into urinary collecting system with urinary extravasation.<br>Renal pelvis laceration and/or complete ureteropelvic disruption.<br>Segmental renal vein or artery injury.<br>Active bleeding beyond Gerota fascia into the retroperitoneum or peritoneum.<br>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.<br>Devascularized kidney with active bleeding.<br>Shattered kidney with loss of identifiable parenchymal renal anatomy.                                                                                                                                                                                                         |

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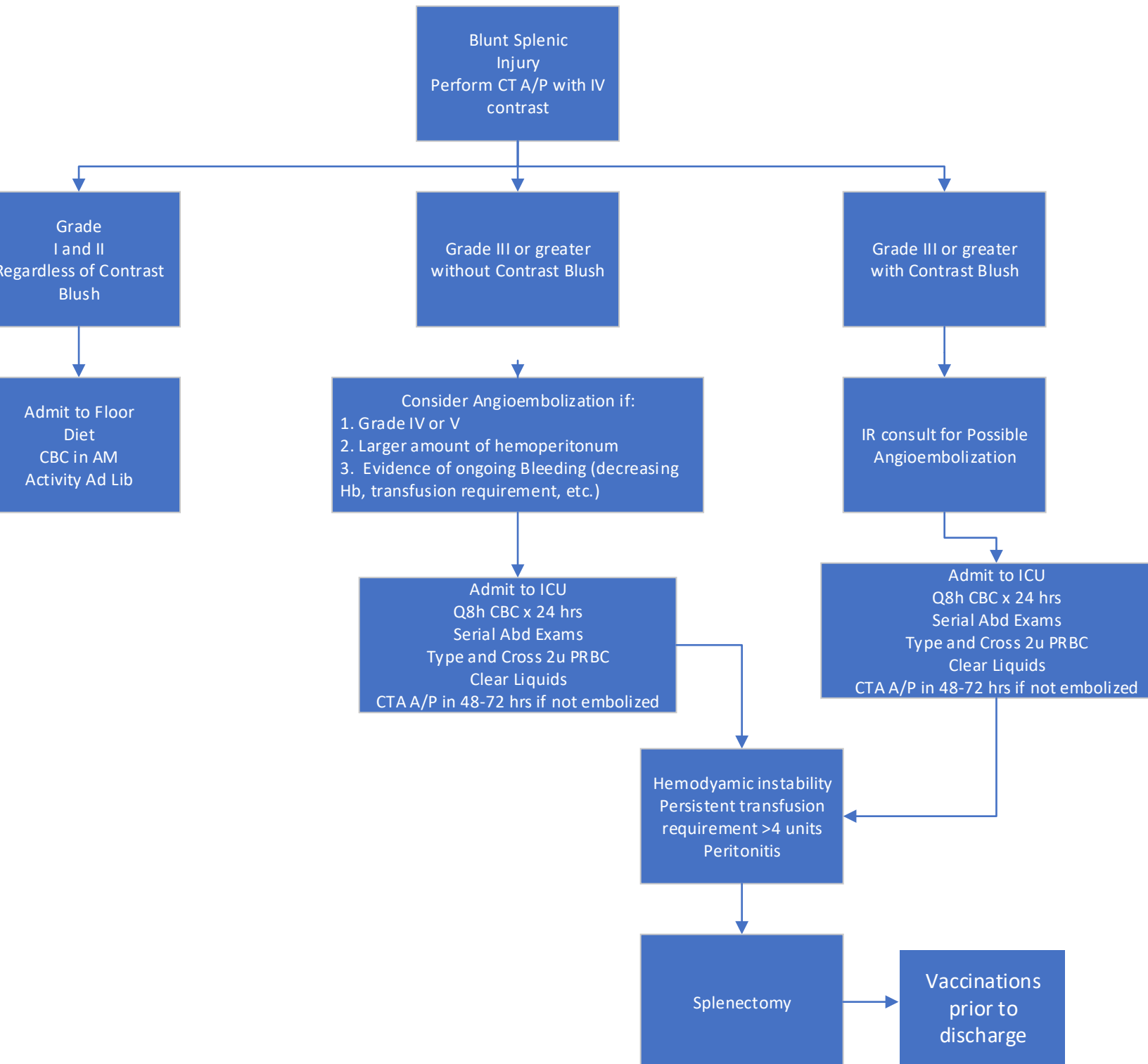
**5. INTRA-ABDOMINAL INJURIES**  
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**AAST Liver Injury Scale (2018 revision)**

|           |                                                                                                                                                                                                                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grade I   | Subcapsular hematoma < 10% surface area.<br>Parenchymal laceration < 1 cm in depth.                                                                                                                                                                                                                    |
| Grade II  | Subcapsular hematoma 10-50% surface area.<br>Intraparenchymal hematoma < 10 cm in diameter.<br>Parenchymal laceration 1-3 cm in depth and ≤ 10 cm length.                                                                                                                                              |
| Grade III | Subcapsular hematoma > 50% surface area or expanding.<br>Ruptured subcapsular or parenchymal hematoma.<br>Intraparenchymal hematoma > 10 cm.<br>Parenchymal laceration > 3 cm in depth.<br>Any injury in the presence of a liver vascular injury or active bleeding contained within liver parenchyma. |
| Grade IV  | Parenchymal disruption involving 25-75% of a hepatic lobe.<br>Active bleeding extending beyond the liver parenchyma into the peritoneum.                                                                                                                                                               |
| Grade V   | Parenchymal disruption involving > 75% of hepatic lobe.<br>Juxtahepatic venous injuries to include retrohepatic vena cava and/or central major hepatic veins.                                                                                                                                          |



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**AAST Splenic Injury Scale (2018 revision)**

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

Approved Date: 04/30/2013

Last Revised 12/20/2023

Date:

To be Reviewed: 12/2026