

DEPARTMENT (DIVISION): Trauma
TITLE: Management of Abdominal Solid Organ Injuries

PURPOSE

The vast majority of pediatric abdominal injuries are due to blunt trauma. The spleen and liver are the two most commonly injured organs in pediatric patients sustaining blunt abdominal trauma, and a majority can be managed with a non-operative approach. Early recognition and standardized management are associated with excellent outcomes. The following guideline has been established to facilitate standardized, evidenced-based management of the physiologically stable pediatric trauma patient with an isolated abdominal solid organ injury.

POLICY

To provide a guideline for care of the pediatric patient sustaining injuries to abdominal solid organs.

DEFINITIONS

Spleen Injury: The spleen is the most commonly injured abdominal organ in children. Injured patients may demonstrate left upper quadrant pain, left shoulder pain (“Kehr’s sign”), abdominal distention, and ecchymoses/abrasions to the left upper quadrant.

- Criteria for staging splenic injury (based on American Association for the Surgery of Trauma (AAST) splenic injury scale):
 1. Grade I: subcapsular hematoma of less than 10% of surface area or capsular tear of less than 1cm in depth)
 2. Grade II: subcapsular hematoma of 10-50% of surface area, intraparenchymal hematoma of less than 5cm in diameter, or laceration of 1-3 cm in depth and not involving trabecular vessels
 3. Grade III: subcapsular hematoma of more than 50% of surface area or expanding and ruptured subcapsular or parenchymal hematoma, intraparenchymal hematoma of more than 5cm or expanding, or laceration of more than 3 cm in depth or involving trabecular vessels
 4. Grade IV: laceration of segmental or hilar vessels with devascularization of more than 25% of the spleen
 5. Grade V: shattered spleen or hilar vascular injury

Liver Injury: The liver is the second most commonly injured intra-abdominal organ. The right lobe is injured slightly more frequently than the left. Patients who sustain an injury to the liver frequently complain of abdominal pain and right shoulder pain. Elevated transaminases are highly suggestive of a liver injury.

- Criteria for staging liver injuries (based on AAST liver injury scale):
 1. Grade I: subcapsular non-expanding hematoma of less than 10% of surface area or capsular tear of less than 1cm in depth parenchymal disruption.
 2. Grade II: subcapsular non-expanding hematoma of 10-50% of surface area, intraparenchymal non-expanding hematoma of less than 2cm in diameter, or laceration of less than 3 cm in parenchymal depth and <10 cm in length.
 3. Grade III: subcapsular hematoma of more than 50% of surface area or expanding and ruptured subcapsular or parenchymal hematoma, intraparenchymal hematoma with active bleeding, or laceration of more than 3 cm in parenchymal depth.
 4. Grade IV: ruptured central hematoma or parenchymal destruction involving 25%-75% of hepatic lobe
 5. Grade V: parenchymal destruction >75% of hepatic lobe or juxtahepatic venous injuries (retrohepatic cava/major hepatic veins)
 6. Grade VI: hepatic avulsion

PROCEDURE

- 1) All trauma patients with blunt abdominal injury should have a thorough physical examination. If signs or symptoms are suggestive of intra-abdominal injury and patient is hemodynamically stable, a "CT Abdomen/Pelvis w Contrast" scan should be performed with intravenous contrast.
 - a. Indications for abdominal CT:
 - i. Evidence of abdominal wall injury (ecchymoses, abrasions to abdominal wall)
 - ii. Positive lab screening (In a patient with an equivocal abdominal examination)
 - iii. Lack of reliable abdominal examination (i.e. patient with neurological deficit, absence of a witness/ patient too young to provide information, ETOH, altered mental status)
 - iv. Provider discretion
 - b. Hemodynamically unstable patients are not to be taken to CT scan
 - c. There is limited evidence to support Focused Assessment with Sonography (FAST) exams in pediatric population; Provider discretion advised.
- 2) A baseline hemoglobin & hematocrit (H & H) as well as a type and screen should be obtained.
- 3) Grading (1-5) of the spleen/liver injury by radiologist and surgeon

MANAGEMENT

The plans of care as outlined below are intended to supplement the ongoing assessment and management of injured patient's treating physician. They do not supersede clinical judgment and ought to be adjusted as necessary for the care of an individual patient. Hemodynamic status, rather than CT grade, should guide patient disposition.

The role of interventional radiology in the management of solid organ blunt trauma in children is currently evolving. IR consult will be placed at the discretion of the Trauma surgeon in PTS with ongoing hemorrhage.

Trauma Program Solid Organ Injury Guideline

	Grade I	Grade II	Grade III	Grade IV	Grade V
Admit to	Surgical floor	Surgical floor	Surgical floor	PICU	PICU
Min. Hospital Days	ONE	ONE	TWO	TWO	TWO
Bedrest	24 hrs	24 hrs	24 hrs	48 hrs	48 hrs
Lab Studies	Admission & 4 hrs after ambulation	Admission & 4 hrs after ambulation	Admission & 4 hrs after ambulation	H&H q 8 hrs until stable then q 12 x 24 hrs, then q 24 hrs. Only check post activity if hemodynamically unstable.	H&H q 6 hrs until stable then q 12 x24 hrs, then q 24 hrs if stable. Only check post activity if hemodynamically unstable.
Medications	Tylenol 15meq/kg q 4 hrs prn. Watch maximum dose/kg. Children: 75mg/kg/day with max of 4 Grams/day. Greater than 12 yrs of age: no more than 4Grams/24 hours.	Tylenol 15meq/kg q 4 hrs prn. Watch maximum dose/kg. Children: 75mg/kg/day with max of 4 Grams/day. Greater than 12 yrs of age: no more than 4 Grams/24hrs.	Morphine 0.5-1mg/kg q 2 hrs (Do not exceed 2mg q 2hrs.). Ofirmev (IV Tylenol) 10-15meq/kg q 4 hrs PRN. When taking PO: Tylenol 15mg/kg q 4 hrs PRN. Percocet 1 - 2 tabs q 4 hrs PRN or Lortab per weight every 4 hrs PRN. Colace 50 - 100mg BID(if on narcotics).	Morphine 0.5-1mg/kg q 2 hrs (Do not exceed 2mg q 2 hrs). Ofirmev (IV Tylenol) 10-15meq/kg q 4 hrs PRN. When taking PO: Tylenol 15mg/kg q 4 hrs PRN. Percocet 1-2 tabs q 4 hrs PRN or Lortab per weight. Colace 50-100mg BID when taking PO(if on narcotics).	Morphine 0.5-1mg/kg q 2 hrs (Do not exceed 2mg q 2 hrs). Ofirmev (IV Tylenol) 10-15meq/kg q 4 hrs. When taking PO: Tylenol 15mg/kg q 4 hrs. PRN. Percocet 1-2 tabs q 4 hrs PRN or Lortab per weight. Colace 50-100mg BID when taking PO(if on narcotics).
Treatments	Maintenance IV fluids, Incentive spirometry q 2hrs. Sequential compression stockings if on bedrest.	Maintenance IV fluids, Incentive spirometry q 2 hrs. Sequential compression stockings if on bedrest.	Maintenance IV fluids, Incentive spirometry q 2 hrs Continuous pulse oximetry. Sequential compression stockings if on bedrest. Consider PICC Continuous CR monitor	Maintenance plus 1/2 IV fluids as indicated, NG to LCS as indicated, Foley as indicated, Incentive spirometry q 2 hrs. Sequential compression stockings if on bedrest. Consider PICC	Maintenance plus 1/2 IV fluids as indicated, NG to LCS as indicated, Foley as indicated, Continuous CR monitor, Incentive spirometry q 2 hrs. Sequential compression stockings if on bedrest. Consider PICC
Nutrition	Clears to regular	Clears to regular	Clears to regular	NPO for first 24 hrs	NPO for first 24 hrs
Psychosocial	STEPP assessment Child Life Chaplain PRN SBI if over 13 yrs	STEPP assessment Child Life Chaplain PRN SBI if over 13 yrs	STEPP assessment Child Life Chaplain PRN SBI if over 13 yrs	STEPP assessment Child Life Chaplain PRN SBI if over 13 yrs	STEPP assessment Child Life Chaplain PRN SBI if over 13 yrs
Consults	CARE PRNRehab Med PRN	CARE PRNRehab Med PRN	CARE PRN, Rehab Med PRNPT/OTPsych PRN	CARE PRNRehab Med PRNPT/OTPsych PRNGI/TPN PRNIV team: PICCPain Team PRN	CARE PRNRehab Med PRNPT/OTPsych PRNGI/TPN PRNIV team: PICCPain Team PRN
Discharge Criteria	Hemodynamic stability	Hemodynamic stability	Hemodynamic stability	Hemodynamic stability	Hemodynamic stability

Discharge Instructions	Restricted activity x 2 weeks. Return to play may take longer. Trauma or Surgery clinic 2 weeks. Review appropriate discharge instructions per age.	Restricted activity x 3 weeks. Return to play may take longer. Trauma or Surgery clinic 2 weeks. Review appropriate discharge instructions per age.	Restricted activity x 5 weeks. Return to play may take longer. Trauma or Surgery clinic 2 weeks. Review appropriate discharge instructions per age.	Restricted activity x 6 weeks. Return to play may take longer. Trauma or Surgery clinic 2 weeks. Review appropriate discharge instructions per age.	Restricted activity x 6 - 8 weeks. Return to play may take longer. Trauma or Surgery clinic 2 weeks. Review appropriate discharge instructions per age.
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NOTE: Consider transfusion for hemoglobin < 7. If transfused, reset bedrest at zero and start again.

References:

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