

Title: PEDIATRIC NONOPERATIVE MANAGEMENT (NOM) OF BLUNT INJURY TO LIVER AND SPLEEN

Scope:

1. Condition: Isolated liver and/or spleen lacerations from blunt abdominal trauma
2. Guideline category: Non-operative treatment
3. Guideline objective: To provide consistency in non-operative management of isolated solid organ injuries.
4. Target population: Children with blunt abdominal trauma

Policy Statement:

This is an evaluation and management guideline. It was adapted from the professional literature searches of peer-reviewed medical journal. The major applicable articles are identified in Attachment B.

Special Instructions:

1. Please refer to Organ Grading System for Trauma (Attachment A).

Procedure:

I. Identify CT Grade (American Association for Surgery of Trauma (AAST) organ severity scale).

II. Follow treatment recommendation in table below:

Treatment	CT Grade (AAST organ injury severity scale)					
	I	II	III	IV	V	VI
ICU Stay	If hemodynamically unstable					
Hemogram monitoring	Q8 hours until plateau					
OOB to chair & bathroom	When pain free					
Hospital stay (post-injury day)*	1	2	3	4		
Activity restriction (wk)**	3	4	5	6		
Follow-up visit (wk)	3	4	4	4		

- A. * Consider early discharge if hemodynamically stable, tolerating diet and without abdominal pain.
- B. Follow-up imaging of affected organ prior to discharge.
- C. ** Return to school and normal childhood activities at time of discharge if no longer require narcotic pain medication. Avoid gym class, rough play and contact sports until cleared at follow up visit. If desire return to full-contact, competitive sports then schedule 4 – 8 week follow up with imaging (abdominal CT or US) (Follow-up imaging to document healing of the liver and spleen is controversial,

	and no formal recommendations for routine follow-up imaging exists. APSA does not support routine post-injury imaging.) D. Limit narcotic prescription to maximum of 5 to 7 days to be taken with stool softener.
	Attachments: Attachment A: Organ Grading System for Trauma Attachment B: Articles Reviewed
	Point of Contact: Pediatric Trauma Program Manager 403-4417
Approval By: MB Pediatric Trauma Multidisciplinary Committee MB Pediatric General Surgery Committee	Date of Approval: 5/11; 3/14 5/11; 3/14
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ORGAN GRADING SYSTEM FOR TRAUMA

GRADE	SPLEEN	LIVER	KIDNEY	PANCREAS
I	Hematoma: <10% surface area subcapsular, non-expanding (2) Laceration: Capsular tear <1 cm deep, non-bleeding (2)	Hematoma: <10% surface area subcapsular, non-expanding (2) Laceration: Capsular tear <1 cm deep, non-bleeding (2)	Contusion: Microscopic or gross hematuria with normal urologic studies (2) Hematoma: Subcapsular, non-expanding hematoma without parenchymal laceration (2)	Hematoma: minor contusion without duct injury (2) Laceration: Superficial laceration without duct injury (2)
II	Hematoma: 10-50% subcapsular surface area; <1 cm intraparenchymal hematoma (2) Laceration: Capsular tear 1-3 cm deep without trabecular vessel involvement; active bleeding (3)	Hematoma: 10-50% subcapsular surface area; <1 cm intraparenchymal hematoma (2) Laceration: Capsular tear 1-3 cm deep without trabecular vessel involvement; active bleeding (3)	Hematoma: non-expanding perirenal hematoma confined to retroperitoneum (2) Laceration: <1.0cm deep without collecting system rupture or urinary extravasation (2)	Hematoma: Major contusion without duct injury or tissue loss (2) Laceration: Major laceration without duct injury or tissue loss (2)
III	Hematoma: >50% expanding subcapsular, ruptured subcapsular hematoma with active bleeding; intraparenchymal hematoma > or = 2 cm or expanding (3) Laceration: >3 cm deep or involving trabecular vessels (3)	Hematoma: >50% expanding subcapsular, ruptured subcapsular hematoma with active bleeding; intraparenchymal hematoma > or = 2 cm or expanding (3) Laceration: >3 cm deep (3)	Laceration: >1 cm deep without collecting system rupture or urinary extravasation (3)	Laceration: Distal transection or parenchymal injury with duct injury (3)
IV	Hematoma: Ruptured parenchyma with active bleeding (4) Laceration: hilar vessel with major (>25%) devascularization (4)	Hematoma: Ruptured parenchyma with active bleeding (4) Laceration: 25-50% hepatic lobe parenchymal disruption (4)	Laceration: Laceration extending through the cortex, medulla and collecting system (4) Vascular: Main arterial or venous injury with contained hemorrhage (4)	Laceration: proximal (to the right of the SMV) transection or parenchymal injury involving the papilla (4)
V	Laceration: Completely shattered spleen (5) Vascular: Hilar vascular injury with total devascularization (5)	Laceration: >50% hepatic lobe parenchymal disruption (5) Vascular: Retrohepatic vena cava/juxtahepatic venous injuries (5)	Laceration: Completely shattered kidney (5) Vascular: Avulsion of renal hilum with devascularized kidney (5)	Laceration: Massive disruption of the pancreatic head (5)
VI		Vascular: Hepatic avulsion (4)		

**Attachment B
Articles Reviewed**

	Year	Reference Title	Class	Conclusion
Gilstrap (Abstract)	2008	Duration of Hospital stay in Pediatric Blunt Spleen and/or Liver Injuries: Can APSA Mandated Guidelines for Length of In-Patient Stay be Safely Reduced (Children's Hospital of WI)	Retrospec. 180 pts 33% Grade II 31% Grade III 22% Grade IV+	Patient's with grade I, II or III injuries are at low risk for ongoing hemodynamically significant hemorrhage. Guidelines may be safely abbreviated in a select group of patients.
McVay	2008	Throwing out the Grade Book: Management of Isolated Spleen and Liver Injury Based on Hemodynamic Status (Arkansas Children's)	Prospective 51 liver, 50 spleen (41 grade III-IV)	Isolated blunt spleen and liver injuries, regardless of grade, can be safely managed using a pathway based on hemodynamic status, resulting in decreased LOS and resource use compared to current guidelines. Patients can be safely discharged if hematocrit stable (>21), tolerating diet and without abdominal pain. May resume normal everyday activities with exception to gym class and contact sports. Patients can safely resume full activity after radiographic evidence of healing.
Shawn	2007	Justification for an abbreviated protocol in the management of blunt spleen and liver injury in children (Children's Mercy, Kansas)	Retrospec. 243 pts Mean Grade 2 ±1.1	An abbreviated trauma protocol with overnight bed rest for grades I and 2 injuries and 2 nights for higher grades can be safely used.

Fata	2005	A Survey of EAST member Practices in Blunt Splenic Injury: A Description of Current Trends and Opportunities for Improvement		<p>Majority of respondents allowed patients to return to light activity (housework, office work or low impact aerobics) within two weeks if they had sustained a low grade injury, and return to full activity within six weeks of the injury. For Grade III, 29.6 % allow light activity at two weeks and two-thirds allow light activity within four weeks to two months.</p> <p>Return to strenuous and full activity showed considerable variation with half allowing patients to return to full activities within two to three months of the injury for grades III, IV and V while a large proportion restricted activities for a period over four to six months. With the higher injury grades there was an increasing reliance on post-discharge CTs for decision-making.</p> <p>Strenuous activity (running, lifting over twenty pounds, construction work or manual labor) grades I and II, 74% chose to restrict strenuous activity until 6 weeks. For grade III or higher results were equally divided between return within six weeks and two to three months timeframe. For grades IV and V, 16.9 would advise strenuous activity restriction for longer than three months</p>
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Leinwand	2004	Application of the APSA Evidence-Based Guidelines for Isolated Liver or Spleen Injuries: A Single Institution Experience	Prospective	Application of an APSA based CPG resulted in decreased length of ICU stay, decreased hospital stay, and decreased resource utilization without effect on outcome. ICU stay may not be necessary for stable patients with isolated grade IV liver or spleen injuries.
EAST Practice Mgmt Guideline Work Group	2003	Practice Management Guidelines for the Nonoperative Management of Blunt Injury to the Liver and Spleen	Level III	There is no evidence that bedrest or restricted activity is necessary or beneficial. Prior to resuming normal activity there should be evidence of healing of the injury.
Stylianos	2002	Compliance with Evidence-Based Guidelines in Children with Isolated Spleen or Liver Injury: A Prospective Study	Prospective	Validated guideline safety
Haan	2003	Protocol-driven Nonoperative Management in Patients with Blunt Splenic Trauma and Minimal Associated injury Decreases Length of Stay	Retrospec. 43 pts, splenic injury only	Protocol-driven management of splenic injury using admission angiography selectively for higher grade splenic injuries led to a decreased length of stay, higher therapeutic yield and decreased use of hospital resources without any increase in the failure rate of nonoperative management.
Rovin	2001	Follow-up Abdominal Computed Tomography After Splenic Trauma in Children May Not be Necessary.		CT evidence of healing for grade III injuries to be 76 ± 7 days for 90% of injuries. 77% of grade IV splenic injuries healed within 81 ± 8 days.

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Mehall, McVey	2001	Prospective Results of a Standardized Algorithm Based on Hemodynamic Status for Managing Pediatric Solid	Prospective	Hemodynamically normal patients with liver or spleen injury were safely managed on the general care unit regardless of their injury grade. Patients who were stable with hematocrit > 21 at 18 hrs post injury and no abdominal
Peitzman	2000	Blunt Splenic Injury in Adults: A Multi-institutional study of the Eastern Association for the surgery of Trauma		Of patients who failed NOM, nearly two-thirds did so within the first 24 hours of admission, and 86% within the first four days
Stylianios & APSA	2000	Evidence-Based Guideline for Resource Utilization in Children With Isolated Spleen or liver injury		
Gandhi	1999	Pediatric Splenic Injury: Pathway to Play		