

Spectrum of Splenic Injury in Polytrauma with Rare Mimickers Leading to Diagnostic Dilemma

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Abstract: Splenic injury is a common occurrence in polytrauma cases, presenting significant diagnostic and management challenges to clinicians. Computed Tomography (CT) remains the gold standard imaging modality for assessing splenic injury due to its high sensitivity and specificity. The presence of intraparenchymal hematoma, laceration, or vascular injury can be accurately identified using CT imaging, aiding in both diagnosis and grading of splenic injury. Moreover, CT allows for the assessment of associated injuries to other organs, which is crucial in the management of polytrauma patients. Spleen is a widely variable organ regarding its size, shape, fissures and position. Some of its variations might form a diagnostic challenge and could result in imaging pitfalls and misinterpreted as a pathological process. [1] Five cases of blunt abdominal trauma are discussed in the below case series focussing on different grades of splenic injury reported at Dr. D Y Patil hospital, Navi Mumbai. It also discusses an important mimicker of splenic laceration which is the "Bi - partite spleen" which is an anatomical variant which may cause diagnostic dilemma in the clinical setting of trauma.

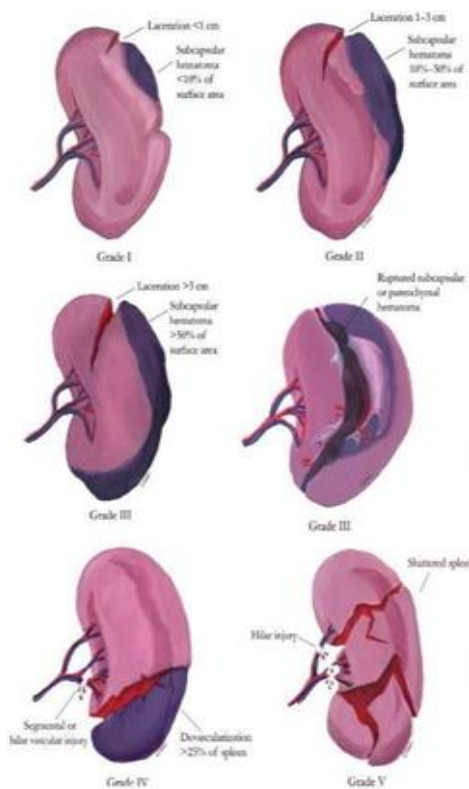
Keywords: Splenic laceration, AAST grading, Bipartite spleen

1. Introduction

Injuries to the spleen are one of the most common injuries in abdominal trauma. The spleen is the most vascular organ in the body. Since bleeding in splenic injuries is mainly arterial, significant haemoperitoneum can occur. Also, bleeding from injuries to the spleen is mainly intraperitoneal. Unrecognized injury can be a cause of preventable traumatic death.

Because of the immunological functions of the spleen, there is a trend toward salvaging the spleen rather than removing it in traumatic cases. The development of CT scans has made conservative management of splenic injuries possible today.

Grading of splenic trauma is done using the AAST (American association for surgery of trauma) guidelines, which classify the injuries in five grades. This grading plays a pivotal role in patient management.



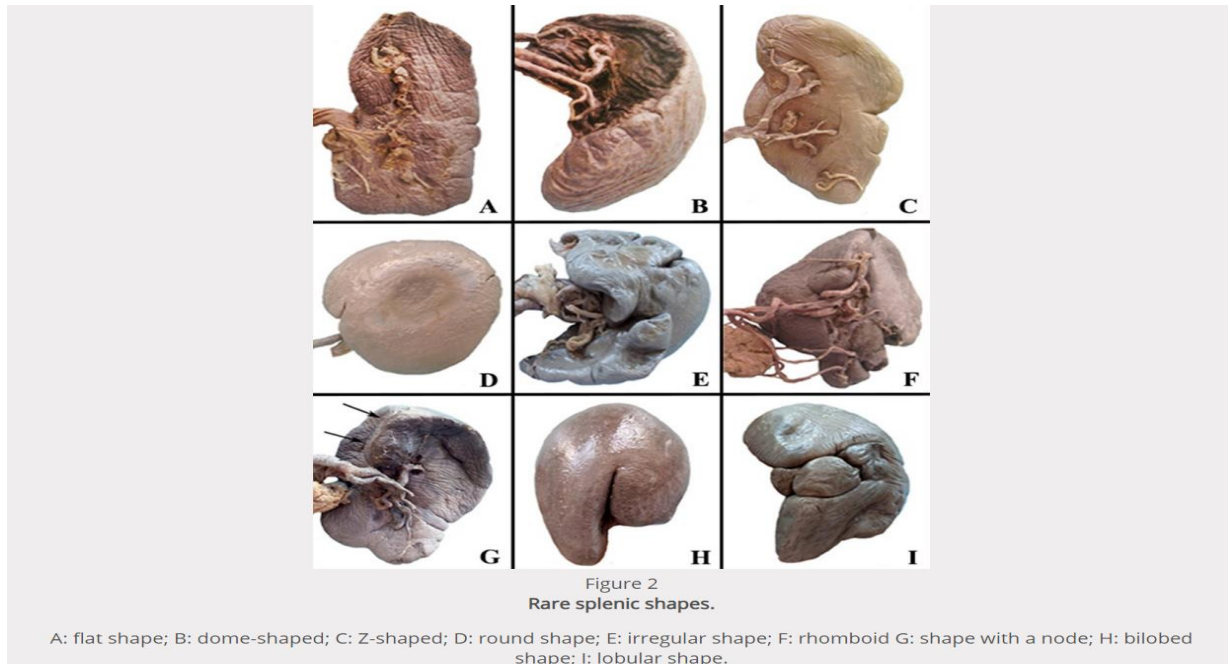
| | | |
|-----|------------|---|
| I | Hematoma | Subcapsular, <10% surface area |
| | Laceration | Capsular tear, <1 cm parenchymal depth |
| II | Hematoma | Subcapsular, 10% to 50% surface area Intraparenchymal, <5 cm in diameter |
| | Laceration | Capsular tear, 1 cm to 3 cm parenchymal depth that does not involve a trabecular vessel |
| III | Hematoma | Subcapsular, >50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma >5 cm or expanding |
| | Laceration | 3 cm parenchymal depth or involving trabecular vessels |
| IV | Laceration | Laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen) |
| V | Laceration | Completely shattered spleen |
| | Vascular | Hilar vascular injury with devascularizes spleen |

Adapted from American Association for the Surgery of Trauma organ injury scale for spleen.

Volume 13 Issue 5, May 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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The spleen has various shapes beyond the classical wedge, triangular and tetrahedral. All of these shapes do not represent a pathological finding but in certain situation may require further analysis and interpretation depending on the imaging technique and experience of the physician. The cadaveric study of 273 human spleens showed 2 bilobed spleens (0.74 % incidence). [3]

2. Case Reports

This report contains a series of 5 cases which presented to the emergency room with history of blunt abdominal trauma. As part of the protocol, eFAST (Focussed abdominal sonography for trauma) and Contrast enhanced CT abdomen were performed.

Case 1:

A 20 year old male presented with history of road traffic accident and was unresponsive on primary examination with hypotension (80/40 mmHg). On serial monitoring, there was further drop in vitals. eFAST revealed moderate hemoperitoneum with splenic laceration. CECT abdomen was performed.



Figure 1: Axial CECT at level of spleen shows multiple large ill defined inter communicating variable sized non enhancing areas noted throughout extending from the capsule upto the splenic hilum with diversions of the splenic

hilum vessels. The splenic parenchyma is shattered with preserved hilar vessels (GRADE 5 AAST injury) with perisplenic fluid.

Case 2:

A 23 year old male presented with history of blunt trauma to abdomen and was delirious on primary examination with hypotension (80/40 mmHg), under influence of alcohol. eFAST revealed moderate fluid with splenic laceration.



Figure 2: Axial CECT at level of spleen shows Multiple intercommunicating hypodense non enhancing areas throughout extending from the capsule upto the splenic hilum with devascularization of approximately 70 - 75% splenic parenchyma suggestive of splenic hematoma/laceration (GRADE IV AAST injury). Mild perisplenic fluid is seen.

Case 3:

A 32 year old female presented to the casualty with history of fall from bike. She was responsive on primary assessment with severe tenderness over left hypochondrium. On eFAST, it revealed mild fluid in the abdomen with ? splenic laceration. CECT abdomen revealed:

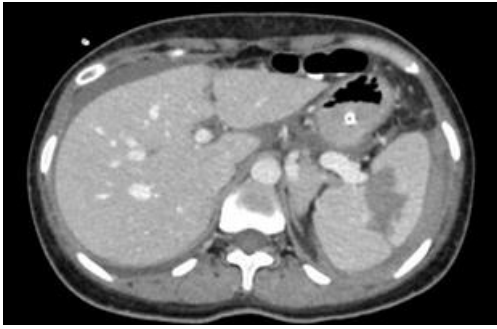


Figure 3: Axial CECT at level of spleen shows Large hypodense non enhancing area (>4 cm) extending from capsule to hilum involving 20 - 30% splenic parenchyma with intact hilar vasculature and subcapsular hematoma. (Grade III AAST Injury).

Mild perisplenic free fluid is seen.

Case 4:

A 35 year old male presented to the casualty with history of RTA. He was responsive on primary assessment with severe tenderness over left hypochondrium. On eFAST, it revealed moderate to gross amount of fluid in the abdomen, peri-hepatic and perisplenic region with splenic laceration and liver laceration. CECT abdomen revealed:



Figure 4: Axial CECT at level of spleen shows few thin linear non enhancing areas extending from capsule to maximum depth of 2 cm with peri - splenic collection. Vasculature remain intact. (Grade 2 AAST injury).

Grade 4 liver laceration with subcapsular and peri - hepatic collection.

Case 5:

A 31 year old male presented with blunt abdominal trauma following a RTA 3 hours ago. On examination, he was responsive with severe generalised tenderness all over the abdomen, however the vitals were stable (130/90 mmHg) and a GCS of 15/15.

eFAST revealed moderate to gross amount fluid with echoes in the abdomen and peri - splenic region communicating via the left para - colic gutter. The spleen showed a full thickness loss of continuity along its mid aspect with smooth margins raising a suspicion of splenic laceration/ shattered spleen.

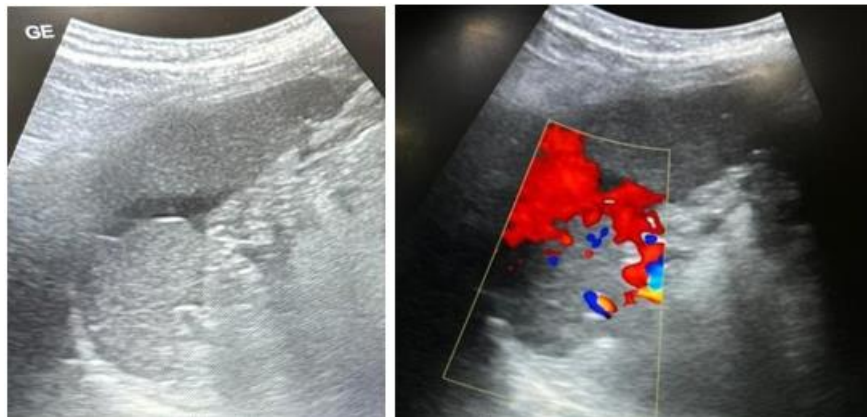


Figure 5: Ultrasound of Spleen showing an echolucent band through it which was suspicious of laceration.

However, on CECT abdomen, the spleen appears to be divided into two unequal parts with smooth margins on axial images. Both these portions show equal degree of enhancement. It is surrounded by small amount of free fluid. However, on sagittal and coronal reformatted images, there is a small bridging tissue connecting the two lobes, suggestive of bilobed/ bi - partite spleen.

This was subsequently confirmed on laparotomy with proximal ileal perforation being the cause of peritoneal free fluid with internal debris. No hemoperitoneum was found.



Figure 6: Axial view of CEC at level of spleen shows it divided into two parts with equal enhancement and minimal

free fluid around it

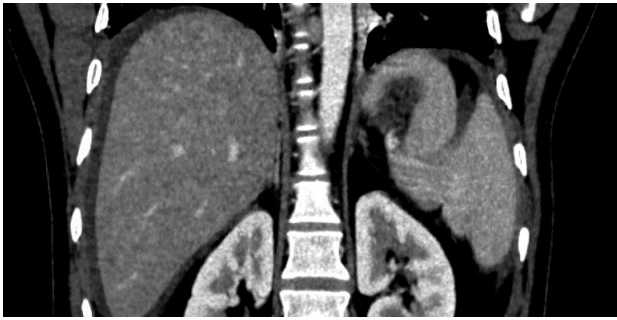


Figure 7: Coronal view of CECT at level of spleen shows it divided into two parts with equal enhancement, bridging tissue (arrow) and minimal free fluid around it.

3. Discussion

AAST scoring of splenic injuries act as a baseline and eliminate the need for diagnostic laparotomy in patients with abdominal trauma, thereby significantly reducing the morbidity and other post operative complications.

Most splenic injuries in haemodynamically - stable patients are treated non - surgically. Splenic artery embolization plays a major role in treating high - grade splenic injuries (both in haemodynamically - stable and - unstable patients). Surgical excision is usually preferred in AAST grade 4 onwards; however it varies from institute to institute.

A bilobed spleen is a rare congenital malformation which should be considered distinct from other known splenic anomalies. As depicted in case 5, it can potentially mimic a high grade splenic injury in the clinical setting of trauma with other secondary findings on bedside eFAST. It is absolutely essential to further evaluate with a contrast enhanced CT to confirm the finding and rule out these rare congenital anomalies.

4. Conclusion

This paper highlights the importance of being aware of the rare congenital malformation in which the spleen appears bilobed or deeply fissured, which can mimic a serious splenic injury on imaging studies. However, careful observation of the coronal and sagittal reformations on CECT images will reveal the connection between the two lobes (as in our case). In addition, the smooth and regular margins of the divided spleen will also help in excluding serious splenic injury (On Ultrasound as well as CECT imaging).

In our literature search, we did not come across any case report of bilobed spleen masquerading as splenic laceration in abdominal trauma imaging.

Grading of splenic injuries in a case of blunt abdominal trauma is essential to plan the further clinical and surgical management. Because of the immunological functions of the spleen, there is a trend towards salvaging the spleen rather than removing it in traumatic cases.

As AAST grading plays a major role in patient management, the knowledge and awareness about potential mimickers is an

absolute necessity.

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