

Non-operative management of blunt splenic trauma

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DEDICATION

**To my family;
my Wife and my daughters
they are my gift from allah**

Abstract

The spleen is one of the most frequently injured organs in blunt abdominal trauma. Motor vehicle accidents are the leading cause of injury to the spleen with pedestrian , bicycle accidents, falls and blunt trauma induced by physical assaults or sports [eg; boxing] as additional common causes.

The patient with blunt splenic trauma can present in many ways. The clinical signs and symptoms vary widely. Some patients are asymptomatic and others present in extremis.

The introduction and increased availability of new imaging modalities have made the diagnostic process easier. Imaging helps to resolve the uncertainties of diagnosis based on physical signs and clinical judgment.

Key Words :

Blood pressure – Antroposterior – Laparoscopy .

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List of abbreviations

abbreviation	The complete name
(ABCDE)	Airway, Breathing, Circulation, Disability, Exposure
AAST	American association for the surgery trauma
ACS	American collages of surgeons
ACTH	Adrenocorticotrophic Hormone
AIS	Abbreviated Injury Scale
ALS	advanced life support
AMPLE	Allergies, Medication, Past illnesses, Last meal, Events and Environment
AP	Anteroposterior
ATLS	Advanced trauma life support
BP	Blood pressure
C/S	Cervical spine
CO₂	Carbon dioxide
CT	Computed tomography
DPL	Diagnostic peritoneal lavage
ED	emergency department
FAST	Focused abdominal sonography for trauma
FUSG	Focused abdominal sonogram for trauma
g/day	grams per day
GCS	Glasgow coma scale
IV	Intravenous
IVU	intravenous urogram
kcal/g	kilocalories per gram
LP	Laparoscopy
MRI	Magnetic resonance imaging
MVCs	Motor vehicle crashes
OPSI	overwhelming postsplenectomy infection
OPSS	overwhelming post-splenectomy sepsis syndrome

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Introduction

Blunt abdominal trauma is more frequently encountered in the emergency department than penetrating one, usually result from motor vehicle collision (**Hoyt D.B et al., 2001**). Blunt trauma to the abdomen can cause severe injury especially to solid abdominal organs (**Hann et al., 2005**). The liver and the spleen are the most frequently injured organs, small and large intestines are the next most injured organs (**Salomone et al., 2001**).

Clinical presentation of splenic injuries:

1 -fatal type:

Hemorrhage is so massive that the patient is severely shocked with rapid death occurring before any surgical intervention.

2- classical type : the commonest presentation.

general manifestations of internal hemorrhage with increase pallor, rapid weak pulse, low blood pressure and air hunger due to O_2 lack.

- Abdominal examination show tenderness and rigidity in the left hypochondrium.
- Special signs may be present:
- Balance's sign: shifting dullness on the right side and fixed dullness on the left side.
- Kehr's sign: referred pain to the left shoulder.
- Cullen's sign: Brownish or bluish discoloration around the umbilicus.

3- Delayed type : initial shock followed by a long lucid interval which may be few days or weeks. The patient presents with the picture of internal hemorrhage this delay may be due to

- The formation of subcapsular haematoma which may rupture later.

- The greater omentum seals the region of the spleen from the peritoneal cavity and then retracts releasing blood.
- A clot may form to block the tear and stop bleeding and later dislodge when the blood pressure rises or digested by enzymes from the injured pancreas. (**Andrew B. Peitzman et al ., 2002**).

Radiological grades of splenic injuries.

Grade I	Subcapsular Haematoma <10% surface area Laceration <1cm depth.
Grade II	Subcapsular Haematoma 10% to 50% surface area; intra parenchymal, <5cm in diameter. Laceration, 1-3cm parenchymal depth that does not involve a trabecular vessel
Grade III	Subcapsular, Haematoma >50% surface area or expanding; ruptured subcapsular or parenchymal haematoma; intraparenchymal haematoma $\geq$ 5cm or expanding. Laceration >3cm depth or involving trabecular vessels
Grade IV	Laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen)
Grade V	Completely shattered spleen or Hilar vascular injury that devascularizes spleen.

(**Moore et al., 1995**)

The recognition of the fundamental role of the spleen in the immune response has led to greater efforts to preserve the spleen after injury (**Pachter HL , 2000**).

Treatment of splenic injury has changed substantially during the modern surgical era .For most of 20th century surgeons , splenectomy was the treatment of choice for all splenic injuries . However , During the last decade

, improved imaging methods and demonstrated success of non operative treatment for children have increased the frequency of non -operative management of blunt splenic trauma (**Peitzman et al ., 2000**).

With modern imaging techniques , most pediatric patients and many adult patients with splenic injuries can be safely managed without laparotomy and their spleens not only stop bleeding but also heal (**Knudson and Maull, 1999**).

Controversy exists about how to appropriately select patients for non-operative treatment since bleeding from splenic injuries can incur significant morbidity and mortality (**Herbrecht BG , 2005**) .

Aim is to evaluate the efficacy of conservative non operative management of patients with blunt splenic injury

Anatomy of the spleen

The spleen consists of a large encapsulated mass of vascular and lymphoid tissue situated in the left upper quadrant of the abdominal cavity between the fundus of the stomach and the diaphragm. Its shape varies from a slightly curved wedge to a 'domed' tetrahedron. The shape is mostly determined by its relations to neighboring structures during development. The superolateral aspect is shaped by the left dome of the diaphragm with the inferomedial aspect being influenced mostly by the neighbouring splenic flexure of the colon, the right kidney and stomach. Its long axis lies approximately in the plane of the tenth rib. Its posterior border is 4cm from the mid-dorsal line at the level of the tenth thoracic vertebral spine. Its anterior border usually reaches the mid-axillary line. (Jeremiah C Healy et al.,2005)

The size and weight of the spleen vary with age and between the sexes. It can also vary slightly in the same individual under different conditions. In the adult it is usually 12 cm long, 7 cm broad and between 3 and 4 cm wide. It is comparatively largest in the young child, and although its weight increases during puberty, by adulthood it is relatively smaller in comparison to the neighbouring organs. It tends to diminish in size and weight in senescence. (Jeremiah C Healy et al.,2005)

Development:

The spleen appears about the fifth week as a localized thickening of the mesoderm in the dorsal mesogastrium above the tail of the pancreas. With the change in position of the stomach the spleen is carried to the left, and comes to lie behind the stomach and in contact with the left kidney. The part of the dorsal mesogastrium which intervened between the spleen and the greater

curvature of the stomach forms the gastrosplenic ligament.(Patricia Collins ,2005)

Surfaces and borders of the spleen:

The spleen has a superolateral diaphragmatic and an inferomedial visceral surface. There are superior and inferior borders and anterior and posterior extremities or poles. The diaphragmatic surface is convex and smooth and faces mostly superiorly and laterally although the posterior part may face posteriorly and almost medially as it approaches the inferior border. The diaphragmatic surface is related to the abdominal surface of the left dome of the diaphragm which separates it from the basal pleura, the lower lobe of the left lung and the ninth to eleventh left ribs. The pleural costodiaphragmatic recess extends down as far as its inferior border. (Jeremiah C Healy et al.,2005)

The visceral surface faces inferomedially towards the abdominal cavity and is irregular. It is marked by gastric, renal, pancreatic and colic impressions. The gastric impression faces anteromedially and is broad and concave where the spleen lies adjacent to the posterior aspect of the fundus, upper body and upper greater curvature of the stomach. It is separated from the stomach by a peritoneal recess, which is limited by the gastrosplenic ligament. The renal impression is slightly concave and lies on the lowest part of the visceral surface. It is separated from the gastric impression above by a raised strip of splenic tissue and the splenic hilum. It faces inferomedially and slightly backwards, being related to the upper and lateral area of the anterior surface of the left kidney and sometimes to the superior pole of the left suprarenal gland. The colic impression lies at the inferior pole of the spleen and is usually flat. It is related to the splenic flexure of the colon and the phrenicocolic ligament. The pancreatic impression is often small when present and lies between the colic impression and the lateral part of the