

# Incidences of Splenic Injury Associated with Blunt Truma to Left Lower Thoracic Ribs

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**Annotation:** The spleen is the most frequently injured solid organ that occurs after blunt abdominal trauma, especially when the left lower part of the chest is the one that is hit. Spleen injury can lead to life threatening bleeding because of its location that is below the 9th-11th ribs and its rich vascularity without immediate diagnosis and treatment. The purpose of this investigation was to determine the correlation between blunt trauma patients with fractures of the lower ribs of the left side and the splenic trauma. The proposed observational study was carried out in the emergency departments of Al-Nassiriya Teaching Hospital and Al-Hussein Teaching Hospital within 2 years, i.e., between 15 March 2021 to 14 February 2023. There were 96 patients who sustained blunt trauma of the left lower chest and /or abdomen. Diagnosis was performed in terms of clinical examination, chest radiography, abdominal ultrasonography, and computed tomography. In 74, splenic rupture was observed (77.08%). The density of splenic trauma by the severity of rib fractures showed that 59.4% of all splenic injuries were three-rib fractures (9th - 11th). Single rib fractures constituted 12.1% of fractures, most often the 10 th rib. The majority of the patients had to undergo splenectomy (87.8). Splenic injury is highly predicted by left lower or multiple rib fractures. The morbidity and mortality should be minimized by early

imaging and immediate management.

**Keywords:** Blunt trauma; Splenic rupture; Rib fractures; Left lower ribs; Emergency surgery.

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## 1 .Introduction

Blunt trauma of the abdomen is a leading cause of morbidity and mortality in the world especially in young and middle-aged adults. The spleen is the organ of the intra-abdominal area most commonly injured because of the anatomical location, the weakness of the parenchyma, and the multitude of blood vessels. A large percentage of emergency laparotomy operations are case of splenic injury after blunt trauma and continues to be the leading cause of traumatic death that can be prevented in situations where diagnosis is not obtained in a timely fashion.[3]

The anatomy of the spleen is that of a wedge organ that is in the left hypochondrium and partially in the epigastrium and is in close proximity with ribs numbered 9-11 [4]. Though the rib cage partially helps in the protection process, blunt force impairment through broken ribs may directly damage the splenic capsule or parenchyma. It is this close relationship between the left lower rib fractures and the splenic injury that is explained by this anatomical closeness [5]. Embryogenesis The spleen is formed out of mesenchymal mesogastric tissue of the dorsal mesogastrium. The incidence of accessory spleens is about 10-30 percent and it can be an important factor in the patterns of splenic injury and surgical outcomes [6]. Spleen injury can be clinically manifested by pain in the left upper quadrant, abdominal pain, and hypotension and left shoulder-referred pain (Kehr sign) due to attachment by several peritoneal ligaments, such as the gastrosplenic and splenorenal ligaments [7]. Nonetheless, symptoms can be subtle or slow especially in patients who have related injuries or changed mental conditions. Thus, radiological assessment is very important in diagnosis. The diagnostic modalities of choice are focused assessment with sonography for trauma (FAST) and contrast-enhanced CT scanning [9].[10] ,[

It has been shown in a number of studies that left lower rib fractures are a strong risk factor of splenic injury and must lead to thorough abdominal examination [11]–[13]. Even with progresses on non-operative management, splenectomy is required in hemodynamically unstable patients or those with high grade splenic injuries [14]. The research will determine the connection between fractured left lower ribs and the spleen injury occurrence in the patients of blunt trauma and emphasize the significance of timely diagnosis and proper treatment.

## 2 .Patients and Methods

The present prospective observational research was carried out at Al-Hussein Teaching Hospital and Al-Nassiriya Teaching Hospital. The number of patients who are included is 96 with the blunt trauma on the left lower chest and/or in the abdomen.

### Inclusion Criteria

Blunt trauma of left lower chest or upper abdomen.

Radiographic manifestations of left lower rib fracture.

### Diagnostic Workup

All patients underwent:

Clinical examination

Chest X-ray

Abdominal ultrasonography

CT scan when indicated

The patients were divided into four categories:

Group A: Splenic trauma with fractured three ribs (9 th -11 th ) ribs.

Group B: Splenic injury, two rib fractures (10 th -11 th ) associated.

Group C: Splenic harm with one fracture of the rib (10th)

Group D: No splenic trauma with rib fractures.

Advanced Trauma Life Support (ATLS) was observed in management.

### 3. Result

The sample size in this paper consisted of 96 patients with left lower chest blunt trauma that left the patients with broken ribs. The sample consisted of 62 men and 34 women whose age range was 8 to 60. The splenic rupture diagnosis was made in 74 patients (77.08) (using the abdominal ultrasonography, CT scanning, and chest X-ray). Among these patients 51 (68.9) and 23 (31.08) were males and females respectively.

The patients with the disease included most of the patients aged between 20-50 years comprising 52 patients (70.27), others aged between 8-20 years comprising 12 patients (16.21), the patients who were aged between 50-60 years comprising 10 patients.(13.5)

Regarding the number of fractured ribs, three left lower rib fractures were the most common and proved to have the largest correlation with splenic rupture (44 patients; 59.4%). The fractures of ribs were identified in 2 (27.02) and single rib was identified in 9 (12.1) patients with single rib having fracture of the 10 th rib in 75% of the cases.

Most of the patients (65 patients; 87.8 percent) had splenectomy as far as management was concerned. The conservative management worked in 4 patients (5.4%), and 5 patients were subjected to splenorrhaphy.(%6.75)

Interestingly enough, 22 patients were left lower rib fractures without splenic trauma which implies that despite the fact that rib fracture is an excellent predictor of splenic trauma, not all cases are correlated. Overall, splenic injury was also significantly correlated with the number of rib fractures and negatively correlated with the number of rib fractures and particularly 10 th rib fractures, though they still remained significantly correlated.

**Table 1: distribution of splenic rupture according to the no. of ribs fracture**

3 ribs fracture	2 ribs fractures	single rib fractures
44 patients 59.4	20 patients 27.02%	9 patients 12.1%

**Table 2: distribution of splenic rupture according to the age**

8-----20 years	20-----50 years	50-----60 years
12 patients 16.21%	52 patients 70.27%	10 patients 13.5%

**Table 3: distribution of splenic rupture according to the sex.**

mal	female
51 patients 68%	23 patients 31.08%

### 4 .Discussion

Blunt splenic trauma is an emergency in surgery since the spleen is highly vascular and has the potential to cause huge hemorrhage [15]. This paper establishes the high affiliation of the fracture of the left lower ribs and splenic injury especially in cases where the ribs are broken in

more than one. The male patient population and the age category of 20-50-years are in line with the epidemiology of traumas in the world [16], [17]. The more the ribs were fractured, the higher was the risk of splenic rupture, as it showed the increased severity of trauma and energy transfer [18]. Particularly, single rib fractures, particularly 10th, were also reported to be related to the injury of the spleen, which points at the fact that even the slightest radiographic evidence requires careful consideration [19]. Nevertheless, 11% of the patients had rib fracture without splenic injury, which underscores the significance of imaging over the use of rib fractures only [20]. The splenectomy rate is high, which indicates the seriousness of the injuries and the lateness of the cases in most instances. Even though the use of non-operative management is becoming popular in the stable patients, splenectomy is life-saving in the unstable patients-21] .[25

## 5 .Conclusion

A fracture of the lower left ribs is a good indication of splenic trauma after blunt trauma. The risk is high when there are many rib fractures, especially at the 9th 11th ribs. Fractures of the 10 th rib alone are also not without a significant risk. Every patient who had left lower rib fracture needs abdominal examination being meticulously performed with the help of ultrasonography or CT scanning. The morbidity and mortality related to traumatic splenic injury can be minimized by the timely diagnosis and proper treatment.

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