Splenic Injuries atAl-Kadhimiya Teaching Hospital

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Abstract:

Background: The spleen is the most common solid organ injured in patients who had sustained abdominal trauma. Such injuries to the spleen represent approximately one quarter of all blunt injuries of the abdominal viscera.

Due to its remarkable vasculature and its fragile structure, splenic rupture is the most widespread cause of intra-abdominal hemorrhage.

Objective: To assess the magnitude of splenic injury, the management of splenic injury, and to evaluate the postoperative complications.

Methods: A prospective study of 57 cases of splenic injury was performed in Al-Kadhimiya Teaching Hospital during the period between the 1st of October 2004 and the 1st of October 2006. Statistical analysis was then performed to identify the causes, management and postoperative complications. Splenic injuries were graded into 5 grades.

Results: The highest incidence of splenic injury was recorded in age group s31-40 year. Penetrating injury was much more common than blunt trauma (73.68% versus 26.31%).

Fifty patients (87 %) were diagnosed by exploratory laparotomy, ultrasonography in 5 patients (8.77 %), CT scan was positive in 2 patients (3.5 %). Associated injuries were recorded in 41 patients 71.92%. Pulmonary complications were the most frequent complications (18 patients, 31.57 %).

Conclusion: Splenic injuries are common surgical problems in Al-Kadhimiya Teaching Hospital. Still there are many difficulties in establishing the diagnosis of the splenic injury with shortage in the new diagnostic modalities especially (CT -Scan, MR1 and even U/S scan) in the emergency situations.

In spite of the dangerous post-operative complications of splenectomy, it is still the most commonly performed surgical procedure in cases of splenic injury.

Keywords: Spleen, Splenic Injury, Splenectomy, Repair

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Introduction:

Although protected under the bony ribcage, the spleen remains amongst the vulnerable organ sustaining injury from amongst the abdominal trauma cases in all age groups [1].

Due to its remarkable vasculature and its fragile structure, splenic rupture is the most widespread cause of intra-abdominal hemorrhage [2, 3].

Although the conventional treatment for splenic rupture is splenectomy which was considered the optional treatment, extirpation of the spleen was believed to be without any harmful effect to the patient [4, 5, 6].

Different approaches to splenic injuries have recently been taken since the function of the spleen has become completely understood and that asplenic patients are at an increasing risk for a number of postoperative complications such as overwhelming postsplenectomy sepsis (OPSI), pulmonary and wound infection, thromboembolic sequel and possible fatal coronary artery disease [7, 8, 9].

It's now generally agreed that surgeons should make every effort to preserve the spleen rather than remove it. This is especially important for children who are more prone to develop postoperative complications, than the adult population.

Therefore current studies are proceeding to produce a safe method to preserve this organ and techniques of splenic preservation have been introduced to avoid splenectomy whenever possible [10].

A classification system for splenic trauma had been developed by Shackford et al. and modified by Feliciano et al. [11]:

- **Grade I:** Capsular tear or minor parenchyma laceration.
- **Grade II:** Capsular avulsion or moderate parenchymal laceration.
- **Grade III:** Major parenchymal fracture or laceration or through and through gunshot or stab wound.
- **Grade IV:** Severe parenchymal stellate fracture, crush, bisection or hillar injury.
- **Grade V:** Shattered or avulsed spleen.

Methods:

A prospective study was done on fifty seven patients who had splenic injury attended Al-

Kadhimiya Teaching Hospital during two years (from the 1st of October 2004 till the 1st of October 2006).

Data concerning age, gender, mechanism of injury, description of splenic injury, associated injuries, management and type of operation, post operative complications, were collected.

All patients underwent laparotomy after resuscitation. In the majority of patients the diagnosis was confirmed during laparotomy, five patients were with positive ultrasound, CT-scan was positive in two patients.

The severity of injury was graded retrospectively using the system developed by Shackford et al., and modified by Felciano et al. [11].

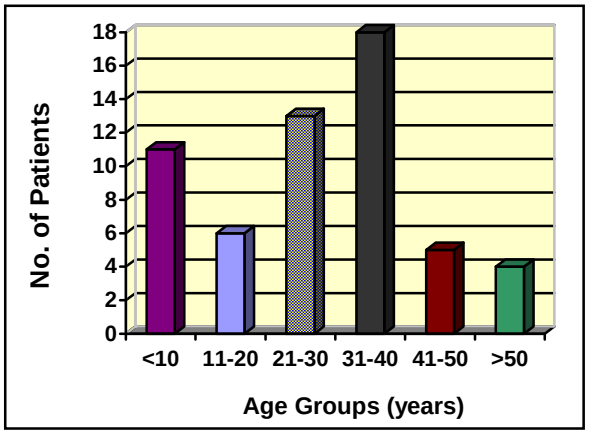
A descriptive analysis was performed for the collected d

Result:

Age and Sex Distribution:

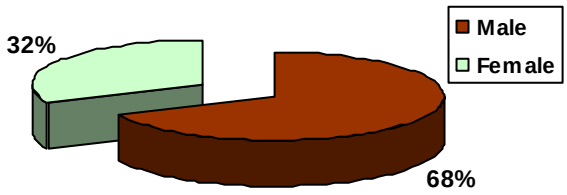
Patients ranged in age from 3 to 65 years old, with a peak age distribution (18 patients, 31.57%) at age group 31-40 year (Figure 1).

Figure (1): Age distribution of splenic injury patients.



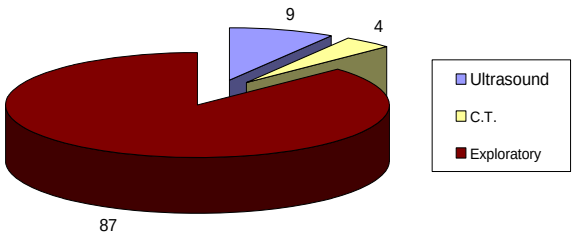
Splenic trauma was more common in males. There were 39 male patients (68.42%) and 18 female patients (31.57 %), with a male to a female ratio of 2.16:1 (Figure 2).

Figure (2): Gender distribution of splenic injury patients.



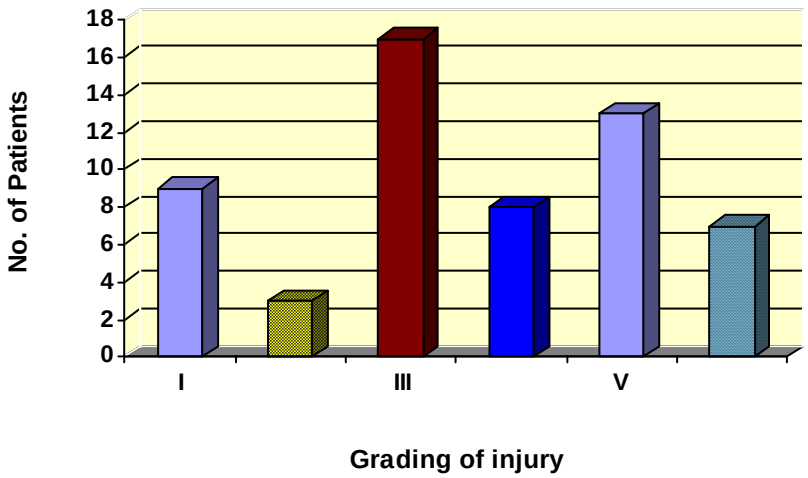
Diagnosis of Splenic Injury:
In this study; 50 patients (87.71 %) where diagnosed by exploratory laparotomy, 5 patients (8.77 %) by ultrasonography, and CT scan was positive in 2 patients (3.50 %) (Figure

Figure (3): Diagnosis of splenic injured patients.



Grading of Splenic Injury:
The splenic injuries were graded as shown in Figure 4.

Figure (4): Grades of splenic injuries



Associated Injuries:
Associated injuries were found in 41 patients (71.92%). 4 patients with blunt trauma (7.01 %) had associated injuries, and 37 patients (64.91%) of the patients with penetrating injury had associated injuries (Table 1). The most common associated injury is diaphragm in 34 patients (59.64%).

Table 1: Associated injuries in splenic injured patients.

	Blunt injury		Penetrating injury		Total	
Abdominal:	**No.**	**%**	**No.**	**%**	**No.**	**%**
Liver	**9**	**60**	**11**	**26.19**	**20**	**35.08**
Small intestine	**2**	**13.33**	**28**	**66.66**	**30**	**52.63**
Stomach	**1**	**6.66**	**19**	**45.23**	**20**	**35.08**
Kidney	**3**	**20**	**17**	**40.47**	**20**	**35.08**
Pancreas	**1**	**6.66**	**13**	**30.95**	**15**	**26.31**
Large bowel	**1**	**6.66**	**24**	**57.14**	**25**	**43.85**
Retroperitoneal hematoma	**5**	**33.33**	**27**	**64.28**	**32**	**56.14**
Extra abdominal:						
Head injury	**8**	**53.33**	**7**	**16.66**	**15**	**26.31**
Chest injury	**5**	**33.33**	**18**	**42.85**	**23**	**40.35**
Ribs fracture	**4**	**26.66**	**2**	**4.76**	**6**	**10.52**
Long bone fracture	**6**	**40**	**7**	**16.66**	**13**	**22.80**
Pelvic fracture	**1**	**6.66**	**2**	**4.76**	**3**	**5.26**
Diaphragm	**3**	**20**	**31**	**73.80**	**34**	**59.64**
Spinal cord	**0**	**0**	**6**	**14.28**	**6**	**10.52**

Treatment Modalities

Non-operative management:

In this study 5 patients (8.77 %) were treated conservatively. Three of them (5.26%) had blunt trauma, and 2 (3.51%) had penetrating injuries (Fig. 5).

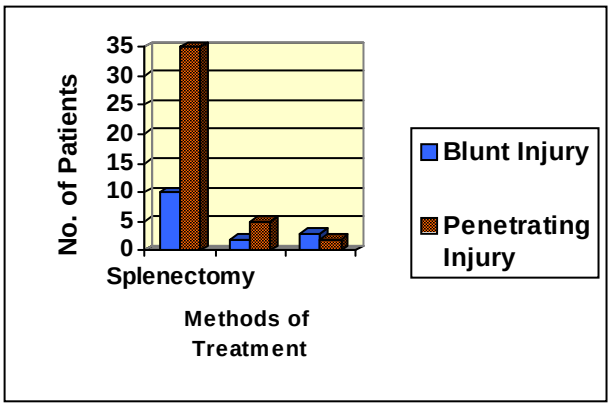
Splenectomy:

Splenectomy was done in 45 patients (78.94 %). Among this group 10 were with blunt abdominal trauma (22.2 %) and 35 (77.8 %) of those sustained penetrating injury (Figure 5).

Splenorrhaphy:

Splenorrhaphy was performed in 7 patients (12.28 %) of the patients with splenic injury. Five of those patients (71.5 %) were with penetrating injury, and 2 patients (28.5 %) with blunt splenic injury (Figure 5).

Figure (5): Mechanism of the injury versus modes of treatment



Postoperative Complications:

Thirty seven patients (64.91%) suffered from one or more complications post-splenectomy, no postoperative complications were reported in the cases that underwent splenorrhaphy.

Pulmonary complications occur in 18 patients (35.08 %). Atlectasis occurred in 13 patients (22.8%), while pneumonia occurred in 3 patients (5.26%).

Nine patients (15.78%) suffered wound infection and 3 patients (5.26%) suffered burst abdomen.

Subphrenic abscess occurred in 2 patients (3.50%), all of them had associated intraabdominal injuries (colon, stomach, pancreas, and pelvic fractures) (Table 2).

Table 2: Postoperative complications:

	Type of Complication	No.	%	Management
Pulmonary complications	**Atlectasis**	**13**	**22.8**	**Antibiotics & physiotherapy**
	Pneumonia	**3**	**5.26**	
	Pulmonary embolism	**1**	**1.75**	**ICU**
	Respiratory failure	**1**	**1.75**	**ICU**
Wound complications	**Wound infection**	**9**	**15.78**	**Antibiotics & dressing**
	Burst abdomen	**3**	**5.26**	**Repair under GA**
Abdominal complications	**Intestinal obstruction**	**3**	**5.26**	**Conservative**
	Subphrenic collection	**2**	**3.50**	**Drainage under GA**
Urinary tract complications	**Infection**	**2**	**3.50**	**Antibiotics**
Total		**37**	**64.91**	

Discussion:

Age and Gender Distribution:

The peak age distribution of splenic injury was in age group of 31-40 years (31.57%) followed by the age group 21-30 years of age (22.80%), as these age groups are more liable to be blast-injured because they are the working and productive age groups.

The other age groups with high proportion of splenic injury were below age of 10 years of age (19.29%). Road traffic accidents were the most common cause of splenic injury in this age group. These results are comparable with studies done in Istanbul by Umit et al [12], and Steel and Um [13].

Diagnosis of Splenic Injuries:

The majority of cases were managed as emergency cases, so there was difficulty in obtaining the diagnosis. In 47 patients diagnosis was done at laparotomy, 5 patients diagnosed by ultrasound examination of the abdomen supported by the operative findings in the patient's files.

Two patients were diagnosed by CT scan, which showed results that were highly suggestive of splenic injuries and supported by the operative findings (Staging).

In a study done in Turkey [13]; 64.8% of patients

was diagnosed by diagnostic peritoneal lavage while exploratory laparotomy done in 10.6% of patients only.

Grading of splenic injuries:

Seven patients (12.80%) were categorized as unclassified grades. The lack of emergency facilities and modern diagnostic equipments, and improper recording of the operative details were the causes behind the undetermined grades of those 7 cases.

The inadequacy of modern imaging techniques made the diagnosis and grading to be done mainly during laparotomy.

The peak of the grades in this study was in grade III splenic injury (29.82%), while a study done in Turkey which showed (71.28%) of grade IV injuries [12].

Associated Injuries:

Extra-abdominal associated injuries were more common in patients with blunt injury.

Patients with penetrating injury had higher proportion of abdominal associated injuries of which the retroperitoneal hematoma ranked the top of the list.

These figures seem to be different to a study performed by Steel and Um, which showed an overall associated injuries of (65.1 %), 63% of patients with blunt trauma and 71 % of patient with penetrating trauma had associated injuries [13]. Also their study showed a higher percentage of extra- abdominal associated injuries in patients with blunt splenic rupture and higher percentage of abdominal associated injuries in patients with penetrating injuries.

Treatment Modalities:

Splenectomy:

In this study; splenectomy was the most commonly performed procedure (87.94%) as a treatment.

Most authors reported that splenectomy for splenic injury is the most commonly performed procedure, but recent studies reported a decreasing frequency from about 91% in late 1970s to be less than 60% [11, 13, 14, 15, 16].

Splenorrhaphy:

In this study splenorrhaphy was performed in 7 patients (12.28%). 5 patients (11.90%) with penetrating injury and 2 patients (13.33%) with blunt splenic injury had their spleen repaired.

The severity of splenic injury in those with preserved spleen ranged from grade I in 3 patients and grade II in 4 patients.

Most authors advocate splenorrhaphy as a preferred therapeutic option in splenic injured patients based on the recognition that splenectomy results in a life long increase in susceptibility to fatal sepsis in any age group.

Splenorrhaphy rather than splenectomy is clearly indicated and should be attempted in all patients with splenic injuries whenever it can be safely performed and the patients condition permits i.e. there's no contraindications [17, 18, 19, 20, 21].

Non-Operative Management:

In this study; 5 patients (8.77%) were treated conservatively. The severity of the splenic injury was grade I injury, there was no abdominal associated injuries.

Those patients were admitted to the surgical ward and followed by close observation including observation of the vital signs, abdominal examination and abdominal girth and serial ultrasound examinations. All of them run a smooth course except one patient who developed mild chest infection.

Post-splenectomy Drainage:

Closed drainage system of the splenic bed for the injured spleen was performed in all patients who were treated by splenectomy or splenorrhaphy.

Daoud cited a 25% complication rate with drainage and12% of those non-drained [22]. Nora, et al [23] in their experimental work concluded that organisms move down drains and cause intra-peritoneal infections.

The routine use of drains following splenectomy for trauma is supported by a study reported by Nylor et al in 1994 [2].

Postoperative Complications:

Complications were frequent, occurring in 37 patients (64.91%).

A study conducted by Steele and Um which showed a 45% complication rate [13], and comparable to a study performed by Guliano and Um and showed that complications occurred in 33% of the patients [24], whereas Fabri et al reported 29% complication rate [25].

A study done in Turkey [12] showed that postoperative complications were frequent in 18.6% of the patients. In our study, pulmonary complications (atlectasis) were the most frequent complication occurred in 22% of patients. Pneumonia occurred in three patients (5.26%). Studies performed by Steele and Um [13], and Giuliano and Um [24] showed that pulmonary

infection was the most common complication and an overall rate respiratory complications of 26% and 30% respectively. In our study burst abdomen was reported in 3 patient (5.26%). Two patients (3.5%) suffered from subdiaphragmatic abscess, this observation is consistent with those of other authors [13, 17, 26].

Pulmonary embolism occurred in one patient (1.75%). This figure is comparable to a studies published by Ziemski et al. which reported an incidence of pulmonary embolism in 3% of patients during the early postoperative period after splenectomy [27].

Conclusions

Splenic injury is a surgical problem in Al-Kadhimiya Teaching Hospital.

Still there are many difficulties in establishing the diagnosis of the splenic injury with shortage in the new diagnostic modalities especially (CT scan, MR1 and even Ultrasonography) in emergency situations. These facilities will clarify the degree of the injury, facilitate a quick assessment of other injuries and plan for the management which in turn decreases the morbidity and mortality of the splenic injury.

In spite of the dangerous post-operative complications of splenectomy, it is still the most commonly performed therapeutic procedure performed in Al-Kadhimiya Teaching Hospital.

The ideal treatment of splenic injuries depends on the degree of splenic injuries and most literatures and textbooks prefer splenic preserving procedures whenever the condition permits.

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