

# Management of Splenic Injuries

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A three year study from April 98 to March 2001 regarding the management of splenic injuries was carried out at the Surgical Wards of Sir Ganga Ram Hospital, Lahore and Mayo Hospital, Lahore. This study comprised of 37 patients. Mode of injury was penetrating trauma in 45% cases. Eighty six percent cases were male. Thirty five percent of the total patients were in the age group between 21-30 years. The spectrum of injury varied from simple laceration or contusion with capsular disruption to total fragmentation of the spleen. Twenty nine percent of the total patients underwent suture ligation, 5% partial resection and 66% underwent splenectomy. Mortality in our study was 5%..

**Key words:** Suture ligation, partial resection, splenectomy

Spleen lies in the left upper quadrant of the abdomen. During increased intra-abdominal pressure accompanying blunt trauma, compression of the spleen may occur between the anterior wall and the posterior rib cage<sup>1</sup>. In penetrating trauma a wound of entry or exit in this area should arouse suspicion. Spleen is the intra-abdominal organ most frequently injured in blunt trauma. Management of splenic trauma has been the subject of major re-examination over the past decade and an increased appreciation is emerging of the danger of intra-abdominal abscess and post-splenectomy sepsis following splenectomy<sup>2</sup>. This evidence lead to the conclusion that the use of total splenectomy should be greatly curtailed and that splenic preservation, splenorrhaphy or partial splenectomy is a more appropriate procedure in many circumstances.

The purpose of study was the assessment of pattern of splenic trauma, its management and the results of various procedures in our own local set up. These results were compared with similar studies conducted in other countries. Another aim of this study was to curtail the use of total splenectomy for lesser grades of splenic trauma and to aim for splenic conservation.

## Patients and methods

During the three year period i.e., from April 1998 to March 2001 Thirty seven patients with splenic trauma were managed in the surgical units of Sir Ganga Ram Hospital, Lahore and Mayo Hospital, Lahore. All the patients were assessed clinically and the decision regarding laparotomy was made based on physical examination, condition of the patient, laboratory studies and plain x-ray films. Diagnostic peritoneal lavage was done in 3 patients. None of the patients had abdominal ultrasonography, C.T. Scan and angiogram done because of lack of these facilities in our emergency set up. On physical examination, abdominal tenderness, guarding, distension, presence of penetrating wounds, abdominal bruising and left lower chest injury were indications of splenic trauma. Indications for laparotomy were continued bleeding from splenic trauma, positive diagnostic peritoneal lavage, peritoneal signs, deteriorating physical signs and other associated

visceral injuries. All the patients were resuscitated both prior to and during operation. Once the abdomen was opened a quick appraisal of bleeding sites was made. Capsular tears and laceration into the splenic substance were controlled by the technique of suture ligation. Major laceration of the splenic substance involving less than 50% of splenic tissue was treated with segmental splenic resection in two patients. Splenic salvage was not pursued if the patient had protracted hypotension, in cases where undue delay was anticipated in attempting to repair the spleen and the patient had other severe injuries. No attempt for splenic salvage was made in cases where there was a total fragmentation of spleen. Drainage with tube drain was provided in most of the cases. No drains were placed in cases where total splenectomy was done and patients had isolated splenic injuries with no other associated visceral injury. Patients were monitored post-operatively for complications. Patients were administered intravenous antibiotics postoperatively. Duration of the stay in the hospital varied between 5 to 22 days with a mean of 8 days.

## Results

Thirty seven patients were included in this study. Of these 32 were male. Age of the patients ranged from 13 to 71 years with a mean of 30 years. All the admission were made from the emergency department. Average time interval between the infliction of injury and presentation to the emergency department was 3 hours. At the time of presentation 16(43%) patients were in a stable position and 21(57%) patients were in a state of shock.

Table 1. Age and sex distribution of patients with splenic injuries.

Age (Years)	Male	Female	Total
11-20	4	1	5
21-30	11	2	13
31-40	9	1	10
41-50	2	-	2
51-60	3	1	4
61-70	2	-	2
71-80	1	-	1
Total	32(86%)	5(14%)	37(100%)

## Management of Splenic Injuries

Distribution of patients according to the severity of the splenic injury is depicted by Table 2 while Table 3 depicts the mode of splenic injury.

Table 2. Severity of splenic injury

Severity	n=	%age
Capsular tear	3	8
Superficial laceration	4	11
Deep laceration (transverse and stellate)	13	35
Fragmentation	10	28
Injury to Hilar vessels	7	18

Table 3 Mechanism of splenic injury

Severity	n=	%age
Blunt trauma	20	55
Penetrating trauma		
Stab injury	9	24
Firearm injury	8	21

Table 4 shows the distribution of patients based on the presence or absence of injuries to other viscera. Stomach, colon, diaphragm, pancreas and liver were the associated viscera with injuries.

Table 4. Associated injuries

Associated injuries	n=	%age
None	13	35
One organ only	8	21
Two organs	11	30
Three or more	5	14

Table 5 shows the operative procedures performed for the management of these splenic injuries.

Table 5 Operative procedures

Operative procedures	n=	%age
Capsular repair	3	8
Suture ligation	8	21
Segmental resection	2	5
Splenectomy	24	66

Table 6 shows the postoperative complications encountered in these patients.

Table 6 Postoperative complications

Complications	n=	%age
Wound infection	3	8
Subphrenic abscess	2	5
Left lower lobe atelectasis	-	-
Iatrogenic pancreatic injury	1	3
Haemorrhage	-	-
Iatrogenic gastric injury	-	-
Mortality	2	5

There were two deaths in our series. One of our patients had table death. Patient had associated injuries to stomach, colon and liver and was received in a state of shock. The second mortality occurred on the second postoperative day. Patient had injuries to pancreas and colon and stomach besides spleen. Patient developed adult respiratory distress syndrome and multiple organ failure syndrome. Both these patients underwent splenectomy for

their splenic injuries. Patients with subphrenic abscesses were treated conservatively.

### Discussion

Removal of spleen is carried out for many reasons including trauma, haematological disorders<sup>3</sup>, as a part of staging laparotomy or as a part of a radical gastrectomy. Splens have been removed by the thousands for bonafide indications and for reasons originally thought to be important but now regarded as trivial. Most commonly the trivial reason was minor inadvertent injury. In 1952 King and Shumacker reported the association between splenectomy and fulminant overwhelming sepsis in infants. Later on the relationship of the asplenic state to overwhelming postsplenectomy infection was documented to occur in adults as well as in children. This led to the conclusion that use of total splenectomy should be greatly curtailed.

Non-operative management of splenic trauma<sup>4</sup> in adults is a possible option if the patient presents more than 12 hours after injury, is haemodynamically stable with no other signs of abdominal injury. For this ultrasound or CT scan should be performed and the patient followed sequentially. Because of lack of availability of these services in our set up we relied on our physical examination and in two of our patients exploration was done after a positive peritoneal lavage.

Minor capsular tears may be managed successfully with pressure alone. If the injured site is dry no further treatment is required. For most capsular avulsion injuries mobilization of spleen is not necessary. Topical hemostatic measures are best carried out with spleen in its normal anatomic position. Surgical and gel foam alone or in combination have been found to be effective.

For splenic repair or partial splenectomy adequate exposure is of paramount importance<sup>5,6,7</sup>. Spleen requires gentler holding than most other parenchymatous organs. Its capsule is thinner and more easily stripped, its substance more friable and more easily disturbed. Sutures must be tied with less tension. Locking sutures have a sheering effect and hence are inadvisable. Splenic parenchyma is divided both by sharp and blunt dissection. Cautery is inadvisable because it leaves a residue of charred splenic parenchyma that may later slough, resulting in bleeding. As the dissection proceeds within the spleen vessels are ligated as encountered.

Linear superficial laceration may be sutured with running non-locking chromic catgut suture<sup>6,7</sup>. Deeper laceration extending thorough and through the splenic parenchyma may require complete division of the involved segment. Otherwise once complete haemostasis in the depths of the wound has been achieved, the segments may be joined with interrupted chromic catgut sutures. Stellate lacerations are treated in essentially the same manner. It is essential that the continuous suture encompasses full depth of laceration if intrasplenic haematoma and delayed rupture are to be avoided<sup>8,9</sup>.

In fragmenting injuries all viable fragments should be retained and may be bundled into a packet of greater omentum or wrapped in a sheet of polyglycolic acid.

In our study splenic conservation and salvage was not pursued in those patient who had profound shock and on exploration were found to have injuries to two or more viscera besides spleen. In these cases we anticipated an undue delay in attempting to salvage spleen<sup>10</sup>. Similarly no attempt was made for conservation of spleen in cases who had fragmentation of spleen<sup>11</sup>.

In our study we were able to achieve splenic salvage in 34% of the patients. We strongly believe that with the provision of better investigative modalities in our emergency setup a large percentage of our patients with splenic injuries can be managed non-operatively. As regards the peroperative management with increasing experience and confidence we should be able to achieve splenic conservation in a majority of patients. Splenectomy, should be avoided at peripheral and district hospital. We recommend a close working relationship between district surgeons and trauma specialists in teaching hospitals in this regard. We also recommend more prospective studies as regards conservation of spleen in trauma to have clearer guidelines for better management.

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