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## Role of splenorrhaphy in selected cases of splenic trauma

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### ABSTRACT

*The term splenorrhaphy actually represents a variety of “spleen sparing” techniques aimed at controlling the hemorrhage from a splenic injury while sparing the patient from the long-term immunologic consequences of splenectomy. This is a hospital-based observational interventional study done on 50 cases in Department of General Surgery NIMS University and Medical College and Hospital, Jaipur during JANUARY 2017- JUNE 2018. The severity of the splenic injury can objectively be described with a grading system developed by the American Association for the Surgery of Trauma.*

**Keywords**— Splenectomy vs. splenorrhaphy, Complication of splenectomy, Advantages of splenorrhaphy

### 1. INTRODUCTION

Any injury to the spleen, including rupture of the spleen, is called a splenic injury. It can be caused by trauma, such as a road traffic accident. Previously, the standard surgical treatment for every kind of splenic injury involved operative intervention but now the management of most of the patients of splenic injury has shifted to non-operative management.

Splenic injury most commonly occurs following blunt trauma due to motor vehicle collisions (driver, passenger, or pedestrian). However, blunt splenic injury can also result from falls, sport-related activities, or assault. Penetrating splenic trauma is less common than blunt injury and is typically due to assault, but inadvertent impalement may also occur. Assault with a knife compared with gunshot or shotgun wounds is less likely to result in penetrating injury due to the spleen's protected location.

Injuries to the spleen are commonly encountered by surgeons treating patients with abdominal trauma. Whereas splenectomy has long been the accepted treatment, significant changes have occurred in the approach to splenic injuries in the last 10 years.<sup>1-3</sup> With documentation that overwhelming post-splenectomy infection (OPSI) can occur in adults after splenectomy for trauma, splenorrhaphy has been utilized with increasing frequency.<sup>4-12</sup>

Splenectomy, however, continues to be required in many patients because of the magnitude of the splenic injury or associated injuries. In 1980, the surgical services at the Ben Taub General Hospital, a major urban trauma centre affiliated with Baylor College of Medicine in Houston, Texas, first started to use splenorrhaphy in adult trauma patients. This is a report of the 4 & 1/2-years' experience (1980-1984) with 326 patients requiring splenectomy or splenorrhaphy.

For decades, splenectomy was considered the safest approach to the injured spleen. Extirpation of the spleen eliminated the risk of post-operative hemorrhage<sup>13</sup> and was believed to be without detriment to the patient.<sup>14</sup> Despite successful reports of suture repair of the injured spleen,<sup>14,15</sup> and partial splenectomy,<sup>16</sup> splenic salvage attracted little notice.

There is, however, a relative paucity of data regarding primary suture repair of the spleen in adults. With the exception of Weinstein,<sup>17</sup> the majority of injuries to the adult spleen have been managed with Microfibrillar Collagen.<sup>18</sup> This report describes experiences with the treatment of 27 consecutive injuries of the spleen between 1978 and 1980. Splenorrhaphy was successfully accomplished in 24 of the 27 patients by primary suture repair often in conjunction with microfibrillar collagen (Avitene). The fact that splenectomy imposes a life-long increase in susceptibility to infection, which at times can be fatal, was first recognized in children.<sup>19,20</sup>

A review of world literature indicates that the reasons for routine splenectomy for trauma can be traced to four sets of misconceptions, passed on from generation to generation of surgeons' viz.:

- (a) The spleen has no function and is, therefore, not essential for life.
- (b) Non-operative management carries high mortality of 90 to 100%.

(c) Imminent danger of delayed rupture, if the spleen is not removed.

(d) The spleen is a friable, vascular organ and, therefore, splenic lacerations cannot be safely sutured.

The evolution of the present policy of conservative management is, indeed, a landmark in the history of clinical research. It tells how a rational inquiry supported by a well-planned study can change a centuries-old irrational surgical practice.

## 2. AIMS AND OBJECTIVES

The present study intends to highlight the importance of splenorrhaphy and spleen salvage in selected patients of splenic trauma

## 3. MATERIAL AND METHOD

This is a hospital-based observational interventional study done on 50 cases in Department of General Surgery, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India during January 2017- June 2018.

### 3.1 Study design

Hospital-based observational interventional study.

### 3.2 Selection criteria of patients

#### 3.2.1 Inclusion criteria

- ALL Patients with abdominal trauma with obvious signs of intra-abdominal haemorrhage.
- Radiological evidence of severe splenic injury.

#### 3.2.2 Exclusion criteria

- If the patient is hemodynamically stable.
- Radiological evidence of minor splenic injury with minimum intra-abdominal haemorrhage.

## 4. OBSERVATION

**Table 1: Age wise distribution of patients**

Age (yrs)	No. of patients	Percentage
15-25 yrs	6	12%
26-35 yrs	25	20%
36-45 yrs	11	16%
46-55 yrs	8	16%
Total	50	100%
Mean±SD	34.60±9.636 yrs	

The above table depicts that the majority of cases were seen in 26 to 35 years of age groups. The mean age of the patients was 34.60±9.636 yrs in our study.

**Table 2: Age wise distribution of gender**

Age (yrs)	Male	Female	Total
15-25 yrs	5	1	6
26-35 yrs	21	4	25
36-45 yrs	7	4	11
46-55 yrs	7	1	8
Total	40	10	50

The above table depicts that the majority of male (52.5%) & females (40%) were seen in 26-35 years of age group. The overall male to female ratio was 4:1.

**Table 3: Mode of injury**

Mode of injury	No. of patients	Percentage
Road traffic accidents	33	66%
Assault	7	14%
Fall from height	5	10%
Street trauma	5	10%
Total	50	100%

The above table depicts that the most common mode of injury was road traffic accidents were seen in 66% cases followed by assault (14%), fall from height (10%) and street trauma (10%).

**Table 4: Clinical profile of patients**

Clinical profile	No. of patients	Percentage
Abdominal pain	38	76%
Abdominal distention	30	60%
Guarding & rigidity	30	60%
Pallor	25	50%
Tachycardia	30	60%
Hypotension	38	76%

The above table depicts that the most common symptoms were abdominal pain (76%) & hypotension (76%) followed by abdominal distention (60%), guarding & rigidity (60%), tachycardia (60%) and pallor were present in 50% of cases in our study.

**Table 5: Hematological investigation of patients**

Haemoglobin	No. of patients	Percentage
<10 mg/dl	42	84%
>10 mg/dl	8	16%
Total	50	100%

Our study showed that the majority of cases (84%) had <10mg/dl haemoglobin and only 16% of cases had >10mg/dl haemoglobin.

**Table 6: Radiological examination of patients**

X-rays	No. of patients	Percentage
Lower rib fracture in x-ray chest	2	4%
Ground glass appearance in x-ray flat plate abdomen	42	84%

In our study showed that the 84% cases had ground glass appearance in x-ray flat plate abdomen and 4% cases had lower rib fractures in x-ray chest.

**Table 7: USG abdomen**

USG abdomen	No. of patients	Percentage
Spleen Injury	50	100%
Hemoperitoneum	42	84%
Adjacent organ injury	9	18%

The above table depicts that the spleen surgery was seen in 100% cases followed by Hemoperitoneum had 84% cases and adjacent organ injury was seen in 18% of cases in USG abdomen.

**Table 8: CECT grading**

CECT	No. of patients	Percentage
Grade I	9	18%
Grade II	7	14%
Grade III	23	46%
Grade IV	11	22%
Total	50	100%

The above table depicts that the maximum patients were seen in grade III splenic injury.

**Table 9: Type of Surgery**

Type of surgery	No. of patients	Percentage
Suture with or without a topical agent	35	85.36%
Suture with omental patch	5	12.19%
Topical agent	1	2.43

In our 5 patients had suture with omental patch and only 1 case had a topical agent.

**Table 10: Hospital stay**

Hospital stay (Days)	No. of patients	Percentage
1-9 days	11	22%
10-19 days	19	38%
20-29 days	7	14%
>29 days	4	8%
Total	41	82%

The above table depicts that the majority of cases (38%) stayed in the hospital was 10-19 days followed by 22% cases had stayed in 1-9 days, 7 cases had stayed in 20-29 days and more than 29 days stay in the hospital only 8% cases in our study.

**Table 11: Complication**

Complications	No. of patients	Percentage
No	32	64%
Re-exploration	2	4%
Post splenic infection	1	2%
Respiratory infection	3	6%
Wound dehiscence & infection	3	6%
Total	41	82%

The above table depicts that the complications occurred mostly in 18% of cases. Of 6% of cases of respiratory infections, 6% of cases had wound dehiscence & infection, re-exploration occurred in 4% and only 2% case had post splenic infection.

**Table 12: Outcome**

Outcome	No. of patients	Percentage
Mortality	2	4%
Recover	48	96%

Most patients were recovered (96%) and only 4% of cases had mortality in our study due to re-exploration, grade III splenic injury with adjacent organ injury.

## 5. DISCUSSION

This is a hospital-based observational interventional study done on 50 cases in Department of General Surgery NIMS University and Medical College and Hospital, Jaipur, Rajasthan, India during January 2017- June 2018. The severity of the splenic injury can objectively be described with a grading system developed by the American Association for the Surgery of Trauma. The grading is based on the CT scan, operative, or autopsy findings. There are five grades of splenic injury. Once the splenic injury is confirmed on CT in, further plan of action is established depending upon associated CT findings.

- Our study showed that the majority of cases were seen in 26 to 35 years of age groups and the mean age of the patients was  $34.60 \pm 9.636$  yrs. The mean age was 40 years.
- Our study showed that the majority of male (52.5%) & females (40%) were seen in 26-35 years of age group. The overall male to female ratio was 4:1. The higher incidence of splenic trauma in the male is due to the fact that the males are more exposed to trauma because of their outdoor works
- The most common mode of injury was road traffic accidents were seen in 66% cases followed by assault (14%), fall from height (10%) and street trauma (10%) in our study. This assumes all the more significant because people involved in RTA are in their most active and productive phase of life.
- The most common symptoms were abdominal pain (76%) & hypotension (76%) followed by abdominal distention (60%), guarding & rigidity (60%), tachycardia (60%) and pallor were present in 50% of cases in our study.
- Our study showed that the majority of cases (84%) had  $<10\text{mg/dl}$  haemoglobin and only 16% of cases had  $>10\text{mg/dl}$  haemoglobin. A decision for laparotomy was taken based on one or more of the following- obvious clinical deterioration, unexplained sustained hypotension (Systolic BP  $< 90$  mmHg with further fall in erect posture) not responding to fluid challenge, signs of continuing intraabdominal haemorrhage in an initially normotensive patient (drop in Hb% by  $> 1.5$  gm% or systolic BP  $< 90$  mmHg/progressively falling hematocrit/appearance of free fluids in the abdomen within 3 hours of admission), signs of generalized peritonitis or associated intra-abdominal injury (increasing abdominal distension, tenderness and rigidity, vomiting, absent bowel sounds), paracentesis positive for blood with any one or more of the remaining criteria's, increase in size of the splenic hematoma on repeat abdominal USG, and active blush on CT Angiography.
- In our study showed that the 84% cases had ground glass appearance in x-ray flat plate abdomen and 4% cases had lower rib fractures in x-ray chest.
- Our study showed that the spleen surgery was seen in 100% cases followed by Hemoperitoneum had 84% cases and adjacent organ injury was seen in 18% of cases in USG abdomen.
- Our study showed that the maximum patients were seen in grade III splenic injury (46%) according to CECT grading followed by grade IV (22%), grade II (14%) and no grading were seen in 18% of cases.
- In our study showed that the out of 50 cases, only 41 cases had splenography surgery. Of 35 patients had suture with or without topical agent followed by 5 patients had suture with omental patch and only 1 case had a topical agent.
- The majority of cases (38%) stayed in the hospital was 10-19 days followed by 22% cases had stayed in 1-9 days, 7 cases had stayed in 20-29 days and more than 29 days stay in the hospital only 8% cases in our study.
- Our study showed that the complications occurred mostly in 18% of cases. Of 6% of cases of respiratory infections, 6% of cases had wound dehiscence & infection, re-exploration occurred in 4% and only 2% case had post splenic infection.
- Most patients were recovered (96%) and only 4% of cases had mortality in our study due to re-exploration, grade III splenic injury with adjacent organ injury. The mortality rate in the present series doesn't reflect the actual mortality of the society, because most of the patients with a severe injury do not reach the hospital due to lack of proper transportation facilities.

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