Changing Patterns in the Management of Splenic Trauma

M N ASLAM A A ALI M J ATHER A M CHAUDHRY
Department Of Surgery, Mayo Hospital, Lahore.
Correspondence to Muhammad Nadeem Aslam

A study of 24 patients who had splenic injury from 1998 to 2000 was carried out. Most of these patient 58.33% had splenic salvage either by splenorrhaphy or partial splenectomy. Splenectomy was done in 33.33% of cases and 8.33% were managed conservatively by not operating. By saving spleen one can avoid post-splenectomy sepsis. Use of ultrasound and more important CT scan helps in conservative treatment.
Keywords: Splenorrhaphy, Partial splenectomy, Splenectomy, Non-operative

An accumulation of clinical and laboratory data has culminated that the spleen is a vitally important organ in the immunologic defence mechanisms. The spleen strains out foreign matter, including bacteria, thus having an important sieve like effect; and, in addition, the spleen is the site of formation of specific antibodies that are necessary for phagocytosis of encapsulated bacteria. Generally, physicians had been satisfied with the operative management of medical and surgical conditions of the spleen until 1952, when King and Schumacker[1] noted a remarkable relationship of splenectomized patients with the development of overwhelming lethal sepsis.
The recognition that splenectomy renders patients susceptible to lifelong risks of septic complications has led to routine attempts at splenic conservation after trauma.

Material and Methods

All patients with splenic injuries admitted to the Mayo Hospital, Lahore, have been prospectively evaluated with the intent of splenic salvage whenever possible. This report describes the prospective management of 24 consecutive patients with splenic injuries treated between 1998 and 2000.

Penetrating Splenic Injuries:
All patients with gunshot wounds to the abdomen or those with stab wounds who were hemodynamically unstable underwent immediate celiotomy after appropriate resuscitation. Splenic repair by splenorrhaphy or partial splenectomy was always attempted if three criteria were met: hemodynamic stability, lack of multiple associated injuries mandating expeditious splenectomy, and injuries less extensive than a shattered or devascularized spleen. A different approach was taken in patients with stab wounds who were hemodynamically stable. Patients underwent emergency room tractotomy under local anaesthesia; if peritoneal penetration was found, a celiotomy was performed.
Blunt Splenic Injuries
Patients who sustained blunt trauma to the abdomen or lower thorax and were hemodynamically unstable also underwent immediate celiotomy after appropriate resuscitation. Criteria for non-operative management included hemodynamic stability, absence of other intra-abdominal injuries, detected on clinical or radiological examination, requiring celiotomy. Repeated examinations are helpful in this regard. Patient who demonstrated any degree of hemodynamic instability were immediately taken to the operating room. During surgery, the decision to perform splenectomy or to attempt splenic repair was based primarily on the severity of associated injuries and the intra-operative stability of the patient.
The extent of injury was graded according to AAST guidelines (Table No 1)

Table No 1: Organ Injury Scaling Committee of the American Association for the Surgery of Trauma (1994 revision)

Grade	Injury	Injury Description
I	Hematoma	Sub capsular, <10% surface area
	Laceration	Capsular tear, <1 cm deep parenchymal tear
II	Hematoma	Sub capsular, 10-50% surface area, intraparenchymal <5 cm in diameter
	Laceration	1-3 cm parenchymal depth not involving trabecular vessel
III	Hematoma	Sub capsular, >50% surface area or expanding; ruptured sub capsular or parenchymal hematoma
	Laceration	>3 cm parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration involving segmental or hilar vessel producing major devascularization (>25% of spleen)
V	Laceration	Completely shattered spleen
	Vascular	Hilar injury which devascularizes spleen

Results

During the two-year period from 1998 to 2000, 24 consecutive adult patients sustaining splenic injuries were treated. The ages ranged from 17 to 52 years with a mean age of 34.5. There were 18 men (75%) and 6 women (25%). Mechanism of injury is shown in Table No 2.

Associated injuries. (Table No 3)
16 (66.66%)had associated injuries. Among these, 7 (43.75%) had splenic repair and 9 (56.25%) had splenectomy.

Non-operative management: (Table No 2,3)
2 (8.33%) pts were managed conservatively. Non-

operative therapy failed in one of the patient with blunt trauma. Patient had acute bleeding 9 days after grade III injury and he required splenectomy.

Splenorrhaphy or partial splenectomy (Table No 2, 3)
14 (58.33%) patients underwent splenic repair, 11 (78.57%) of them by splenorrhaphy and remaining 3 (21.42%) had partial splenectomy. Techniques of both splenic repair and partial splenectomy have been extensively described in several previous publications [1,2,8]. One crucial point regarding intraoperative splenic salvage merits emphasis: the success of either splenorrhaphy or partial splenectomy is critically dependent on full mobilization of the spleen into the wound. This maneuver often requires dividing one or two of the short gastric vessels, combined with gentle dissection posteriorly, so that the capsule is not torn in the mobilization process.

Table 2. Mechanism of injury and management

Injury	(n=)	Splenectomy	Splenic Repair	Non-operated
Blunt	11	2	7	2
Gunshot wound	5	3	2	-
Stab wound	8	3	5	-
Total	24	8	14	2

Splenectomy: (Table No 2)
8 of the 24 patients (33.33%) required splenectomy. 6 (75%) of these were done for either hemodynamic instability or multiple associated injuries. In each of these instances, the injury to the spleen itself did not preclude repair, but rather the patients precarious condition mandated expeditious splenectomy. In the remaining 2 (25%) patients, splenectomy was necessitated by injuries that were not amenable to either suture splenorrhaphy or partial splenectomy.

Table 3: Details of injury

Grade	(n=)	Operated	Conservative	Associated injuries
I	3	2	1	2
II	6	6	-	6
III	7	6	1	4
IV	5	5	-	3
V	3	3	-	2
Total	24	22	2	16

Postoperative infectious complications: (Table 4)
Infectious complications occurred in 12of 22 patients (54.54%). Of all the infectious complications incurred in this series postoperative pneumonia was the most common infectious complications 41.66% (n=5) followed by abdominal wound infections 25% (n=3) and subphrenic collections 16.66% (n=2). Subphrenic abscesses occurred in two patients after multiple associated hollow viscous injuries.

Table 4 Infectious Complications

	Splenectomy	Splenic Repair
Abdominal wound infection	2	1
Pneumonia	3	2
Subphrenic abscess	1	1
Intra-abdominal abscess	-	1
Urosepsis	-	1

Mortality:
Fortunately there was no mortality in this series of 24 patients.

Discussion
Over the past 2 decades, major changes have occurred in the treatment of injuries of the spleen. These changes evolved based on the concept that splenectomy renders patients at lifelong risk for increased susceptibility to infections [2] [3] [4] [5] The most serious of these infections is the syndrome of overwhelming post-splenectomy infection, which occurs rarely (0.5%)[6] [7] [8] in adults subjected to splenectomy but carries a prohibitive mortality in unvaccinated patients. For these reasons, a trend away from splenectomy and toward splenic conservation has emerged. [2] [2] [4] [5]

Splenic preservation has been firmly established as the preferred treatment modality for both blunt and penetrating injuries whenever deemed safe and feasible. [2] [3] [4] Cumulative experiences towards conservative management of splenic injuries, however, began to accrue, supported by data confirming both its safety and effectiveness.

The most prevalent form of splenic salvage is intra-operative suture splenorrhaphy or partial splenectomy (58.33%) and less frequently non-operative management (8.33%). Previously the infrequent use of splenic conservation merely reflected the prevalent thinking of the time that this approach was applicable to only 15% to 20% of all splenic injuries [9] [10] [11]. Several factors have been responsible for this change towards splenic conservation. [12] [9] [10] [11] The original rigid criteria of treatment has been modified and expanded as experience with this treatment modality has increased. As a result, patients who in the past would have been excluded now meet the criteria for splenic conservation or non-operative management. This is because of advances in radiographic imaging technology i.e. ultrasound, CT scan.

Two recent reports shows that non-operative management of blunt splenic has come to represent the most prevalent method of splenic preservation. Hunt et al [11] in a statewide analysis of 2258 patients over a 5-year period, found that the non-operative management rate increase from 33.9% to 46.3%, with as success rate of 94%. Hunt noted that splenectomy rate decreased from 52.9% to 43.4% while the splenorrhaphy rate remained unchanged at 10%. Clancy et al., [13] in an evaluation of

splenic injuries seen in all trauma centres in North Carolina during a 6-year period, accrued 1255 patients. Overall, splenic preservation rates increased to 52%, with 40% of patients' managed non-operatively and 12% by splenorrhaphy. In a recent review of one institution's 30-year experience with splenic injuries over three distinct time periods, Morrell et al. [14] reported an increase in both splenorrhaphy and non-operative management. Morrell noted that despite achieving a splenic salvage rate of 61% during the last 10 years, splenectomy still was the most common method of managing splenic injuries (38.8%), as compared to 30.6% each for splenorrhaphy and non-operative management. An increase in splenic salvage rates has also been reported by others [15] [16].

These and many other reports shows that the new emerging trend towards splenic conservation, either by managing the patient by conservatively or by splenorrhaphy or partial splenectomy.

Conclusion

Trend towards patients with splenic injuries is now becoming more and more conservative. Splenectomy definitely has more serious and life threatening complications. Splenorrhaphy or partial splenectomy should be attempted wherever possible. Non-operative management has become the most common method of managing blunt splenic injuries in hemodynamically stable adult patients. But this kind of treatment modality definitely needs good imaging devices and expertises in the emergency department.

References

1. King H. Schumacker, H. B. Splenic studies: Susceptibility to infection after splenectomy performed in infancy. Annals of Surgery, 136, 239-242 (1952)
2. Pachter HL, Spencer FC, Hofstetter SR, et al. Experience with selective operative and nonoperative treatment of splenic injuries in 193 patients. Ann Surg 1990; 211:583-591.
3. Feliciano DV, Spjut-Patrinely V, Burch JM, et al. Splenorrhaphy: the alternative. Ann Surg 1990; 211:569-582.
4. Malangoni MA, Cue JI, Fallat ME, et al. Evaluation of splenic injury by computed tomography and its impact on treatment. Ann Surg 1990; 211:592-599.
5. Pachter HL, Hofstetter SR, Spencer FC. Evolving concepts in splenic surgery--splenorrhaphy *versus* splenectomy and postsplenectomy drainage: experience in 105 patients. Ann Surg 1981; 194:262-269.
6. DiCataldo A, Duleo S, LiDestri G, et al. Splenic trauma and overwhelming postsplenectomy infection. Br J Surg 1987; 74:343-345. Cullingford GL, Watkins DN, Watts ADJ, Mallon DF. Severe late postsplenectomy infection. Br J Surg 1991; 78:716-721.
7. Lynch AM, Kapila R. Overwhelming postsplenectomy infection. Infect Dis Clin North Am 1996; 10:693-707.
8. Wasvary H, Howells G, Villalba M, et al. Nonoperative management of adult blunt splenic trauma: a 15-year experience. Am Surgeon 1997; 63:694-699.
9. Smith JS Jr, Cooney RN, Mucha P Jr. Nonoperative management of the ruptured spleen: a revalidation of criteria. Surgery 1996; 120:745-750. Hunt JP, Lentz CW, Cairns BA, et al. Management and outcome of splenic injury: results of a 5-year statewide population-based study. Am Surg 1996; 62:911-917.
10. Sclafani SJA, Shaftan GW, Scalea TM, et al. Nonoperative salvage of computed tomography-diagnosed splenic injuries: utilization of angiography for triage and embolization for hemostasis. J Trauma 1995; 39:818-827.
11. Clancy TV, Ramshaw DG, Maxwell JG, et al. Management outcomes in splenic injury: a statewide trauma center review. Ann Surg 1997; 226:17-24.
12. Morrell DG, Chang FC, Helmer SD. Changing trends in the management of splenic injury. Am J Surg 1995; 170:686-690.
13. Garber BG, Yelle JD, Fairfull-Smith R, et al. Management of splenic injuries in a Canadian trauma centre. Can J Surg 1996; 39:474-480.
14. Powell M, Courcoulas A, Gardner M, et al. Management of blunt splenic trauma: significant differences between adults and children. Surgery 1997; 122:654-660.