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Incidence and Management of Splenic Injury in Abdominal Trauma

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Abstract: ***A prospective study of 109 patients with splenic injury due to abdominal trauma was collected from the causalty department of two centers, teaching hospital, Saddam Medical College and a AI-Yarmouk teaching hospital in the period from January 1992-January 1997. The aim of our study is to evaluate the Incidence, causes and management of injured spleen with abdominal trauma taking into account that the spleen is the most common solid organ injured with blunt abdominal trauma[1], and major cause of this trauma Is auto-mobile accident, while In penetrating trauma (stab, shotgun) the incidence of splenic injury with associated injury come next in incidence. 60 patients out of 109 patient have splenic injury due to blunt trauma, while (49) patients got splenic injury from penetrating trauma. Since our policy is to explore all penetrating trauma the problem of early recognition arise In patients with blunt trauma whom need frequent physical examinations and close observation to detect signs of hypovolemia, because most trauma come to casualty at night without availability of aiding diagnostic tools like U/S, or precise lab service splenectomy was undertaken for 104 patients and successful splenoraphy was done for 5 patients. In our study there is no place for conservative treatment because there is no sound clinical or Investigation to depend on it to know with insurance about degree of splenic laceration and whether this laceration is isolated or associated with other intra-abdominal organic injury. Post splenectomy complication were mostly due to pulmonary and secondary wound infection***

Keywords: spleen, trauma, splenectomy

1. Introduction

Pleen is relatively well protected by the rib cage posteriorly and laterally and soft cushioned by surroundingorgans medially and anteriorly.

Still it is one of the most commonly injured organ by abdominal trauma due to compression between anterior abdominal wall or anterior chest wall with posterior rib cage or compression between parities and vertebral columns.[1, 2]

The relative mobility of the spleen and its pedicle also makes it subjected to sudden and forceful dislodgment from its peritoneal attachment and causes tear to the parenchyma and capsule of the spleen[3-4]. The spleen is the most commonly Injured organ In blunt abdominal trauma and frequently injured in penetrating trauma to upper abdomen or lower chest in left posterior aspect.[5, 6]

Splenectomy has long been the preferred therapy for this potentially fatal Injury.[6]

The problem with splenic injury Is that what occur with blunt trauma because not all patients with blunt trauma come with clear criteria indicating splenic injury, also the un-availability of special diagnostic aids to be done for patient like U/S or CT scan in orderto support clinical findings elicited from patient examination.

Hemorrhages from splenic injury may be massive, moderate which is either persistent or stopped temporarily and then recurs days or weeks later[7] in contrast to liver laceration which rarely produce delayed hemorrhage.

The surgeon must be well oriented and do good and precise clinical evaluation for patient with blunt trauma which is mostly associated with Injury to spleen.[7]

Splenic salvage and conservative treatment modality specially In pediatric age group is proceeding rapidly in well equipped trauma centers specially after recognition of post-splenectomy sepsis syndrome.[8]

Some authors have documented Increase susceptibility to coccal infection specially in pediatric age group after splenectomy and sporadic reports suggested of mostsusceptibility in adult group.[11]

Most investigator believes that it is related to reticule-endothelial system and this consistent with higher risk in infant in whom spleen represent a large proportion of reticule-endothelial system.[11]

There are interesting reports of increased incidence of post - splenectomy hepatitis which was followed by 30% mortality rate.[12]

2. Materials and Methods

One-hundred nine (109) patients with injury to spleen due to abdominal trauma as showed in table-1.

Table 1: Incidence and causes of traumain109 patients

Type of Trauma	Number of patients	Percentage
A. Blunt Trauma	60	55.1%
1. RTA	67	61.6%
2. Fall	20	33.3%
3. Assult	3	5%
B. Penetrating	49	44.9%
Trauma	30	61.2%
1. Stab	19	38.8%
2. Gun shot		

As we can see from table-1, blunt trauma is major cause of splenic injury (55.1%) and mostly caused by road-traffic

accident while fall represent the second cause in blunt trauma.

Penetrating injury mainly caused by stab and shotgun. The incidence of associated intra-abdominal injuries should be taken in consideration regarding the planning of the approach in treatment of splenic injury.[8]

From table-2 we notice only (53) patients (88.3%) have associated injuries, while only (7) patients (11.7%) out of (60) patients have isolated splenic injury.

Table 2: The associated injury in blunt trauma (60) patients 55%

Type of associated injury	No.	Percentage
Splenic injury + Extra-abdominal injury	28	55.1 %
Splenic injury + Intra-abdominal injury	15	25%
Splenic injury+abdominal+ extra-abdominal injury	10	16.7%

In penetrating trauma only (10) (20.4%) patients out of (49) patients (44.9%) have isolated splenic injury, while the associated splenic injuries Seen in (39) patients (79.6%) were distributed as shown in table-3.

Table 3: The associated injury in penetrating trauma (49) patients (44.9%)

Type of injury	No.	Percentage
Splenic injury + abdominal injury	27	55.1%
Splenic injury + extra-abdominal injury	8	16.3%
Splenic injury lntra-abdominal+ extra-abdominal	4	8.1%

In our study (75) patients were male (68.8%) and (34) patients are female (31.2%). Patients with blunt trauma had high incidence of extra-abdominal & intra-abdominal like head, chest wall injuries.

While patient with penetrating trauma had high incidence and chest, diaphragm, stomach, liver injuries as shown in table -4.

Table 4: Associated injuries in (53) patients with blunt trauma

Associated injury	*No.*	*Percentage*
A. Abdominal	15	28.3%
Liver	7	13.2%
Pancreas	4	7.5%
Stomach	1	1.9%
Kidney	1	1.9%
Colon	1	1.9%
B.Extra-Abdominal	30	56.6%
Extrmltres	12	22.6%
Head injury	7	13.2%
Ribs	6	11.3%
Pelvis	4	7.5%
spine	1	1.9%

Associated injuries in (39) patients with penetrating trauma

Associated injury	*No.*	*Percentage*
Chest	11	28.2%
Stomach	9	23.1%
Diaphragm	7	17.9%
Liver	5	12.8%
Lt kidney	3	7.7%
Colon	2	5.1%
Small Bowel	1	2.6%
Pancreas	1	2.6%

The diagnosis was highly made on clinical ground in the casualty specially for traumas which arrive after the working morning hours at evening or night where the diagnostic aids were not available our policy was to explore all penetrating wounds of the abdomen.

The problem raised mainly in patient with blunt trauma where the diagnosis was made on history, physical examination and the presence of clinical signs of hypovolemic as well we used peritoneal tapping as an aid for our clinical Judgment.

Four - quadrant or bilateral flanks abdominal tapping were used to assist in the diagnosis and carried a high rate of accuracy I depend in diagnosis in this study on clinical grounds (vital signs chart). In addition to the great help of peritoneal tapping which were used to support the diagnosis speciallyin doubtful cases.

In this study peritoneal tapping was carried out in (40) patients out of (60) patients with blunt trauma In whom equivocal abdominal signs predominant and In whom reliable physical examination and history were not obtained either due to associated head or spinal cord Injuries or Alcoholic consumption. In our study it was done for (40) patients out of (60) patients with blunt trauma and the result found in (35) patients which proved accurate and (5) patients with false negative result due to technical errors was not taken in consideration.

The only diagnostic aids available in casualtyis plain X-ray and some laboratory investigation which were of no such significance to establish the diagnosis In blunt trauma.

So main criteria for the diagnosis of splenic injury in blunt trauma in our study is serial physical examination by same examiner and chart of vital signs which mostly showed hypovolumia inspite of adequate replacement added to peritoneal tapping.

Signs of hypovolumia were present on admission in (45) patients (41.3%) arrived with pallor and increase pulse rate, hypotension seen in patients with associated injuries mostly.

Blood transfusion required for (62) (56.996) patients out of (109) patients mostly for patients with associated injuries.

The type of splenic injuries encountered in our patients were capsular tear, hailer disruption, subcapsular hematoma. Fragmentation and avulsion as shown in table 5 and table -6.

Table 6: Types of splenic Injuries in penetrating trauma (49) patients

Splentio injury	*No.*	*Percentage*
Capsular Tear	31	63.3%
Hilar injury	11	16.3%
Fragmentation	7	14.3%

Table 5: Types of splenic Injuries In blunt trauma (60) patients

Splenic injury	*No.*	*Percentage*
Capsular Tear	36	60 %
Subcapsular hematoma	16	26.7 %
Hilar injury	5	8.3 %
Fragmentation	2	3.3 96
Avulsion	1	1.7 %

Complications were frequently pulmonary like aspiration pneumonia, atelectasis, pneumonitis were seen in (12) patients, subphrenic abscess were seen in (3) patients, pancreatitis (2), sepsis (2), as shown in table -7.

Table 7

Complications	Blunt trauma	Penetrating trauma
Respiratory	5 (8.3%)	7 (14.3%)
Sub phrenicAbases	1 (1.7%)	2 (4.1%)
Pancreatitis	1 (1.7%)	1 (2%)
Sepsis	1 (1.7%)	1 (2%)

The overall mortality in blunt trauma were (3) patients and in penetrating trauma were (4) patients. But the high mortality rate were encountered generally in those with severe associated Injuries and those with severe hypovolumia. The adequacy and rapidity of early resuscitation when receiving the patient in the causality also play significant role. Splenectomy were done classically for (104) patients (95.4) out of (109) patients and hopefully splenoraphy for 5 patients (4.6%) out of (109) patients usually below 16 years, 3 of them did well post-operatively and 2 patients need re-exploration because of hypovolumia due to recurrence of hemorrhage. Splenectomy remain the standard and preferable treatment for most splenic injuries.[6]

3. Discussion

Splenectomy is still regarded as the preferable treatment for doubtful splenic injuries. In this study 53 patients (88.3%) out of 60 patients with blunt trauma included in our study had sustained serious associated intra-abdominal injuries, in addition to splenic injury that required operative intervention and 39 patients (79.6%) out of 49 patients with penetrating trauma were similarly affected.

This compared with study was done by Andrey[1] in 1981 in Saint-paul Ramsay hospital in USA, 80% of patients with blunt trauma have associated injuries whether extra abdominal or intra- abdominal or both. In addition to splenic injury, and 59% of patients with penetrating trauma were similarly affected.

There is no place for conservative treatment in our series noted as in Burengton study because that the risk of this therapy lies in missing serious associated intra-abdominal injuries.[2]

We were hoping and trying to encourage the conservative approach which showed good result as published. In 1952. King & Schumacker brought attention to serious complications which occur in post Splenectomy state and the serious post-Splenectomy sepsis syndrome, this is coupled with the not uncommon finding of splenic injury which has ceased to bleed at time offirst laparotomy had interest in the non-operative therapy particularly in pediatric age group.[3, 4, 5, 6]

Splenectomy for splenic injury still the preferable treatment and reducing mortality rate from nearly 100% at 1930 to the turn of this century to 25%.[7, 8]

The mortality rate in our study were 3 patients of Blunt trauma and (4) cases with penetrating trauma which occur mostly in severe associated injuries and delayed arrival of patients.

The technique of splenic repair (Splenorraphy) had been regarded as alternative to non-operative therapy, it gives a chance for preservation of splenic function while at same time giving surgeon the time to evaluate the other associated intra-abdominal injuries.

Where the suturing technique may be easier in children than in adult because of greater ratio of capsule to pulp.[9]

In our study (5) patients with minor capsular and subcapsular affection of spleen underwent successful splenic repair (Splenorraphy) (3) of them did well post-operatively and only (2) patients required reexploration for recurrent hemorrhage and Splenectomy done for them.

In study done 1980 by Slater on (85) patients with splenic injury treated by Splenorraphy and (70) patients did well post-operatively.[10]

Post operative complications in our study (18) patients (16.5%) out of (109) patients, all patients in our study given post - operative prophylactic antibiotics while they are in the hospital and prophylactic antibiotics were prescribed for them specially pediatrics age group till 18 years of age, vaccine (pnemovax) was not given because it is not available in our hospital. Some authors have documented increase susceptibility to streptococcal infection specially in pediatrics age group after Splenectomy and sporadic reports suggested of increased susceptibility in adult group.[11]

4. Conclusion

1) As splenic injury is fatal injury and its complications is frequent, and early recognition of these injuries is mandatory. As in our study frequent clinical examination and other beside diagnostic aids such as peritoneal tap which justified our diagnosis and aid in decision for early proper management of blunt trauma because it gives high accuracy rate.
2) Intra - abdominal Injuries associated with splenic injury at high rate (more than 50%). So conservative non-operative management lie in missing of these concomitant serious intra-abdominal injuries and increase mortality rate.

3) Spenectomy is preferable operation and its complication post -operatively were less compared with selenography which was tried to patient below 16 years of age and high possibility of post - operative hemorrhage.
4) So Sphenorraphy must be selected for such patients regarding the type of injury and age of the patient to get successful result.

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