



ORIGINAL ARTICLE

OPERATIVE VERSUS NON-OPERATIVE MANAGEMENT OF SPLENIC INJURIES IN HEMODYNAMICALLY STABLE TRAUMATISED PATIENTS

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ABSTRACT

Background: We aimed to compare clinical outcomes and early adverse events of operative management and non-operative management in splenic injuries in hemodynamically stable patients and identify the prognostic factors.

Methods: It is a prospective, descriptive, analytical study. All consecutive patients with blunt splenic trauma who were admitted to the Department of General Surgery at Zagazig University Hospitals were included in the study. On admission, all patients will be resuscitated according to the ABCDE approach of Advanced Trauma Life Support. Patients were diagnosed clinically and confirmed radiologically by ultrasound and computed tomography for all cases. Patients were investigated by complete blood count and routine lab.

Results: Thirty patients underwent non-operative management. Of them, nineteen patients responded to the non-operative management, and the remaining eleven patients required splenectomy due to failure of the non-operative management.

Conclusion: Non-operative management of blunt solid organ injury has become the rule rather than the exception. The key decision point is the hemodynamic stability of the patient also the grade of injury and available hospital resources are considerable predictors for successful non-operative management.

Keywords: splenic trauma, non-operative management, operative management.



INTRODUCTION

Spleen is a highly vascular lymphoid organ, located in the left hypochondrium. Despite its protection by the left 9th, 10th, and 11th ribs and its intercostal muscles, it is commonly injured with direct left upper abdominal quadrant trauma causing massive intra-peritoneal bleeding. [1].

Injury to the spleen is commonly induced by blunt trauma which is more common than penetrating trauma. [2].

The mainstay in the decision of management is hemodynamic stability on the patient, splenic injury grade, and associated other injuries. [1].

The most important factor that decides the initial course of management with emergent surgical exploration is any patient with signs of hemodynamic instability and evidence of peritonitis or evisceration in this case surgical exploration is mandatory [2].

Successful observation during non-operative management for splenic trauma depends on two factors, proper patient selection and adequate resources with the presence of sufficient

flexibility to allow urgent intervention if surgery is required [3].

In the past, controlling splenic injury was mainly by operative management, splenectomy was done whatever the type of injury. After that surgeons focused on trying to preserve the spleen in traumatized patients, based on studies that demonstrated the importance of the spleen in the immunological and hematopoietic system and encouraging conservative operations, such as splenorrhaphy, spleen wrapping operation, and splenic segmental resection [3].

The non-operative management of splenic injuries in traumatized patients is a preferred option in patients with stable hemodynamics but in patients with unstable hemodynamics, there are precautions about non-operative management in those patients. [4].

PATIENTS AND METHODS

Technical design:

This is a prospective, descriptive, analytical study. The study included thirty patients who presented with blunt splenic trauma admitted to Zagazig

University Hospital in the period from December 2017 to November 2018. Patients were fully informed about the procedure. Written consent was obtained

This study was carried out on patients who had the following **inclusion criteria**, all trauma cases with blunt splenic injury in a hemodynamically stable state and no massive injury. This thesis included different age groups and both sexes.

While the exclusion criteria were severely injured patients with a neurological or cardiothoracic insult that require intensive care unit admission and mechanical ventilation, penetrating splenic injury, patients with blunt splenic injury in a hemodynamically unstable state and no massive injury, patients with evidence of perforated viscus.

I. Operational design: Personal history: name, age, sex, occupation, smoking, present history by analysis of the complaint and associated diseases, history of chronic illness.

Clinical examination: This included vital signs, general examination, and local examination: abdominal rigidity, tenderness, distension, evidence of trauma as bruises, and ecchymosis.

Investigation: Routine investigations: Complete blood count, random blood sugar, coagulation profile, Kidney and Liver function tests.

An abdominal sonogram for trauma was performed on all patients by a radiologist. The decision to perform splenectomy was taken by the attending trauma surgeon based on factors such as hemodynamic stability, and degree of splenic injury on computed tomography.

Hemodynamic instability was defined as systolic blood pressure < 90 mmHg despite adequate fluid replacement.

Patients who were managed non-operatively were monitored in the ICU.

Bed rest for 5 days was initiated for patients with injuries graded 3 or lower. Standard of care consisted of infusion of crystalloid fluids or packed red blood cells as required to keep systolic blood pressure > 90 mmHg and hemoglobin concentration > 8 g/L. For patients suffering from ischemic heart disease hemoglobin was kept > 10 g/L. The diagnosis and grading of splenic injury were established by CT scan. The follow-up was done by CT scan of the abdomen to evaluate the degree of splenic healing was performed a week, 1, 3, and 6 months after injury.

Non-operative management commonly involves a period of bed rest, limited oral intake, antibiotics, serial hemoglobin and hematocrit value, continued observation, and repeated imaging which require a highly advanced trauma center.

RESULTS

The data was computerized and statistically analyzed using SPSS version 25. Quantitative data were expressed as mean and sd. The Mann-Whitney test was used to find differences between quantitative data. Qualitative data were expressed as numbers and percentages. The Chi-square test was used to find differences between qualitative data. P value of < 0.05 is significant and <0.001 is highly significant.

During the study period, 30 patients aged from 3 to 55 years with a mean \pm SD age of 28.7 ± 12.72 met the inclusion criteria. Nineteen of them with a mean age of 21.52 years were successfully treated non-operatively. The remaining 11 with a mean age of 37.18 years needed operative management due to the failure of conservative management. Comparison between the ages of 2 groups using the Mann-Whitney U Test shows significant relation between age & plan of management which means that age is inversely proportional to successful non-operative treatment of U value = 0 & P value <0.001 (**table 1-2**). 14 of 30 patients (46%) were due to fall from height (FFH). 10 of them were successfully treated non-operatively. - The remaining 4 patients needed operative interference. 15 of 30 patients (50%) were due to road traffic accidents. -9 of them were successfully treated non-operatively - The remaining 6 patients needed operative interference. The remaining 1 patient (3.6%) was due to direct blunt trauma (Blow) to the abdomen and was treated operatively. Comparison between different mechanisms of injury & plan of management using Chi-square showing non-significant relation between them of P value = 0.33 (**table 3**).

Seven patients of thirty (23.3%) were of grade I all of them showed successful non-operative management, eleven patients (36.7%) were of grade II ten of them showed successful non-operative management, and the remaining patient needed operative Interference, three patients (10%) were of grade III one of them showed successful non-operative management and the remaining two patients were needed Interference, four patients (13.3%) were of grade IV one of them showed successful non-operative management and the remaining three patients needed operative Interference, five patients (16.7%) were of grade V all of them needed operative interference.

Comparison between different radiological grades by C.T study & plan of management using Chi-square showing significant relation which means that grades inversely proportional to successful

non-operative treatment of P value <0.001. (Table 4). Twenty-seven of the total thirty patients received blood transfusion and the three didn't need it because of their normal Hb levels and they managed non-operatively, twelve of nineteen patients who were managed non-operatively, and zero patients who were operated upon received less than four units of blood, Four of the nineteen patients who were managed non-operatively and all patients who were operated upon received more than four units of blood.

Comparison between blood transfusion & plan of management using Chi-square showing significant relation which means that blood transfusion is inversely proportional to successful

Table (1): Distribution of management among the studied group

N. of patients	Non-operative	Operative
30	(%63.3)19	(36.7)11

Table (2): Age and sex distribution among the studied group

	.No	%
Age (Mean ± SD) (Years)	11.91 ± 28.7	
:Sex		
- Male	23	%76.67
- Female	7	%23.33
:Associated co-morbidities		
- Hepatic	3	%10
- Cardiac	2	%6.6
.The time between trauma and E.R arrival (Mean±S.D) (hours)	1.1±3.5	

Table (3): Mode of trauma distribution among the studied group

FFH	(%71.4)10	(%28.6)4	(%46.6)14
RTA	(%60)9	(%40)6	(%50.0)15
Direct trauma	(%0.0)0	(%100)1	(%3.4)1

Table (4): Relation between grades of injury and type of management

	Non-operative	Operative	Total
Grade I	(%100) 7	(%0.0) 0	(%23.3) 7
Grade II	(%90) 10	(%10) 1	(%36.7) 11
Grade III	(%33.3) 1	(%66.7) 2	(%10.0) 3
Grade IV	(%25) 1	(%75) 3	(%13.3) 4
Grade V	(%0.0) 0	(%100) 5	(%16.7) 5
Total	19	11	30

Table (5): Relation between blood transfusion and type of management

	Non-operative	Operative	Total
No Blood Transfusion	3	0	3
Less than 4 Units of Blood Transfusion	12	0	12
More than 4 Units of Blood Transfusion	4	11	15

Table (6): Relation between HB level and type of management

	Number	Mean Hb	SD
Non-operative	19	9.1	2.1
Operative	11	6.27	0.78
Total	30	8.06	2.21

non-operative treatment of P value <0.001. (Table 5). On admission, thirty patients were checked for Hb. The percentage during admission varies from 5 gm to 14 gm with a mean ± SD Hb. of 8.06 ± 2.21. Nineteen of the patients with a mean Hb of 9.1gm were successfully treated non-operatively. The remaining eleven patients with a mean Hb of 6.27gm needed operative management due to failure of NOM management.

Comparison between Hb. of 2 groups using the Mann-Whitney U Test showing significant relation between Hb. percentage& plan of management of U value = 17& P value <0.001. (Table 6)

DISCUSSION

For decades, splenectomy remained the line of treatment for all grades of splenic injuries, even minors. This was based on the false belief that the spleen has no major role in adults so there was no need for conservative management to avoid life-threatening bleeding. Nowadays conservative management has become the main line of treatment after awareness of the role of the spleen in the immunological system and the fear of overwhelming post-splenectomy sepsis (OPSI). [5].

The changing mode of management in splenic injuries requires a good analysis of risks and benefits to protect the patient from life-threatening hemorrhage and the possible viral infections that resulted from blood transfusion. Besides, recent advances in radiological modalities like computerized tomography (CT) scanning and ultrasound help us to detect the suitability of patients for conservative management. [5].

In our study period 30 patients underwent non-operative management, of them, 19 patients showed successful management, and the remaining 11 patients required splenectomy due to unsuccessful non-operative management a percentage of 63.3 versus 36.7 respectively which compares well to the study showing a success rate of 75.6%. [6].

Regarding age, our study showed that 19 of the patients with a mean age of 21.52 years were successfully treated non-operatively and the remaining 11 with a mean age of 37.18 years needed operative management due to failure of conservative management. The relation between age and the plan of management is significant which means that failure of NOM was associated with increasing age which is comparative to other studies which said that patients who failed non-operative management were more likely to be older than 55 years [6]. This study revealed that grade I/II injuries showed success in non-operative management more than grade III-V injuries. None of the patients with grade I injuries failed non-operative management. Matching with some other studies these patients could be discharged after one day, 90% of patients with grade II injuries were managed by non-operative management. [7]. The failure rate for patients presented with grade II splenic injuries who were managed non-operatively was 10%. The discharging of these patients is accepted with warning the patient from risk of re-bleeding. Patients presented with grade III-IV injuries who were managed non-operatively showed failure

rate of 83.3%, the results were higher in some studies and other studies had similar rate [8]. Our study was compared to other studies on high failure rate in patients presented by grade V injuries (0%). Some studies showed high failure rates of non-operative (more than 50%) for patients with grade IV-V injuries. [9].

The study of Smith RS and his colleagues showed success rates of non-operative management in patients presented with grade I and II injuries more than grades III-V. In patients with grade V injuries show lower success than patients with grades III and IV, but low percentage of patients with grade V in this study doesn't reveal significance. [10].

The requirement for blood transfusion after admission is probably a sign of the failure of non-operative management. Five units or more than that in blood transfusion related to a high rate of failure. [11]. Interestingly, in our study, 19 patients underwent NOM 4 of them required (21%) more than 5 units of blood while all the 11 patients underwent OM (100%). That reveals a significant relationship between massive blood transfusion and the plan of management. In this study low hemoglobin level has no relation with decision of operative management, it does predict the failure of non-operative management. This is because the operation is not based on hemoglobin levels but on the instability of the patient's haemodynamics. In this study, 30 patients were checked on admission for Hb. Percentage during admission varies from 5gm to 14gm with a mean \pm SD Hb. of 8.06 ± 2.21 . Nineteen patients with a mean Hb of 9.1gm were successfully treated non-operatively. The remaining 11 with a mean Hb. of 6.27gm needed operative management due to failure of NOM management. That showed that HB level is a significant factor for failure of non-operative management. [11].

CONCLUSION

Non-operative management of blunt solid organ injury has become the rule rather than the exception. The key decision point is the hemodynamic stability of the patient also the grade of injury and available hospital resources are considerable predictors for successful non-operative management.

Conflict of interest: None

Financial Disclosures: None

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