Bulletin of the *Transilvania* University of Braşov
Series VI: Medical Sciences • Vol. 8 (57) No. 1 - 2015

MANAGEMENT OF BLUNT SPLENIC INJURIES IN CHILDREN – A PROSPECTIVE STUDY

**M. HOGEA[1, 2] A. MIRONESCU[1,3] A. PASCU[1]
A.BANCIU[2] M. MOGA[1] I. ŞAMOTĂ[1]
C. COBELSCHI[2]**

Abstract: *The spleen is one of the most vulnerable organs in case of abdominal trauma. Nonoperative management of splenic trauma is successfully applied in children, but there is not a standardized protocol for using this type of treatment. We performed a prospective study started in 2013, including by now 10 patients, mean age 10.7 years (2-15 years), admitted to the Children's Hospital of Brasov. The spleen was preserved in all patients and in 90% of the cases the nonoperative management was successfully applied. The study also revealed the importance and the limitations of imaging methods (ultrasound and computed tomography) in selecting and monitoring patients with spleen injury.*

Key words*: splenic injury, nonoperative management.*

1. Introduction

The spleen, one of the most vulnerable organs in case of abdominal injury, is still a matter of controversy regarding its therapeutic approach in trauma [1], [5], [8].

In 1911, Kocher suggested splenectomy as the only treatment for splenic trauma because it provided a permanent and rapid haemostasis [3], [6], [11]. This indication has been extensively discussed and challenged, taking into account the risk of infection after splenectomy, especially in children (OPSI – "Overwhelming postsplenectomy infections") [2], [4], [7], [9].

Therefore, nonoperator management of splenic trauma in children is successfully applied in most cases, but a standardized protocol for this type of treatment indication has not been yet established [3], [5], [10].

2. Patients and Methods

The main purpose of the study is to confirm that the nonoperative management for splenic injuries in children represents the best and safest approach.

It is a prospective study started in 2013 and, by now, 10 patients [mean age 10.7 years (2-15 years)], admitted to the

[1] *Transilvania* University of Braşov, Faculty of Medicine.
[2] Clinical Emergency County Hospital, Brasov
[3] Clinical Children Hospital of Brasov

Children's Hospital of Brasov, were included. The main inclusion criterion was the presence of a blunt splenic trauma.

In order to adequately assess the severity of splenic trauma, clinical, biological and imagistic monitoring of each patient was performed.

Contrast enhanced tomography is the best imagistic investigation for the diagnosis and quantification of splenic trauma [5]. CT scans can also serve to quantify other injuries associated with splenic trauma.

Because most of the patients presenting splenic injury are polytraumatized, it is necessary to quantify the severity of associated injuries [1], [5].

Therefore a series of scores necessary for evaluating trauma patient were analysed:

- GLASGOW COMA SCORE (GCS)
- ABBREVIATED INJURY SCALE (AIS)
- INJURY SEVERITY SCORE (ISS)
- SPLEEN INJURY SCALE (SIS)

3. Results and Discussion

Splenic injuries were more common in boys [n = 9 (90%) patients], and in n = 5 (50%) patients were the consequence of aggressions.

In 90% of the cases the nonoperative management was successfully applied One single patient needed emergency laparotomy, because of the CT findings, but splenectomy was not necessary (Fig. 1).

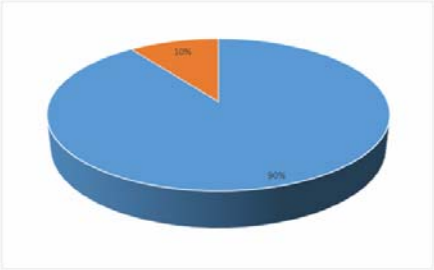

Fig. 1. *Operative vs. nonoperative management in splenic trauma*

Haemoperitoneum volume was an important determinant of splenic trauma management. Haemoglobin and haematocrit were also taken into account for a more accurate assessment *(Fig. 2).*

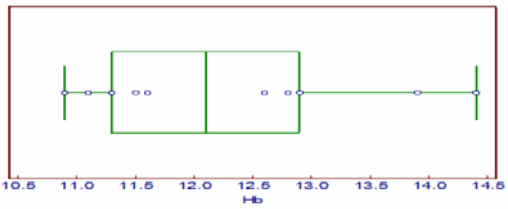

Fig. 2. *Haemoglobin (Hb)[mg/dL] levels in the study group*

Tachycardia and low systemic arterial blood pressure correlated with the severity of splenic injury quantified by trauma scores (r = 0.56, P < 0.001).

All trauma scores were registered and are showed below *(Fig. 3, 4, 5)*:

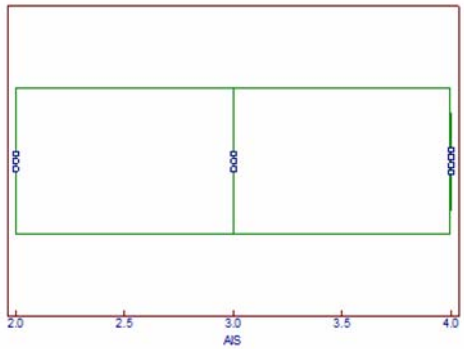

Fig. 3. *AIS in the study group*

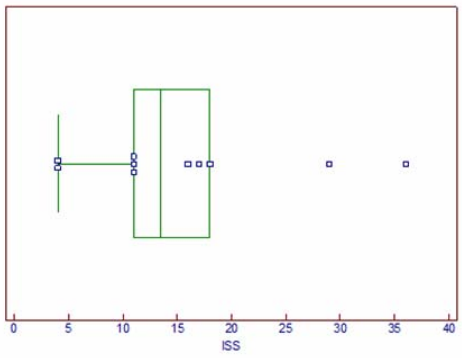

Fig. 4. *ISS in the study group*

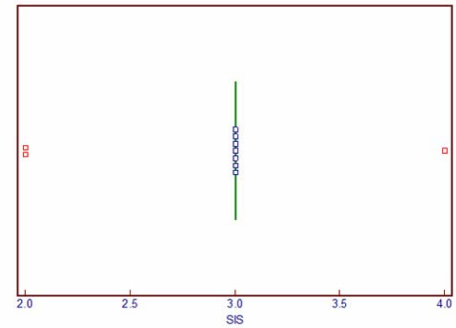

Fig. 5. *SIS in the study group*

There was no significant correlation between the injury severity score and the spleen injury scale (r = 0.35, P = 0.1865). This shows that clinical, biological and imagistic monitoring is not sufficient and it must be correlated with an overall trauma score when assessing a patient with splenic trauma.

There was also a strong correlation between the injury severity score and the duration of hospitalization (r = 0.7678, P = 0.0095) (Fig. 6, 7).

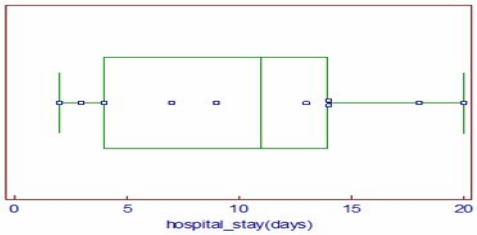

Fig. 6. *Duration of hospitalization in the study group*

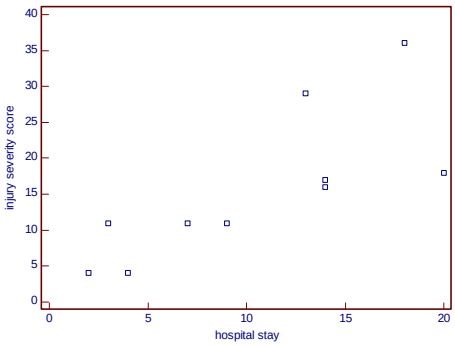

Fig. 7 *Correlation between duration of hospitalization (days) and ISS*

4. Conclusions

Conservative treatment of splenic trauma in children has been successfully applied in all recorded cases.

One patient needed exploratory laparotomy because of the severity of lesions (observed on CT), but even though did not required splenectomy. In this patient trauma scores were:

- GCS: 12
- ISS: 29 (on a scale from 0 to 75)
- SIS: 3 (on a scale from 1 to 5)

Imaging methods (ultrasound and CT) are important, but have some limitation in selecting and monitoring patients with spleen injury.

Creating and implementing a strict protocol in managing blunt spleen trauma is crucial and could significantly improve not only the survival rate, but also the quality of life in affected children.

Acknowledgments

This study is supported by the Sectorial Operational Programme Human Resources Development (SOP HRD), ID134378, financed from the European Social Fund and by the Romanian Government.

References

1. Coburn, M.C., Pfeifer, J., Deluca, F.G.: *Nonoperative management of splenic and hepatic trauma in the multiple injured pediatric and adolescent patients*. In: Arch Surg. (1995), vol. 130, p. 332-338.
2. Davidson, R.N., Wall, R.A.: *Prevention and management of infections in patients without a spleen*. In: Clinical Microbiology and Infection, vol. 7 (2002) p. 657-660.
3. Flancbaum, L., Dauterive, A., Cox, E.F.: *Splenic conservation after multiple trauma in adults*. In: Surg

Gynecol Obstet (1986), vol. 162, p. 469–473.
4. Francke, E.L., Neu, H.C.: *Postsplenectomy infection.* In: Surg Clin N Am (1981), vol. 61, p. 135–155.
5. Gavant, M.L., Schurr, M., Flick, P.A., Croce, M.A., Fabian, T.C., Gold, R.E.: *Predicting clinical outcome of nonsurgical management of blunt splenic injury: using CT to reveal abnormalities of splenic vasculature.* In: AJR Am J Roentgenol (1997), vol. 168(1), p. 207-212.
6. Jalovec, L.M., Boe, B.S., Wyffels, P.L.: *The advantages of early operation with splenorrhaphy versus nonoperative management for blunt splenic trauma patient.* In: Am Surg (1993), vol. 59, p. 698–705.
7. Kyaw M.H., Holmes E.M., Toolis F., Wayne B., Chalmers J. : *Evaluation of Severe Infection and Survival after Splenectomy.* In: Am J Med (2006), vol. 119, p. 271 e1-e7.
8. Koury, H.I., Peschiera, J.L., Welling, R.E.: *Non-operative management of blunt splenic trauma: a 10 year experience*. In: Injury (1991), vol. 22, p. 349–352.
9. Krivit, W.: *Overwhelming postsplenectomy infection.* In: Am J Hematol (1977), vol. 2, p. 193–201.
10. Luna, G.K., Dellinger, E.P.: *Nonoperative observation therapy for splenic injuries: a safe therapeutic option?* In: Am J Surg (1987), vol. 153, p. 462–468.
11. Resciniti, A., Fink, M.P., Raptopoulos, V., Davidoff, A., Silva, W.E.: *Nonoperative treatment of adult splenic trauma: development of a computed tomographic scoring system that detects appropriate candidates for expectant management*. In: J Trauma (1988), vol. 28, p. 828–831.