

Conservative Non-Invasive Treatment of Splenic Trauma-Our Experience

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Abstract

Background: conservative treatment of splenic trauma reduces unnecessary surgical interventions and depends on the context and healthcare center where they are treated.

Objective: to describe the results of non-invasive conservative treatment of patients with blunt abdominal trauma with splenic injury and correlate them with the complexity of our center.

Material and Methods: a series of patients with blunt abdominal trauma with splenic injury admitted in the period 2012-2022 were analyzed. Variables such as: clinical conditions of admission, trauma kinematics, associated injuries, evolution during hospitalization, place of hospitalization and result of the treatment established were analyzed.

Results: a total of 102 patients were included, the most frequent trauma kinematics was motorcycle/car (47.1%), the success rate of non-operative treatment was 66.6%. The degree of tomographic lesion and the success of non-operative treatment showed a significant association ($p < 0.001$).

Conclusion: we consider the success rate of the non-invasive conservative modality applied in our center to be of great importance, despite not being prepared, according to the existing literature, to apply a TNO modality, due to not having the necessary human and technological resources.

Keywords: blunt abdominal trauma; splenic injury; non-operative treatment; non-invasive conservative treatment

Introduction

Known as non-operative treatment (NOT) of abdominal trauma, it is indicated in patients with abdominal injuries so as not to undergo surgery. This is a dynamic approach whose objective has been to reduce the number of unnecessary laparotomies and their complications [1]. In blunt abdominal trauma, the spleen is the most frequently injured organ, with an incidence that varies between 30 and 45% [2]. The diagnostic and therapeutic approach to these patients has undergone an important change and evolution in recent years, from physical examination to computed tomography (CT) for diagnosis [2], and from scheduled splenectomy to all patients regardless of the degree of the injury to non-operative management, which would involve conservative treatment with non-invasive modality (NICT) such as observation and follow-up; and spleen-conserving invasive modality (ICT) such as Partial splenectomy, embolization, use of biological adhesives and splenorrhaphy. Currently, conservation of the spleen, both through non-operative treatment with NICT and conservative surgery, seems to be the most accepted therapeutic

modality in cases of blunt and penetrating trauma affecting this organ [1].

At the moment there is evidence in favor of carrying out this management in highly complex centers with conditions to receive these patients, that have trained human resources and adequate technological resources, being decisive factors for the safety in this conservative behavior, since they are the that define the limits for the indications of TNO (availability of the operating room 24 hours a day, spiral CT, blood bank and possibility of performing arteriography-embolization) [4], with no pre-established protocols for the management of this condition or bibliography at the national level. that recommends its implementation, in centers of minor complexity that do not meet the necessary human resource and infrastructure requirements, which allow establishing the modality of a non-invasive conservative treatment, nor studies of acceptable evidence that support them. The objective of this publication is to describe the results of non-invasive conservative treatment of patients treated for blunt abdominal trauma with splenic injury and to correlate them with the

complexity of our center, which does not have the total necessary infrastructure described in the literature to implement this conservative mode.

Material and Methods

An observational, descriptive, retrospective, cross-sectional study was carried out on a series of cases including patients admitted to the General Surgery service of the Hospital Interzonal General de Agudos Dr. Prof. Luis Güemes, in the period of 10 years, from 2012 to 2022, with a diagnosis upon admission of abdominal trauma with splenic injury. Patients admitted with a diagnosis of abdominal trauma and an imaging study such as ultrasound and/or computed tomography with intravenous contrast that suggested splenic trauma were included. Patients with open abdominal trauma and those with closed abdominal trauma without EFAST (Extended Focused) were excluded from this study. Assessment with Sonography in Trauma) on admission. The variables analyzed: age, sex, time of evolution at admission, hemodynamic status at admission, peritoneal signs at admission, presence of initial surgical indication, degree of tomographic lesion, degree of hemoperitoneum, minor associated injuries, days of hospitalization, sector of hospitalization, need for transfusions and causes of termination of TNO.

The initial surgical indication was considered instability and hemodynamic abnormality, abdominal peritonism, and severe associated injury. A serious associated injury was considered one that, due to its presence, indicates the initial surgical conduct as a hollow viscus injury and/or vascular injury, excluding severe traumatic brain injury (severe TBI). Minor associated injuries were classified as those injuries associated with splenic trauma that, due to their minor severity, did not require major surgical treatment and/or did not interfere with the follow-up of non-invasive conservative treatment, also excluding, from this category, severe TBI and considering it as a single category. Hemoperitoneum was classified according to the number of abdominal spaces with free fluid as mild (1-2 spaces), moderate (3-4 spaces) and severe (more than 4 spaces). The tomographic classification of splenic injury of the American Association for the Surgery of Trauma (The American Association) was used. for the Surgery of Trauma - AAST) [5]. Patients admitted to the general ward had strict 24-hour follow-up by 1st and 2nd year resident doctors of General Surgery and the Chief

General Surgeon of the Surgery Ward for 8-14 hours and then the follow-up was carried out by the resident doctor of General Surgery on call (1st to 4th year) together with General Surgeon on call. In the intensive care unit, follow-up was carried out by the therapist, 2nd year resident doctor in Surgery and Chief Surgeon of the Surgery Room.

For data collection, the statistical database of the General Surgery Service Access Office and the SISC hospital statistical database (Integrated Central Supervision System) were used. For statistical analysis, the IBM SPSS Statistics program (International Business Machines - Statistical) was used. Package for the Social Sciences). Variables were related such as: degree of splenic injury, associated injuries, degree of hemoperitoneum, association with severe ECT, place of hospitalization with successful TNO, using Chi [2] statistical test (Pearson's Chi-square) and, when the expected count was greater at 20%, Cramer's V test was used for association of polytomous variables.

Those tests with a value of $p < 0.05$ were considered significant; the confidence interval was 95%.

Results

In the period of 10 years, 102 patients (N=102) with a diagnosis of blunt abdominal trauma with splenic injury were admitted to our center. 88.2% men (90) and 11.8% women (12), with an average age of 31 years. At the time of hospital admission, 84 of them had less than 48 hours from the time of the trauma, while 12 were admitted in the interval between 48 hours-7 days and in 6 cases the consultation was beyond 7 days. The most frequent kinematics of the trauma were motorcycle/car with 47.1%, followed by car/car, motorcycle skid and aggression by third parties with 11.8% each respectively and the remaining percentage distributed among other modalities (Table 1). On admission, the majority had hemodynamic stability and normality (94.1%) and absence of peritoneal signs (76.5%) for which they were prescribed TNO TCNI modality. Of the total, 30 cases had at least one initial surgical indication, so ONT was not indicated and the initial treatment was surgical. Of the patients who underwent TNO TCNI modality (72 patients), in 66.6% (48) of the cases the treatment was successful, while they had to undergo surgery in 33.3% of the cases due to failure of TNO, of which 18 cases were due to the presence of abdominal peritonism, and 6 cases were due to the presence of abdominal peritonism and instability and hemodynamic abnormality. Of the patients who had

to undergo surgery because conservative treatment was not successful, 100% of them underwent surgery within 24-48 hours of admission. In all of them the

surgical treatment was splenectomy. Of the patients who underwent TNO TCNI modality, 5.9% (6) required transfusion as part of the treatment.

Table 1: Kinematics of trauma. Frequency distribution.

Kinematics of Trauma		
	Frequency	Percentage
Motoauto	48	47.1
Auto/auto	12	11.8
Motorcraft	12	11.8
Third party aggression	12	11.8
Auto/wall	6	5.9
Height fall	6	5.9
Own fall height	6	5.9
Total	102	100.0

Upon admission, all patients had undergone an EFAST. Of them, 11.8% (12) did not undergo tomography due to the presence of contraindications and/or emergency surgical indications; while the majority (88.2%) underwent computed tomography with intravenous contrast to diagnose and categorize the degree of injury. Of the total, 24 (23.5%) patients had grade I injury, 42 (41.2%) grade II, 18 (17.6%) grade III and 6 (5.9%) grade IV. In the imaging studies, 30 (29.4%) patients did not have associated hemoperitoneum while 30 (29.4%) had mild hemoperitoneum, 24 (23.5%) patients had moderate hemoperitoneum and 18 (17.6%) had hemoperitoneum. severe. In 54 cases (52.9%) they were associated with other minor injuries resulting from trauma, while in 48 cases (47.1%) the splenic injury occurred as the only one. Of those cases that were associated with other minor injuries, 30 cases (29.4%) were associated with one injury, 12 (11.8%) with two injuries, and 12 (11.8%) with three injuries; and only 4.9% (5 cases) were associated with severe

ECT. The minor associated injuries presented were: single rib fracture, multiple rib fractures, simple pneumothorax, single limb bone fracture, open tibia fracture, unilateral hemothorax, soft tissue cutting wounds, facial fractures, ocular trauma.

The average number of days of hospitalization for patients with successful TNO was 5 days. Of the total number of patients admitted, 94.1% (96) of the cases were monitored in a general hospitalization ward, requiring intensive therapy in only 5.9% (6). The degree of tomographic lesion and the success of TNO TCNI modality showed a significant association ($p < 0.001$), as did the degree of hemoperitoneum with respect to the success of TNO ($p < 0.001$). The analysis of the association of the success of TNO TCNI modality was also carried out with variables such as association with minor injuries, severe ECT and place of hospitalization, all variables showing a significant association as detailed in Table 2.

Table 2: Statistical association analysis.

Variable	Successful TNO n= 48	TNO not successful n= 24	p value
	Variable measurements		
Tomographic lesion degree	GI = 15 GI = 33 GIII = 0 GIV = 0	GI = 9 GII = 9 GIII = 6 GIV = 0	< 0.001**
Degree of hemoperitoneum	Mild = 13 Moderate = 12 Severe = 0 Not Present = 23	Mild = 11 Moderate = 0 Severe = 6 Not Present = 7	< 0.001***
Presence of other injuries	Yes = 15 No = 33	Yes = 15 No = 9	< 0.001***
severe ECT	IF = 1 No = 47	Yes = 4 No = 20	0.009**
Place of hospitalization	General Room = 47 UTI = 1	General Room = 19 UTI = 5	0.002**

Cramer's V; *Pearson's chi square; ECT: traumatic brain injury; GI: grade I; GII: grade II; GIII: grade III; GIV: grade IV

Discussion

We analyzed blunt abdominal trauma with splenic injury and found that the patients most frequently treated in our center were those with high energy modality [6] such as motorcycle/car and that according to the results, the success of TNO was high and had a direct relationship with the degree of tomographic lesion and degree of hemoperitoneum as described in similar studies [7,9], while also, the association of splenic trauma with minor injuries, multiple traumas or severe ECT, could not be demonstrated to contraindicate the therapeutic modality. conservative, but they do have a significant statistical association and could contribute to the lack of success of this treatment. On the other hand, we can show that the therapeutic success of conservative treatment with a non-invasive modality could be ensured through minimal care with medium and low complexity in a general admission ward in a hospital as long as it has strict follow-up by a medical-surgical team. We can announce that, despite our hospital not having a 24-hour hemodynamics sector, as Guillermo Barillaro claims to be necessary in the Trauma Surgery Manual [1], on which our care protocol is governed, the success of the treatment non-operative was significant through the application of non-invasive modality with monitoring and observation, with a low failure rate, similar to that reported by Juan Pablo Toro et al. in their study, since it was established in a center with a hemodynamics service [7].

It is for the aforementioned reasons that we consider the success rate of the non-invasive conservative

modality applied in our center to be of great importance, despite not being prepared, according to the existing literature, to apply a TNO modality, due to not having the necessary human and technological resources; Thus opening the question of the real effectiveness of the TNO modality with invasive measures, as well as the limits that the literature sets for the application of conservative treatment, topics that are beyond the objectives of this study and that could be addressed in future jobs. Likewise, we consider providing bases to establish standardized protocols in the care of this pathology in low and medium complexity centers that determine conditions in which these patients should be cared for.

Conflicts Of Interest

The authors declare that they have no conflicts of interest.

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