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Splenectomies for abdominal trauma in a Second Level General Hospital. 5-year analysis

Esplenectomías por trauma abdominal en un Hospital General de Segundo Nivel. Análisis de cinco años

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Keywords:
Abdominal trauma, spleen trauma, splenectomy, conservative treatment, Non conservative management.

Palabras clave:
Trauma abdominal, trauma esplénico, esplenectomía, tratamiento no operatorio.

ABSTRACT

Introduction: Approximately a quarter of the closed abdominal traumas present spleen injury and a high index of clinical suspicion is required along with the help of the imaging studies to be able to decide to operate because when these patients are carefully chosen and it is decided not to operate, this is related to a low morbidity and mortality rate. **Material and method:** The demographic variables were obtained: age and sex; etiology; Laboratory tests: group and Rh, Hemoglobin, arterial blood gases; Cabinet studies: (US, TAC), admission to ICU, intra-hospital stay and morbidity. **Results:** During the study period, twelve splenectomies were performed for open (2) or closed (10) abdominal trauma and 5 of them with thoraco-abdominal injury. Four required packing, eight had no other morbidities. **Discussion:** Zarzaur BL et al. have established that the risk factors in a patient who does not undergo operation are age > 55 years, degree of the injury and hemoperitoneum volume (moderate 250 to 500 ml, severe > 500 ml), concomitant lesions to other solid organs and vascular anomalies. Hemodynamic instability (which they define as blood pressure < 90 mmHg and heart rate > 130 beats per minute), is an indication to operate immediately. **Conclusions:** In our hospital, all cases were managed with total splenectomy because they presented additional hepatic, renal, intestinal, and/or diaphragmatic damage that justified the surgical intervention and we did not consider the preservation of the spleen.

RESUMEN

Introducción: *Aproximadamente una cuarta parte de los traumas abdominales cerrados presenta lesión del bazo y se requiere un alto índice de sospecha clínica, junto con la ayuda de estudios de imagenología, para poder tomar la decisión de operar, debido a que cuando se elige cuidadosamente a estos pacientes y se decide no operar, se relaciona con un bajo índice de morbimortalidad.* ***Material y método:*** *Se obtuvieron las variables demográficas: edad y sexo, etiología, exámenes de laboratorios: grupo y Rh, hemoglobina, gases arteriales; estudios de gabinete: US, TAC, ingreso a UTI, estancia intrahospitalaria y morbilidad.* ***Resultados:*** *Durante el periodo de estudio se realizaron 12 esplenectomías por trauma abdominal abierto (dos casos) y cerrado (10 casos), con lesión toracoabdominal agregada (cinco casos). Packing en cuatro casos, y ocho casos sin morbilidades.* ***Discusión:*** *Zarzaur BL y equipo establecen que los factores de riesgo en un paciente que no se opera son la edad > 55 años, grado de lesión y volumen del hemoperitoneo (moderado de 250 a 500 ml y severo > 500 ml), lesiones concomitantes a otros órganos sólidos y anomalías vasculares (aneurismas, fístulas arteriovenosas). Cuando existe inestabilidad hemodinámica (la cual definen como presión arterial < 90 mm Hg y frecuencia cardiaca > 130 latidos por minuto), es indicación de operar de inmediato.* ***Conclusiones:*** *En nuestro hospital, todos los casos fueron manejados con esplenectomía total, debido a que presentaron daños adicionales hepáticos, renales, intestinales y/o diafragmáticos.*

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INTRODUCTION

In 1878, in an autopsy study of an 18-year-old Muslim youth in India, Murray RD[1] reported a friable splenic injury from a pyrotechnics explosion without external injury; that is, without visible splenic rupture. Gang Uli HK[2] also reported a case of death from late splenic rupture 25 days after injury.

The spleen has special functions in its two medullary structures, red and white: the first is responsible for the destruction

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of old red blood cells and recycles iron for the production of new red blood cells. The white marrow functions as a secondary lymphoid organ and generates humoral immune and cellular responses. In addition, 30% of thrombocytes are sequestered right there.[3] In fact, since 1951, Gruber[4] reported the first case of post-splenectomy sepsis and the importance of splenic preservation. Morris DH et al.[5] had already demonstrated the resistance of the spleen to infections in experimental studies.

Approximately a quarter of closed abdominal trauma presents with a spleen injury. A high index of clinical suspicion, imaging studies, and the experience of the surgeon are required, in order to decide whether or not to operate a patient with suspected splenic injury. When these patients are carefully chosen and decided not to undergo surgery, there is a low morbidity and mortality index.[6]

It is also known that a patient with hemodynamic stability has the possibility of being managed by observation and does not require splenectomy; and although there is currently a tendency not to operate or to operate as little as possible, not operating severe IV and V injuries entails a high degree of failure, prolonged hospital stay, late bleeding and infections associated with transfusions.[7] On the other side, splenectomy has complications such as atelectasis, pancreatitis, postoperative bleeding, thromboembolism, portal thrombosis, or fulminant bacteremia.

MATERIAL AND METHOD

In order to know the incidence, etiology, clinical characteristics, and morbidity of splenectomies and their preservation due to open and closed abdominal trauma in a population in the Mexican southeast, an observational, retrospective, cross-sectional study was conducted over a period of 5.5 years (2013 -2018) in a general hospital, where all patients who were admitted to the emergency department with a diagnosis of abdominal trauma were included. There were no exclusion criteria.

Demographic variables were obtained: age and sex; etiology; laboratory tests: group and Rh, hemoglobin, arterial gases; ultrasound, CT scans, admission to the ICU, hospital stay, and morbidity. For the statistical analysis, descriptive statistics were used, the qualitative variables were expressed in percentages and the quantitative variables in means, medians, and standard deviation.

Table 1: Adaptation of the American Trauma Surgery Association (AAST) of the splenic injury scale.

Grade	Type of lesion	Description of lesion
I	Hematoma	Subcapsular, < 10% surface area
	Laceration	Subcapsular tear, < 1 cm in depth
II	Hematoma	Subcapsular, 10 a 50% surface area, intraparenchymal, < 5 mm in diameter
	Tear	Capsular tear 1-3 cm in depth, not involving trabecular vessels
III	Hematoma	Subcapsular, > 50% surface area or expansive: subcapsular rupture or parenchymal hematoma, ≥ 5 cm or in expansion
	Laceration	3 cm in parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration involving segmentary or hilar vessels, with major devascularization (> 25% of spleen)
V	Laceration	Complete destruction of spleen
	Vascular	Vascular hilar lesion with devascularization of spleen

Our own devising.

Table 2: Clinical and pathological characteristics of the 12 splenectomized patients.

Total splenectomies (n = 12) mean ± standard deviation or median (min-max.)	
Average age (years)	33 ± 14
Sex	
Male	11 (92%)
Female	1 (8%)
Hemodynamic status by hemoglobin	
Stable	10 (84%)
Unstable	2 (16%)
Hemodynamic status by BP < 90 mmHg and HR > 130 bpm	
Stable	10 (84%)
Unstable	2 (16%)
Grade of lesion	
I-III	9 (75%)
IV-V	3 (25%)
Status ICU	
Required	8 (66%)
Non required	4 (33%)

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RESULTS

During the study period, 12 splenectomies were performed due to open (two cases) and closed (ten cases) abdominal trauma, five cases had associated thoraco-abdominal injury. Mechanisms of injury: two cases with stab wounds, three cases due to a fall, and seven car accidents. Eleven males and 1 female. Two patients were in shock and ten were stable. Packing was required in four cases, and eight cases had no associated morbidity. Three CT scans and three ultrasounds were taken; the classification of splenic lesions is shown in *Table 1*, the general characteristics are described in *Table 2*, the statistical analysis in *Table 3*, and the injured organs, procedures, and morbidity in *Table 4*. There was no preservation of the organ, nor autologous transplant.

DISCUSSION

In the study by Tugnoli G et al.[8] 293 patients were treated for splenic trauma and 77 of them were operated immediately, 216 were initially kept under observation and 207 did not require surgery with a success rate of 70%. They reported a 95.8% success, all patients were hemodynamically stable and a CT scan was performed immediately. Fifty-four cases underwent angiography with proximal embolization due to extravasation of the contrast medium and, one case with a grade V lesion, without active bleeding.

Zarzaur BL et al.[9] establish that the risk factors in patients not undergoing surgery are age over 55 years, degree of injury and volume of hemoperitoneum (moderate from 250 to 500 ml and severe > 500 ml), concomitant injuries to other solid organs, and vascular abnormalities (aneurysms, arteriovenous fistulas).

Olthof DC et al.[10] emphasize that hemodynamic instability (defined as blood pressure below 90 mmHg and heart rate over 130 beats per minute), is an indication to operate immediately.

Jiménez-Garcia et al.[11] tell us that operative management in most series is indicated in IV and V degree lesions, as well as hemodynamic instability. In our series, we did not have patients in shock or injuries of such degrees. However, there were concomitant injuries

Table 3: Statistical analysis of 12 splenectomized patients.

Value	Age	Hemoglobin	In-hospital disease
Meana	33	12.0	15
Median	26	13.0	9
Mode	26	13.0	7
SD	14	1.3	11
Range	37	4.0	32
Min.	17	9.9	3
Max.	54	14.0	35

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that required exploratory laparotomy for their resolution in addition to splenectomy. Other potentially serious and multiple injuries had to be resolved, which precluded conservative treatment.[12]

Gheju I et al.[13] recommend non-operative management and the application of embolization in splenic trauma, but Miller PR et al.,[14] in their study on non-operative splenic trauma, found failures of 19.6%, 33.3%, and 75% in grades III, IV, and V respectively. Using a strict angioembolization protocol, they recommend it for patients with splenic trauma grade III, IV, which would reduce failure rates in these non-operated cases. Crichton JC et al.[15] mention that non-operative management in splenic trauma in stable patients is the rule, in such a way that the American Association for the Surgery of Trauma (AAST) recommends angioembolization in grade IV and V injuries, although their opinion regarding grade III lesions is unclear and controversial. Rasuli P et al.[16-19] compared gelatin sponge embolization vs. coils, finding similar usefulness of both procedures with the advantage of the gel sponge application being easier and less time-consuming.

Table 4: Procedures performed and morbidity.

Patient	Injured organs	Surgery performed	Morbidity
1	Spleen, lesion grade III	Splenectomy	None
2	Spleen, lesion grade III, left kidney	Splenectomy, renal suture	None
3	Spleen, lesion grade II, colon, liver lesion grade II	Splenectomy, distal pancreatectomy, colonic lesion repair, packing	Iatrogenic lesion of the pancreatic tail
4	Spleen, lesion grade IV, liver, lesion grade III	Splenectomy, hepatic suture, packing	No
5	Spleen, lesion grade II, liver, lesion grade I	Splenectomy, closure of diaphragmatic lesion, water seal	No
6	Spleen, lesion grade III, colon, hemoperitoneum, pneumothorax	Splenectomy, closure of colon lesion, hepatic suture, water seal	No
7	Spleen, lesion grade III	Splenectomy	No
8	Spleen, lesion grade III, colon, liver, lesion grade III, pancreas	Splenectomy, closure of colon lesion distal pancreatectomy	Traumatic lesion of the pancreatic tail
9	Spleen, lesion grade IV, liver, lesion grade III	Splenectomy, hepatic suture	None
10	Spleen, lesion grade IV, liver lesion grade III	Splenectomy, hepatic suture, packing	None
11	Spleen, lesion grade III, hemoperitoneum, pneumothorax	Splenectomy, closure of colon lesion, hepatic suture, water seal	None
12	Spleen, lesion grade IV, hemoperitoneum, pneumothorax	Splenectomy, water seal, packing	Iatrogenic lesion of the pancreatic tail

Our own devising.

Navas-Cuellar et al.[20] report that the use of hemostatic agents, gelatin and thrombin gel, and polyglycolic acid wrapping meshes help splenic preservation with encouraging results.

One of the important tools for assessing the intensity of splenic trauma is tomography. In a study of 351 consecutive patients undergoing multidetector computed tomography (MDCT), Margari et al.[21] found it very useful, due to its accuracy in describing lesions of the splenic parenchyma, as well as traumatic vascular lesions, which in the stable patient improves the decision whether to operate or not.

Similarly, Motta-Ramírez[22] reaches the same conclusion about MDCT, which allows us to make sound decisions about the management of operative or non-operative trauma.

Dodgion CM et al.[23] point out that prolonged rest is not recommended, they observed a speedy recovery in children with splenic and liver lesions with short rest periods. Pediatric patients were not treated in our case series.

Concerning the pediatric patient with splenic trauma, Hakim et al.[24] observed that when these patients are cared for in pediatric trauma hospitals, they undergo fewer splenectomies. Podkamenev et al.[25] report that in a non-operated child, bleeding does not exceed 15% of the total volume and blood losses are moderate in 89.6%, severe in 6.8%, and massive in 3.4%, respectively, which in many cases allows for non-operative management.

Either way, if a spleen is embolized, it may require later removal due to necrosis or infection that may occur up to five days after embolization. In their study, Bilello et al.[26] found that 16 cases (13%) of 124 embolized patients that had to be splenectomized. Shinkai et al.[27] reported a late hemorrhage in a nine-year-old boy after 72 hours of suffering a blow to the lateral left abdomen, managed non-operatively, and classified with a grade III injury. Anyanwu et al.[28] report a case of a late liver rupture in a 62-year-old man, who suffered a fall from his height 15 days before presenting to the emergency room for syncope, resembling a peptic ulcer perforation; splenectomy was performed. Cardoso et al.[29] recommend that, when performing splenectomy, a splenic autologous transplant is performed to avoid post-splenectomy sepsis. This was not done in our patients.

Guzmán et al.[30] report a case of splenosis in a 43-year-old man, who had undergone a previous splenectomy. The best diagnostic method in these cases is histological. Different immunohistochemical stains are used to identify splenic tissue, such as CD20 in the case of B lymphocytes, CD3 to detect T lymphocytes, and CD8 to distinguish endothelial cells. The treatment of these cases is non-surgical, and only when symptoms appear will it become surgical. Scintigraphy with Tc^{99} is the diagnostic modality for liver splenosis.

Luu et al.[31] conducted a study to assess adherence to postplenectomy vaccination and found that 77% of 77 patients evaluated had a good understanding of the measures to avoid infection, although adherence to vaccination was poor, 70% used chemoprophylaxis and 66% had reserve antibiotics in case of an infectious eventuality.

CONCLUSIONS

In our hospital, all cases were managed with splenectomy because we did not have an interventional radiologist, so embolization was not possible. As for the imaging studies, these were not always available, and lesions of the tail of the pancreas call for attention, probably due to technical failure to manipulate the spleen. Additional damages were present that justified surgical intervention. It is difficult to have supplies and specialists in general hospitals, which makes taking a non-operational attitude unthinkable. The closest hospital for resolution of these cases is 500 km away and in cases of trauma, it is not recommended to transfer these patients. In this case series, there was no mortality and the morbidity was minimal.

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