



Management of Splenic Injuries in a University Teaching Hospital in Nigeria

Gestion des blessures spléniques dans un hôpital d'enseignement universitaire au Nigeria

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ABSTRACT

BACKGROUND: Management of spleen injuries has undergone evolution over the past few decades.

OBJECTIVE: To assess the challenges of managing splenic injuries in Nigeria.

METHODS: The medical records of all adult trauma patients with documented injury of the spleen over a two-year period (2006-2008) were reviewed. Data collected included patient demographics, mechanism of injury, injury-arrival time, Revised Trauma Score, abdominocentesis, abdominal ultrasound and CT findings. Treatment received, outcome and length of hospital stay were also documented.

RESULTS: Twenty-three patients were managed for splenic injuries during the period under review. These consisted of 21 (91.3%) males and two (8.7%) females. The age range was 16–58 years (mean of 29.6±12.2 years). The mechanism of injury was blunt in 21 cases and penetrating in two cases with motor vehicle accident being the most common cause of injury. The mean injury-arrival time was 25.2±26.5 hours. Eight patients successfully underwent non-operative management, while 15 had operative intervention. Splenectomy was the most frequently performed procedure. Challenges identified in the management of patients with splenic injuries in Nigeria include delayed presentation, underutilization of CT, unavailability of interventional radiology, inadequate ICUs, limited vaccination, discharge against medical advice and poor follow up.

CONCLUSION: Non-operative management of injuries to the spleen in adults appears promising. The challenges identified need to be addressed in order to deliver optimal care for the victims of spleen trauma. *WAJM* 2009; 28(5): 308–312.

RÉSUMÉ

CONTEXTE: La gestion des blessures rate a subi une évolution au cours des dernières décennies.

OBJECTIF: Évaluer les défis de la gestion des blessures spléniques au Nigeria.

MÉTHODES: Les dossiers médicaux de tous les patients adultes présentant une lésion traumatismes documentés de la rate au cours d'une période de deux ans (2006–2008) ont été examinés. Les données recueillies comprennent les caractéristiques démographiques des patients, le mécanisme de la blessure, blessures heure d'arrivée, Revised Trauma Score, abdominocentesis, une échographie abdominale et les résultats de CT. Traitements reçus, les résultats et la durée du séjour à l'hôpital ont aussi été documentés.

RÉSULTATS: Vingt-trois patients ont été gérés pour des blessures spléniques au cours de la période sous revue. Il s'agissait de 21 (91,3%) hommes et deux (8,7%) femmes. La fourchette d'âge est 16-58 ans (moyenne de 29,6 ± 12,2 ans). Accident de la route le mécanisme de blessure n'a pas mâché dans 21 cas et pénétrant dans les deux cas avec le moteur étant la cause la plus commune des blessures. La moyenne des blessures-heure d'arrivée était de 25,2 ± 26,5 heures. Huit patients ont subi avec succès la gestion non coopérative, tandis que 15 avaient intervention opératoire. Splénectomie a été la procédure la plus fréquemment effectuées. Défis identifiés dans la gestion des patients souffrant de lésions spléniques au Nigeria comprennent retardé la présentation, sous-utilisation de la TDM, l'indisponibilité de la radiologie interventionnelle, les unités de soins intensifs inadéquates, une vaccination limitée, la décharge contre avis médical et les pauvres de suivi.

CONCLUSION: La non-gestion coopérative des lésions à la rate chez l'adulte semble prometteuse. Les défis identifiés doivent être traités afin d'assurer des soins optimaux pour les victimes de traumatismes rate. *WAJM* 2009; 28 (5): 308–312.

Keywords: Spleen, injury, aetiology, Nigeria.

Mots-clés: Spleen, le préjudice, l'étiologie, le Nigeria.

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Abbreviations: AAST, American Association for the study of Trauma; ARDS, Adult Respiratory distress Syndrome; CT, computerized tomography; DAMA, Discharge against medical advice; DPL, Diagnostic Peritoneal Lavage; FAST, Focused, Assessment Using Sonograph Trauma; ICU, intensive care unit; NOM, non-operative management; OM, Operative management; OPSI, overwhelming post splenectomy infection; PCV, packed cell volume; RTS, Revised trauma score; USS, ultra sound scan.

INTRODUCTION

The spleen is the most frequently injured organ after blunt trauma of the abdomen.¹⁻³ Management of injuries to the spleen often involves a complex decision making process. On the one hand haemorrhage from a traumatized disrupted spleen can be lethal and timely splenectomy may be life saving. On the other hand, many patients with injured spleen can be treated with procedures that accomplish splenic salvage and preserve the organ's immunologic function.⁴

Emphasis shifted towards non-operative management (NOM) since recognition of overwhelming post splenectomy infection (OPSI) several decades ago.⁵⁻⁷ This trend was enabled by the emergence of computerized tomography (CT) as an investigative tool in the early 1980s which enabled more accurate diagnosis of blunt solid organ injury.⁸

The success of NOM of spleen injuries in selected patients has been widely reported in developed countries.⁹⁻¹³ In developing nations however there are several challenges in the management of injuries to the spleen. This may be responsible for the limited information on NOM in developing nations. We present a two-year experience of splenic trauma at the University of Benin Teaching Hospital – a 650-bed hospital serving a population of over three million people in the Mid Western region of Nigeria after the formal creation of a trauma unit. The trauma unit manages an average of 5000 major trauma cases annually.

SUBJECT, MATERIALS, AND METHODS

The study was retrospective and involved analysis of medical records of patients. All adults 16 years or more in age with documented splenic injury between February 2006 and March 2008 were included in the study. Documentation of injury was based on abdominal ultrasound scan (USS) ± CT scan of the abdomen, or operative evidence of injury to the spleen. Patients who had a diagnosis of blunt abdominal trauma with suspected visceral injury but did not undergo USS scan, CT evaluation or trauma laparotomy were excluded from the study.

Data collection included patient's demographics, mechanism of injury, time interval between injury and arrival in trauma unit (injury – arrival time), initial pulse rate, initial blood pressure recording (hypotension was defined as systolic blood pressure of 90mmHg or less), initial packed cell volume (PCV), Revised trauma score (RTS), abdominocentesis, abdominal ultrasound scan as well as CT findings.

Other data collected included the management to which the patient was subjected – Non Operative Management (NOM) or Operative Management (OM), use of blood products, presence of associated injuries and in the case of OM the grade of splenic injury and the amount of haemoperitoneum. The length of ICU stay, length of hospital stay, occurrence of complications, the outcome of management and the length of follow up were also documented.

Statistical analysis was done using Epi Info version 3.3.2. Continuous variables are summarized using means and standard deviation. Categorical variables are presented as frequencies and percentages. Comparison between the operated and the non operated groups was performed with t-test for continuous variables and Fisher's Exact test for categorical data. All tests are two-sided with a type one error rate of 5 %.

RESULTS

Twenty three adult trauma patients were managed for splenic injuries during the period under review. This consisted of 21(91.3%) males and two (8.7%) females. The age range was 16–58 years with a mean of 29.6 ± 12.2 years. The mechanism of injury was blunt in 21 (91.3%) cases and penetrating in two (8.7%) cases (Table 1). Fifteen patients

had trauma laparotomy while eight were successfully managed non-operatively out of 10 that qualified for NOM (success rate 80%). The reasons for failure were persistent tachycardia, decreasing PCV and peritonitis in both patients. Injury – arrival time varied from one hour to three weeks. One patient presented three weeks post trauma with delayed rupture of the spleen. Excluding her in the series the average injury – arrival time was 25.2 ± 26.5 hours.

All the patients had a subnormal initial PCV. Hypotension was present in 9 patients on presentation. However comparing hypotensive to non hypotensive patients the initial blood pressure was not statistically predictive of operative intervention, ICU admission or mortality (p values were 0.34, 0.42 and 0.61 respectively).

The most common associated injury was blunt chest trauma which occurred in 12 patients with varying degrees of fractured ribs, lung contusion and haemopneumothorax. Of the OM cases, there were three diaphragmatic injuries, two liver injuries, one pancreatic injury and one cases of pelvic fracture. Amongst the NOM cases it was difficult to assess associated injuries as majority could not afford CT evaluation.

The mean RTS in all patients was 7.7392 ± 0.3136 . Abdominocentesis (four quadrant tap) was done in 15 patients and it was positive in all the cases (presence of free flowing non-clotting blood). Patients who had clear cut indication for laparotomy such as evisceration or who came in with an ultrasound diagnosis of haemoperitoneum were not subjected to abdominocentesis.

Sixteen patients had ultrasound evaluation of the abdomen performed by either consultants or senior registrars in radiology department. Free fluid was documented in 15 patients, splenic injury in eight patients while it was negative in one patient. USS confirmed all the cases of haemoperitoneum diagnosed by abdominocentesis. Only two patients had CT evaluation of the abdomen. None had angioembolization due to absence of the facility and interventional radiologists. Patients who had successful NOM (n=8) were compared with those who had OM (n=15) (Table 2). Patients who received

Table 1: Mechanism of splenic injuries

Mechanism	Number
Motor vehicle accident	9
Motor bike accident	6
Pedestrian hit by car	3
Blow to the abdomen	2
Gunshot injuries	1
Stab injuries	1
Falling tree	1

Table 2: Splenic Injuries; Non operative Vs Operative Management

	Non-Operative	Operative
Number	8	15
Male: female ratio	8:	13:2
Average age (years)	35.6 ± 16.9	26.3 ± 7.6
Average injury – arrival time (hours)	39.5 ± 33.1	17 ± 18.5
Average RTS	7.84	7.70
No with blood transfusion	2	12
No. of units transfused	4	53
ICU admission (n)	0	7
Mortality (n)	0	1
Average length of hospital stay (days)	8.4 ± 3.0	13.5 ± 4.6

RTS, Revised trauma score

OM were more likely to have blood transfusion compared to those receiving NOM ($p=0.02$ Fisher's Exact test). None of the NOM patients received ICU admission. However, they received intensive care in the critical care bay section of the accident and emergency unit. Among the OM patients ($n=15$) seven received ICU admission (Table 3). Grade one injury occurred in two patients, grade II injury also in two patients while grades III, IV and V occurred in four, five, and two patients respectively. In the two patients with grade one injury and one patient with grade II injury, the spleen was left alone at operation. The other patient with grade II had a splenorrhaphy while 11 patients with varying degrees of grade III to grade V injury received total splenectomy. The amount of haemoperitoneum increased

with increasing grade of spleen injury. In grade one the average was 200ml, grade II 1000ml, grade III 1400ml, grade IV 2700ml while, grade V was 3000ml.

The common post operative complications were post operative pyrexia ($n=5$) and anaemia ($n=4$).

Due to difficulty in obtaining vaccines only 10 patients received meningococcal vaccines while two received pneumovax.

The average length of hospital stay for the patients with splenic injury was 11.7 ± 4.8 days. One patient died in our series (mortality of 4.3%). He was a 25 year old male who fell from a moving bus and presented after 16 hours of injury. His RTS on presentation was 7.55 while PCV was 29%. At laparotomy he was found to have a grade IV splenic injury with a haemoperitoneum of 4.5 litres.

Table 3: Characteristics of the Patients who received ICU Admission

S/N	Initial SBP	Initial PCV (%)	Grade of splenic injury	Haemo-peritoneum (mls)	Blood units transfused	Associated injuries/ reason for admission	Days in ICU
1	90	31	V	3000	4	Liver	7
2	120	29	IV	4500	8	ARDS/ pulm oedema, respiratory failure	1
3	90	31	V	3000	9	Coagulopathy	6
4	110	16	III	1600	5	Status asthmaticus	1
5	140	37	I	200	–	Chest injury, haemopneumothorax	6
6	110	36	II	400	–	Ruptured diaphragm, liver, stomach, transverse colon, omentum	4
7	120	38	I	150	–	Chest injury, ruptured diaphragm	1

SBP, Systolic BP mmHg

Splenectomy was done for him and he received seven units of blood intra-operatively and one unit in the recovery room. He died in the ICU 24 hours after admission from adult respiratory distress syndrome (ARDS), pulmonary oedema and respiratory failure.

Two patients in the NOM group discharged themselves against medical advice (DAMA) while four patients did not come for follow up following discharge from hospital. The others were followed up for varying periods between four weeks and two years

DISCUSSION

The male preponderance of patients with splenic injuries probably reflects the normal preponderance of males in trauma especially since majority of splenic injuries follow motor vehicle crashes or motorcycle accidents. Other workers have made similar observations.^{14,15} The average age of the patients is also in keeping with observed trend in a previous study.⁵ Success rates of NOM have been reported in literature as varying between 80% and 93%.^{16–20} The critical determinants of successful NOM in adults remain controversial^{21,22} although it is known that the most important element for success is appropriate patient selection.²³ Factors associated with failure include older age, haemodynamic instability, large quantity of haemoperitoneum, severe or multiple injuries, and higher grades of splenic injuries.^{20, 24, 25} The two patients that failed to respond to NOM in our series were due to continued bleeding and peritonitis. Both had an initial PCV below 30% while one had an episode of hypotension in the emergency department. At laparotomy one had a grade II injury with a haemoperitoneum of 1.5litres while the other had a grade III injury with a haemoperitoneum of three litres.

Laparotomy is indicated when there is a significant haemoperitoneum, shock or persistent haemorrhage. Factors favouring surgery include suspected visceral injuries or serious brain injury that would be exacerbated by hypotension.

There was significant delay in presentation at our trauma centre following injury. This is due to absence

of pre hospital teams and organized trauma system.^{26,27} Some of the patients had presented either in private hospitals or lower levels of care which may be far away from the University Teaching Hospital. Often times there may be delayed recognition of the injury by the attending physician leading to a delayed referral. At other times the patients present to alternative medical care such as the herbalist especially in gunshot injury where futile efforts at magical bullet extraction are often undertaken.

Abdominocentesis has been criticized for poor sensitivity. However with good patient selection and technique it could be very useful in the determination of haemoperitoneum in centres where Focused Assessment using Sonography in Trauma (FAST) or Diagnostic peritoneal lavage (DPL) facilities are unavailable provided it is borne in mind that a negative tap does not exclude haemoperitoneum. In all the cases subjected to abdominocentesis it was positive and this was confirmed either by USS or at operation. The poor use of CT scan amongst the patients was due to the high cost. An abdominal CT scan costs 40000. In a country with a monthly minimum wage of 7500 and a weak Health Insurance Scheme the affordability crisis is understandable.

It is recommended that patients for NOM should be admitted in the ICU.²⁸ However with limited ICU bed space in our hospital these patients received intensive care in the critical care bay of the accident and emergency department. All the patients that successfully underwent NOM had normal RTS but the average RTS in the OM group was below normal. The earlier presentation noted in the OM group may be due to increased severity of the injury. Splenectomy was the most frequently performed procedure. This was the finding in a previous work.⁵

The infrequent application of splenorrhaphy is due to the success of NOM such that, OM is for greater degrees of injury.⁵ In the patients with lower grades of splenic injury that had operative intervention it was due to other visceral injuries. Grade V injuries may have been less frequent due to probable increased mortality pre-hospital.

Increased blood transfusion in the OM group as we found has been the experiences of some workers.¹⁵ Increased length of stay in the OM group has been similarly documented.^{5,13}

Intensive care unit (ICU) admission was influenced by injury grade, amount of haemoperitoneum, transfusion requirements, presence of coagulopathy, associated injuries or presence of comorbidity.

Mortality following splenic injuries is quoted as being between three and 23%.²⁹ Adult respiratory distress syndrome (ARDS) accounted for the mortality in our series. Hildebrand *et al*³⁰ in a review of blunt abdominal trauma found the most frequent reasons for death as haemorrhagic shock, ARDS and head trauma.

Self discharge by patient against medical advice is a recognized problem in Nigeria and this is rampant, especially amongst trauma patients.³¹⁻³³ Similarly, poor follow up visits after discharge from hospitals remain a cause for concern. These issues are often the results of poverty, long distance from trauma centre and ignorance.

In conclusion we have presented our experience of splenic trauma. Non-operative management of injuries to the spleen in adults appears promising. Major challenges in the current management of this injury in Nigeria include delayed presentation, absence of FAST, underutilization of CT, unavailability of interventional radiology, inadequate ICUs, limited vaccination, discharge against medical advice (DAMA) and poor follow up. These issues need to be address, in order to deliver optimal trauma care for the victims of splenic injuries.

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