

**Splenic Injuries in a Semi Urban Hospital in Nigeria**

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**Background:** The management of splenic injury has changed dramatically over the last two decades. The objective of this study is to evaluate splenic injuries in our community and factors affecting the outcome of treatment modalities.

**Methods:** A prospective descriptive study of 73 patients treated for splenic injuries in our surgical unit between 1991 and 2006 was carried out. Data were collected on the nature of their injuries, treatment modalities and their outcome. All the data were analyzed using SPSS 13 software for windows.

**Results:** The ages ranged from 3 to 65 with a mean of 24.2 years. Seventy of these patients sustained their injuries from blunt trauma and road traffic accidents accounted for 55 cases. Forty of these patients sustained isolated splenic injury while the remaining thirty-three were multiply injured. Majority of our patients (93.8%) were treated operatively. Fifty-three (72.6%) of the 73 patients had splenectomy and twenty (27.4%) had splenic preservation. Post operative complications were recorded in sixteen patients. There were eight deaths all occurring in multiply injured.

**Conclusion:** Only 6.8% the patients had non-operative management. Factors that significantly affected patients' recovery and good outcome were: age of the patient, cause of injury, accident and emergency systolic blood pressure, intra-operative blood transfusion and the amount of haemoperitoneum. Vehicular motor accident remains the commonest cause of splenic injury in our community with high rate of associated injuries and the need for inter-specialty care of these patients.

### Introduction

Splenic injuries occur worldwide both in developing and industrialized countries. The common causes include road traffic accidents, fall from height, penetrating injuries such as gunshot and stabbing<sup>1,2</sup>. Following the first successful total splenectomy in the 16<sup>th</sup> century, total splenectomy came to be regarded as the main mode of treatment for splenic injuries; however, with the recognition of increased incidence of systemic infection following splenectomy by encapsulated organisms: and soon after the understanding of the immunological as well as the anatomy of the organ, the treatment of splenic injury shifted from total splenectomy to splenic preservation<sup>3,4</sup>. This can be achieved by conservative means, angiography and embolization or operative salvage. Operative salvage can be by splenorrhaphy, partial splenectomy, subtotal splenectomy or deliberate autotransplantation<sup>5,6</sup>. The

treatment method employed depend on the grade of splenic injury, hemodynamic stability of the patient, associated injuries, anaesthetic technique, laboratory back-up and the experience of the surgeon<sup>7-9</sup>.

The objective of this study was to evaluate splenic injuries and to determine the factors affecting the outcome of treatment modalities in Obafemi Awolowo Teaching Hospital Complex (OAUTHC), Ile-Ife. This hospital is located in the South-western part of Nigeria and serves the health needs of three neighbouring States.

### Patients and Methods

A prospective descriptive study of 73 patients treated for splenic injuries in our surgical unit between 1991 and 2006 was carried out. The patients either presented directly or were referred to the accident and emergency unit of OAUTHC from peripheral hospitals. They were initially

reviewed by the medical staff in the Accident and Emergency unit before being referred to the general surgical unit. The age, gender, cause of injury, associated injuries, blood pressure at presentation, sonographic grading, intra-operative grading using American Injury severity grading system (AIS), amount of haemoperitoneum, blood transfusion requirement, treatment modalities, outcome, post operative and follow-up complications were entered in the proforma designed for the study. All the data were analyzed using SPSS 13 software for windows using descriptive statistics and linear regression with significant level put at  $p < 0.05$ .

## Results

The patients' ages ranged from 3 to 65 years with a mean of  $24.2 \pm 15.2$  years. There were 50 males and 23 females giving a Male: female ratio of 2.2:1. The highest incidence was in the first decade with 19 patients followed by 3<sup>rd</sup> decade with 18 patients: the distribution is as shown in Figure 1. Blunt injuries accounted for 95.9% of the cases. Road traffic accident accounted for 55 (75.3%) of the injuries. Other causes were falls from height 10 (13.7%), gunshot injury 3 (4.1%), assault 2 (2.7%), child battery 1 (1.4%), domestic injury 1 (1.4%) and sport injury 1 (1.4%). Thirty four (46.6%) of the patients presented with grade IV splenic injury, 19 (26%) with grade III, sixteen (21.9%) with grade II, 3 (4.1%) with grade V and one (1.4%) patient with grade I splenic injury.

Thirty three patients had associated injuries; the commonest being rib fracture with liver laceration. The pattern of associated injuries was as shown in Figure 2. Road traffic accident accounted for these associated injuries in twenty-nine patients of which 60.6% had grade IV splenic injury. Fifty-five patients had their injuries from road traffic accident, 28 (50.9%) with grade IV, 11 (20%) with grade III, 13 (23.6%) grade II and 3 (5.5%) with grade V. None of the patients presented with grade I splenic injury. The most common associated injury

in the road traffic group was rib fracture with liver laceration seen in 8 (14.5%) followed by head injury in 5 (9.1%) of the cases.

Of the 73 patients, 53 (72.6%) had splenectomy and 20 (27.4%) had splenic preservation. Of those that had splenic preservation, 5 (6.8%) had non operative treatment, 14 (19.2%) had splenorrhaphy and one (1.4%) had partial splenectomy. All the patients with grade IV and V injuries had splenectomy. Only 13 out of 35 patients with grade II and III injuries had splenorrhaphy; the rest had splenectomy. All the 5 patients that were managed conservatively had grade II splenic injury.

Overall, there were post operative complications in sixteen patients (21.9%). These were due to development of wound infection in 5 (6.8%) and respiratory distress syndrome in 3 patients (4.1%). Other postoperative complication recorded respectively in 1 patient (1.4%) each were pneumothorax, subphrenic abscess, pulmonary embolism, extradural haematoma, acute renal failure, reactionary haemorrhage, stitch sinus and malaria. There were 8 deaths out the 73 patients treated which gave an overall mortality of 10.96%. All the mortalities were in multiply injured. Sixty three 63 (86.3%) of the 73 patients were discharged with good outcome, one patient was referred for the management of her extradural haematoma which developed 6<sup>th</sup> post operative day and the remaining one patient was discharged against medical advice while undergoing conservative management of her splenic injury.

The factors that significantly affected patients' recovery and good outcome were (Table 1):

- Age of the patient,
- Cause of injury,
- Accident and emergency systolic blood pressure,
- Intra-operative blood transfusion and
- Amount of haemoperitoneum.

The follow-up periods ranged from 2 weeks to 7 years, with a mean of 11.9 months with 35 patients being lost to follow-up. During the follow-up period, 3 patients presented with hypertrophic scars, one developed

adhesive intestinal obstruction, one patient with recurrent malaria and another patient with incisional hernia. None of these patients presented with overwhelming post splenectomy sepsis

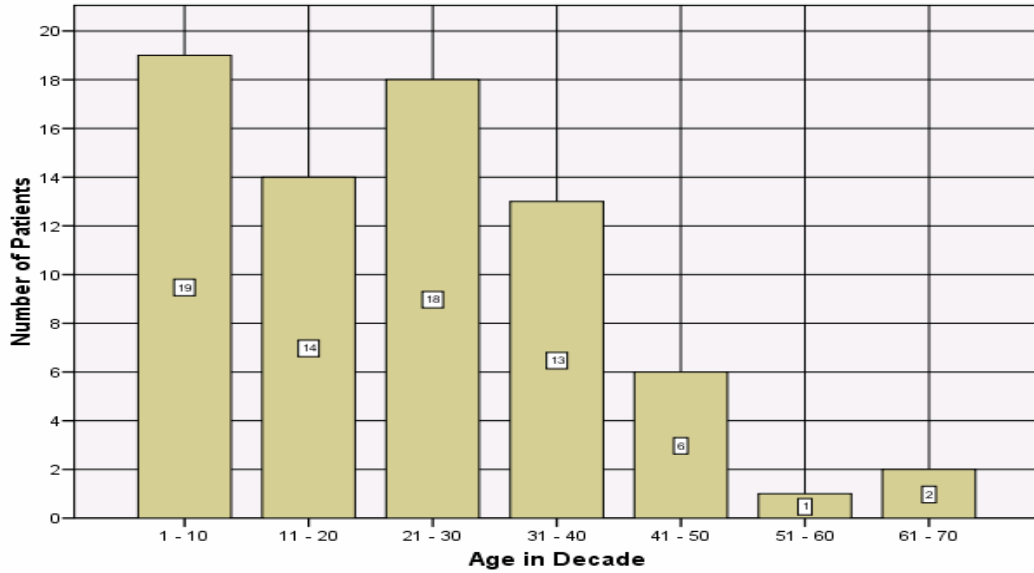


Figure 1. Distribution of patient age in decade

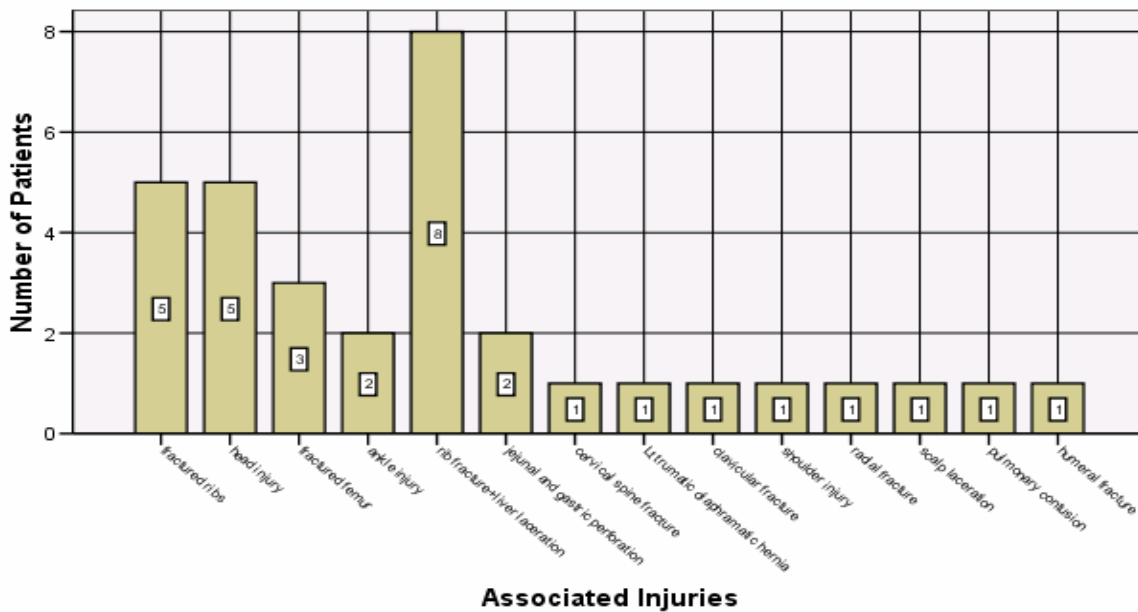


Figure 2. Distribution of associated injuries

**Table 1.** Factors affecting patients' Recovery

| Factors   | P value |
|---|---------|
| Age in years                                    | 0.001   |
| Gender  | 0.628   |
| cause of injury                                 | 0.021   |
| Type of injury                                  | 0.950   |
| Associated injury                               | 0.750   |
| Accident and emergency pulse rate               | 0.483   |
| Accident and emergency systolic blood pressure  | 0.001   |
| Accident and emergency diastolic blood pressure | 0.710   |
| Packed cell volume on admission                 | 0.332   |
| Accident and emergency blood transfusion        | 0.398   |
| Intra operative blood transfusion               | 0.045   |
| Post operative blood transfusion                | 0.966   |
| Amount of haemoperitoneum                       | 0.029   |
| Grade of splenic injury                         | 0.474   |
| Surgery done                                    | 0.714   |
| Post operative complication                     | 0.194   |

$P < 0.05$

### Discussion

The spleen is a commonly injured organ in intra-abdominal trauma second only to the liver. The commonest cause of injury being vehicular accident and this is usually blunt in majority of cases<sup>10, 11</sup>. The mean age of patients in this study was 24.2 years with the highest incidence between the second and third decade which is similar to findings by Obekpa<sup>12</sup> in northern Nigeria in 1997. The male: female ratio in this study was 2.2:1. The majority (75.3%) sustained their injuries following vehicular motor accident; 95.9% of these were due to blunt trauma to the abdomen. This was comparable to the experience of Al-Qahtani<sup>10</sup> in Saudi-Arabia. Twenty-nine (87.8%) out of the thirty-three patients with associated injuries also had their injuries from vehicular motor accident and 60.6% of these patients had grade IV splenic injury which is a reflection of severity of the accident and the degree of energy impart. This vehicular cause of injury is preventable or can be minimized by reducing the amount of energy transferred to the occupants by ensuring strict compliance to the local road rules. The abuse of alcohol, driver fatigue and non-compliance to the principles of driving may

play major role in the aetiology of these accidents<sup>13</sup>. Improvement in road conditions, prevention of overloading of commuter vehicles and vehicle design changes with minimal safety standards will decrease the frequency and extent of these injuries<sup>13,14</sup>.

The high degree of associated injuries also underscores the need for multidisciplinary care of these patients: with inter-specialty coordination where necessary with a view of early management and this will also eliminate duplication of theatre time<sup>14</sup>. Twenty (27.4%) of the 73 patients had splenic preservation out of which only five (6.8%) had non-operative management. This in contrast with communities with well developed health care system where reported cases of non-operative management of blunt splenic injury approaches 70%<sup>15</sup>. In communities with developed health system, availability of adjuncts to non-operative management of splenic injury improves their rate of splenic conservation; the developing nature of our health system and haemodynamic instability of these patients on presentation makes operative management inevitable. Operative

salvage rate of 20.6% in this study is equally low because of high incidence of associated injuries and large percentage (50.7%) of these patients presenting with grade IV and V splenic injuries. All the eight mortalities had operative treatment and they died from their associated injuries which is similar to the findings by Franklin et al<sup>15</sup> in their review. The post operative complications except for stitch sinus and malaria were due to associated injuries and this does significantly not affect the outcome. The factors that significantly affect the outcome in this study included the age of the patients, cause of injury, accident and emergency systolic blood pressure, intra-operative blood transfusion and the amount of haemoperitoneum. It is of interest that none of these patients represented with overwhelming post splenectomy sepsis; though, thirty-five (47.9%) out the seventy-three patients were lost to follow-up: hence, it might be impossible to reach definitive conclusion.

### Conclusion

Vehicular motor accident remains the commonest cause of splenic injury in our community with high rate of associated injuries and the need for inter-specialty care of these patients; age of the patient, cause of injury, accident and emergency systolic blood pressure, intra-operative blood transfusion and amount of haemoperitoneum are the factors that determines good outcome in this study.

### References

1. Ameh EA, Chirdan LB, Nmadu PT. Blunt abdominal trauma in children: epidemiology, management, and management problems in a developing country. *Pediatr Surg Int* 2000;**16**(7): 505-509.
2. Demetriades D, Hadjizacharia P, Constantinou C, Brown C, Inaba K, Rhee P, Salim A. Selective nonoperative management of penetrating abdominal solid organ injuries. *Ann Surg* 2006;**244**(4): 620-628.
3. Harbrecht BG. Is anything new in adult blunt splenic trauma? *Am J Surg* 2005;**190**(2): 273-278.

4. Reihner E, Brismar B. Management of splenic trauma--changing concepts. *Eur J Emerg Med* 1995;**2**(1): 47-51.
5. Reddy CG, Chalasani V, Pathma-Nathan N. Splenic preservation: an additional haemostatic measure during mesh splenorrhaphy. *ANZ J Surg* 2004;**74**(7): 596-597.
6. Acs G, Furka I, Miko I, Szendroi T, Hajdu Z, Sipka S, Jr., Barath S, Aleksza M, Csipo I, Baló E, Balint A, Fekete K. [Comparative hematologic and immunologic studies of patients with splenectomy and spleen autotransplantation]. *Magy Seb* 2005;**58**(2): 74-79.
7. Mooney DP, Rothstein DH, Forbes PW. Variation in the management of pediatric splenic injuries in the United States. *J Trauma* 2006;**61**(2): 330-333; discussion 333.
8. Lunca S, Romedea N, Morosanu C, Mihalache C, Mihalache S. [Traumatic injuries to the spleen in adults]. *Rev Med Chir Soc Med Nat Iasi* 2005;**109**(2): 281-285.
9. Upadhyaya P. Conservative management of splenic trauma: history and current trends. *Pediatr Surg Int* 2003;**19**(9-10): 617-627.
10. Al-Qahtani MS. The pattern and management outcomes of splenic injuries in the Assir region of Saudi Arabia. *West Afr J Med* 2004;**23**(1): 1-6.
11. Khan JS, Iqbal N, Gardezi JR. Pattern of visceral injuries following blunt abdominal trauma in motor vehicular accidents. *J Coll Physicians Surg Pak* 2006;**16**(10): 645-647.
12. Obekpa PO, Ugwu BT, Kidmas AT, Momoh JT, Edino S, Igun G. Experience in managing splenic trauma on the Jos Plateau. *West Afr J Med* 1997;**16**(3): 150-156.
13. Adebayo ET, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. *Br J Oral Maxillofac Surg* 2003;**41**(6): 396-400.
14. Batstone MD, Monsour FN, Pattel P, Lynham A. The patterns of facial injury suffered by patients in road traffic accidents: a case controlled study. *Int J Surg* 2007;**5**(4): 250-254.
15. Franklin GA, Casas SR. Current advances in the surgical approach to abdominal trauma. *Injury* 2006;**37**(12): 1143-11