

Arrow injuries in North East Nigeria

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Summary

Arrow injuries are an extinct form of injury in most parts of the developed world but constitute 0.1% of emergency admissions in the University of Maiduguri Teaching Hospital annually.

This is a retrospective study of arrow injuries carried out over a ten-year period (1989 – 1999) in order to study the reasons for its continued incidence the presentation and the experiences in the management of these injuries.

There were 73 cases of arrow injuries and were all males with a peak age incidence of 31–40 years of age. Majority were farmers, cattle herdsman and traders from the northeast region of Nigeria and the neighbouring republic of Cameroon, Chad and Niger. The various reasons for the injuries were armed robbery in 41%, communal clashes, 20.5%, dispute between farmers and cattle herdsman 13%, and cattle theft 8%.

Majority were clinically stable on presentation with arrows in the head, neck, chest and abdomen this resulted in various surgical procedures in order to remove the arrows and repair damaged viscera. Unstable presentations resulted in mortalities (4.1%) preoperatively. Wound infection was the most common complication in patients who presented late

Improvements in the socio-economic conditions in the region and legislation on the use of these weapons would reduce the incidence of these injuries.

Keywords: *Arrow injuries, Northeast Nigeria.*

Résumé

Blessures à travers la flèche est une forme spéciale de blessure qui est presque tombée en désuétude dans la plu part de pays développé du monde mais recensée pour 0,1% d'hospitalisation d'urgence au centre hospitalo-universitaire du Maiduguri tous les ans.

Il s'agit d'une étude rétrospective des blessures à travers les flèches effectuée au cour d'une durée de dix ans (1989 1999) afin d'étudier les raisons pour sa fréquence soutenue, sa présentation et l'expérience en matière de la prise en charge de ces blessures.

Il y avaient 73 cas de blessures par flèche et les mâles sont tous concernés avec une fréquence de 31 – 40 ans, la plus grande partie étaient des cultivateurs, gardiens de troupeau et commerçants venant de la région nord est du Nigeria et les voisins du République fédérale du Cameroun, Chad et Niger. Les raisons divers pour les blessures étaient: vol à main armée en 41%, violence entre communautés 20,5%, querelle entre cultivateurs et gardiens de troupeau 13% et vol de bestiaux 8%.

La plus grande partie était en bonne santé cliniquement au cours de la présentation avec la flèche dans la tété, au cou, à la poitrine et dans l'abdomen. Ceci a provoqué des processus chirurgicaux diverses afin d'enlever les flèches et réparer le viscéral endommager.

Des présentations défectueuses provoquent des mortalités (4,1%) préopératoire. Blessure d'infection est une complication la plus fréquente chez des patients qui se sont présenté bien trop tard.

Améliorations dans des conditions socioéconomiques général dans la région et une législation sur l'utilisation de ces armes pourraient diminuer la fréquence de ces blessures.

Introduction

While vehicular and modern firearm injuries would constitute important causes of emergency admissions in most hospitals in developed and developing countries, the University of Maiduguri Teaching Hospital, (UMTH), in addition receives cases of arrow injuries. UMTH is a tertiary level healthcare institution located in Maiduguri, the capital city of Borno state in Nigeria. The hospital receives patients from six states of Nigeria, namely Borno, Adamawa, Yobe Taraba, Bauchi and Gombe states. It also receives patients from the neighbouring republics of Chad, Cameroon and Niger.

Arrow injuries are generally rare on a worldwide scale, but there are reports of such type of injuries in the highlands of Papua New Guinea¹ South Africa² and India³.

The injuries we see here are sustained from an arrow, made of a metallic tip, which is edged and barbed with a wooden shaft and propelled from a bow. They were traditionally designed for hunting game, such that when poisonous substances were applied to the arrow tips, the barbs would ensure that the arrow stays in place even when the prey runs away, eventually succumbing to the effects of the poisons but have now become weapons for human assault. Arrows cause injury by incising tissues and perforating viscera along its trajectory and these may range from soft tissue injuries to fatal ones resulting from damage to vital organs. The presence of the barbs further complicates matters, as removal of such arrows without surgical intervention would result in further tissue damage.

This study examines the various reasons for its incidence in this region, the presentation and the experiences in the management of arrow injuries in the University of Maiduguri Teaching Hospital over a ten-year period.

Patients and methods

Patients that were admitted and treated for arrow injuries over a ten-year period (1989 – 1999) were retrospectively studied. The data studied included the personal data, circumstances of injury, presentation, treatment and outcome.

Results

Seventy-three (73) cases of arrow injuries were seen and treated during the period of study and they were all males.

Age distribution

The age distribution is shown in table 1, with a peak age range of 31 – 40 years.

Table 1 Age distribution in patients with arrow injuries

Age range (years)	Number	Percentage
<10	2	2.7
11 – 20	6	8.2
21 – 30	15	20.5
31 – 40	23	31.5
41 – 50	18	24.7
51 – 60	8	11
>61	1	1.3
	73	100

Table 2 Places of residence in patients with arrow injuries

Residence	Number	Percentage
Borno State	15	20.5
Yobe State	17	23.3
Adamawa state	10	13.7
Taraba state	5	6.8
Bauchi state	7	9.6
Gombe state	10	13.7
Republic of Chad	3	4.1
Republic of Cameroon	4	5.5
Republic of Niger	2	2.7
Total	73	100

Occupation

Of the 73 patients, 32(44%) were farmers, 20(27%) were cattle herdsman, 15 (21%) were traders, and 4 were drivers while 2 of the patients did not have records of their occupation.

Place of residence

The various places of residences are shown in Table 2. Most of the patients reside in the neighbouring states of the northeast region of Nigeria. A few came from the border regions of the neighbouring countries.

Duration of injury

Forty-five patients (62%) presented within 48 hours of injury, 28(38.5%) were delayed presentations (>48 hours).

Reasons for the injury

The various reasons given for the injuries are shown in Table 3. Attack by armed bandits was the most common reason. It often occurred when victims, while being transported to and from local markets were ambushed. Open pickup vans are the available mode of transport in the rural areas and the passengers make an easy target.

Anatomical regions of the body injured

Fifteen patients presented with multiple arrow injuries affecting more than one region of the body. The various regions of the body affected are shown in Table 4. In 66% of cases the head, neck and chest were affected

Figure 1 shows a typical patient with multiple arrow injuries, one in the chest with an entry point in the 3rd left intercostal space, mid-clavicular line, which on exploration was impaled into the left ventricle, the other in the soft tissues of the right arm.

**Fig. 1** Typical patient with arrow injuries showing multiple arrows, one with an entry point in the 3rd left intercostal space, mid clavicular line, which at exploration was impaled into the left ventricle. The other in the right arm was in the soft tissues.**Table 3** Reasons for the injury in patients with arrow injuries

Reasons for the injury	Number	Percentage
1. Attack by armed bandits	30	41.0
2. Communal clashes	15	20.5
3. Dispute between farmers and cattle herdsman over grazing land	13	17.8
4. Cattle theft	9	12.3
5. Not specified	6	8.2
Total	73	100

Table 4 Anatomical regions of the body injured in patients with arrow injuries

Anatomical regions	Number	Percentage
Head and neck	19	26.0
Chest	29	40.0
Abdomen	8	11.0
Upper limb	10	13.7
Lower limb	5	6.8
Perineum	2	2.7
Total	73	100

Table 5 Treatment procedures in 73 patients with arrow injuries

Procedures	Number
1. Arrow extraction and observation	17
2. Exploration of soft tissues for removal of arrow and wound debridement	10
3. Removal of arrow from the orbit and enucleation of the eye	2
4. Neck exploration and removal of arrow with:	
- repair of tracheal injury only	2
- repair of tracheal injury and tracheostomy	2
- repair of carotid vascular injury	2
- closure of cervical oesophageal perforation	1
5. Thoracotomy for	
- Arrow extraction with repair of lung perforation	4
- Removal of arrow from the heart	2
6. Removal of arrow, and closed thoracostomy tube drainage only	23
7. Exploratory laparotomy removal of arrow and:	
- closure of perforation of the stomach	2
- debridement and drainage of liver injury	2
- primary closure of right colonic perforation	3
- primary closure of left colonic perforation and defunctioning colostomy.	1
Total	73

Treatment

Most of the patients were clinically stable on admission. Unstable presentations included 2 cases in severe shock, and 1 with associated head injuries. None had shown symptoms and signs suggestive of poisoning from the arrows.

Tetanus prophylaxis and antibiotics were routinely given. The various treatment procedures are shown in Table 5.

Post operative complications

There was wound infection in 7 patients, pneumonia in 3, pyothorax in 1 patient.

Duration of hospital stay

Majority of the patients presented early and had a shorter duration of hospital stay (average duration of hospital stay 13 days). Those that presented late (>48 hours) stayed longer in hospital (average 20 days) and they had more infective complications.

Mortality

There were 3 mortalities, (4.1%). Two from severe shock probably due to injuries to major vessels in the chest, 1 from associated severe head injuries, however no post-mortem was carried out on any of the patients.

Discussion

An average of 7 of the 5,200 emergencies seen in the University of Maiduguri Teaching Hospital are due to arrow injuries constituting 0.1% of emergencies and this is not insignificant considering the fact that it is virtually an extinct form of injury in most of the developed world³.

The patients were all males, with a peak age range of 31 – 40 years, and were mostly farmers, traders and cattle herdsmen. This is the age group that is commonly involved in farming, cattle rearing, and fighting communal wars in this region.

While tribal wars have been reported as a common cause of arrow injuries in Papua New Guinea^{1,3} the most common reason given for the injury is an attack by armed bandits, and in

only 20% of cases were communal clashes given as a reason and most of the clashes were either due to political differences and clashes over farmlands.

Other circumstances that result in injury is when farmers and cattle herdsmen engage in battle over grazing land when animals are allegedly allowed to graze on farm crops.

Cattle theft is also common and herdsmen can often be seen carrying bows and arrows to protect their cattle against thieves.

There was an increase in incidence towards the end of the year (July to December), and this coincides with the period of heightened activity of farming and trading of farm produce both in the local markets and across the borders.

The head, neck and chest are the most common parts of the body that are injured; and it may not be unconnected with the intent to kill the victim. Also, these were the more exposed and available regions of the body as most victims were attacked while being transported in open pickup vans, which is the main mode of transportation in the rural areas.

Arrows cause tissue damage by lacerating, perforating or transecting structures in its flight path and unlike high velocity gunshot injuries, energy dissipation to distant tissues and organs are minimal therefore unless a vital organ is directly struck, these injuries are not immediately fatal. Majority of the injuries were soft tissue injuries and were adequately treated by local wound exploration for the extraction of the arrow with minimal complications.

Most of the injuries to the head were scalp injuries that did not penetrate the cranium, probably because the thicker part of the cranial bones were the ones struck by the relatively low velocity arrows. Vulnerable areas of the skull are the orbit and the thin temporal bone that are easily penetrated by these types of arrows resulting in intracranial injuries^{3,4}. There were two cases in which the arrows were impaled in the orbit, although it resulted in complete destruction of the affected eye there was no intracranial penetration.

Although there have been experiences in the conservative management of penetrating injuries to the neck following stab injuries and low velocity gunshot injuries in selected cases especially when significant visceral injuries have been excluded,^{5,6} patients with arrow injuries to the neck all underwent exploration because the arrows needed to be removed and because of the presence of barbs, blind removal would result in further tissue damage. Also there was a high incidence of associated visceral injuries that needed repair, thus of the seven that sustained injuries to the neck, four had associated tracheal injuries, two carotid vascular injuries and one oesophageal injury.

Exploration for arrows impaled in the neck with injury to the common carotid vessels were through vertical neck skin incisions that allowed for the tip and shaft of the arrows to be exposed in order to assess the extent of visceral injury. The common carotid vessels were then dissected in its proximal and distal lengths to enable prior control with vascular clamps before the evacuation of haematoma and removal of the arrows. Simple repair was carried out with fine monofilament non-absorbable sutures. In both cases there was haematoma around the arrow tip that formed a seal and there was minimal active bleeding while the arrow was insitu, and this further underscores the need of not dislodging the arrow prior to exploration as it may provoke severe haemorrhage.

In two cases of tracheal injuries, repair was done without the need of a tracheostomy, however in the other two cases a tracheostomy was necessary because of respiratory obstruction.

The cervical oesophagus was perforated in one patient and this was closed utilising fine chromic catgut sutures. In all the neck explorations, the soft tissues were drained with a penrose drain. Of the 29 patients that sustained thoracic injuries, 6(20.6%) underwent thoracotomy, 2 for cardiac injury and 4 for suspected mediastinal injuries, which on exploration were lung parenchymal injuries. The rest, 79.3% were satisfactorily managed by closed thoracostomy tube drainage alone with no significant complications. Therefore in this study, and based on similar experiences with penetrating chest injuries elsewhere⁷, majority of the arrow injuries to the chest can be managed with tube thoracostomy drainage alone when mediastinal, cardiac or hilar injuries can be excluded.

Two patients sustained penetrating injuries to the myocardium (one arrow penetrating the left ventricle, the other, left atrium) but because the elasticity of the myocardium narrowed the wound around the arrow shaft there was minimal bleeding while the arrow was insitu. This allowed for exploration on a fairly stable patient.

Repair of myocardial injuries was through a thoracotomy incision in the fifth left intercostal space. The pericardium was opened and blood within it evacuated. In both instances they were minimal. The arrows were then gently removed and bleeding controlled by digital pressure while repair was carried out using the pledgeted monofilament non-absorbable sutures on the beating heart. A pericardial window was left in the pericardium for drainage into the pleural space, which in turn was drained by chest tubes. In both cases recovery was uneventful.

Curiously, there were no small bowel injuries in patients that sustained injuries to the abdomen in these series despite the fact that it occupies a larger volume of space in the abdominal cavity, with the liver, stomach and colon being the most frequently injured. This may not be unrelated to the free mobility of the small bowel as compared to the rest of the abdominal viscera. Of the 4 colonic injuries 3 were to the right colon and were repaired primarily, while the one to the left colon was repaired and a defunctioning colostomy fashioned because there was significant peritoneal contamination. This however resulted in prolonged hospital stay and the need for a second operation in order to close the colostomy.

Infection was the most common complication in this study and it occurred more frequently in patients who presented to the hospital late, thus enabling infection to take hold before the arrows were removed.

In conclusion, various socio-economic factors account for the continued incidence of arrow injuries in this region and varied surgical procedures are often required for their removal.

Acknowledgement

The cooperation and support of the entire staff of the department of surgery of the University of Maiduguri is highly appreciated.

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