

# Penetrating Arrow Injuries of the Head-and-Neck Region: Case Series and Review of Literature

Hamisu Abdullahi<sup>1</sup>, Auwal Adamu<sup>2</sup>, Muhammad Ghazali Hasheem<sup>1</sup>

<sup>1</sup>Department of Otorhinolaryngology, Aminu Kano Teaching Hospital/Bayero University, Kano, Nigeria, <sup>2</sup>Department of Otorhinolaryngology, Aminu Kano Teaching Hospital, Kano, Nigeria

## Abstract

Penetrating arrow injuries of the head-and-neck region are rare in the developed countries, but they are common in the rural communities of our country. Arrow shot to the head-and-neck region can be life-threatening due to the presence of major vessels and vital organs. Management of arrow injury to the head-and-neck region is seriously challenging, extraction of the arrows are usually difficult due to the proximity to vital structures, unskilled removal may worsen the existing injury or result in inadvertent damage to the vital structures. We presented the four cases of arrow shot to the head-and-neck region, three were managed successfully, and one was brought in dead probably due to attempt at the removal at home or poisonous nature of the arrow. Therefore, the aim of this report is to highlight our experience and challenges in the management of penetrating arrow injuries to head-and-neck region and to review some literature reports.

**Keywords:** Arrow injuries, craniofacial injuries, neck exploration, penetrating neck injury

## INTRODUCTION

Arrows are the weapons of the war used since the prehistoric era; evidence available showed that arrow injuries were found in the Indian and Papua New Guinea war samples documented in 1860s. In the Indian war samples, 11.7% of the arrows were found impacted in the bones of head-and-neck region, whereas 14.5% was found in Papua New Guinea wars.<sup>1</sup> Arrow injuries in the developed countries are extremely rare due to the development of modern guns. However, they are still common in the rural areas of Northern Nigeria, due to incessant community clash, farmers and herders conflicts, and increasing rate of cattle rustling in the rural communities. However, generally, the cases are under-reported.<sup>2</sup> Historic evidence showed that arrow injuries in Northern Nigeria were documented in the medical literature by British surgeon as far back as 1909.<sup>3</sup>

Arrow injuries are classified as low velocity but can be life-threatening, especially when the vital organs are affected. The severity and extent of the injury depend on the range at which the arrow is fired, the degree of penetration and whether poisons were applied to the tip of the arrow or not. Arrow injury can affect any part of the body, cases of arrow shot involving

different region/organ of the body have been reported, such as limb and limb vessels,<sup>4,5</sup> abdomen and abdominal viscera,<sup>4,5</sup> chest,<sup>4,6</sup> heart,<sup>7,8</sup> neck,<sup>9</sup> supraorbital region,<sup>2</sup> eyes,<sup>10</sup> base of skull,<sup>11</sup> brain,<sup>12</sup> or even multiple organs.<sup>13</sup>

Arrow injury to the head and neck region can be devastating and life-threatening. Arrow shot to the head and neck can easily penetrate and injure major blood vessel, and patient may present with massive bleeding, expanding hematoma, or shock. Patient with laryngeal or tracheal injury may present with air blowing wound, expanding emphysema, or upper airway obstruction that require immediate surgical intervention.

The management of arrow injury to the head and neck region is seriously challenging, extraction of the arrows are usually difficult due to proximity to vital structures, unskilled removal may worsen the existing injury or result in inadvertent damage

**Address for correspondence:** Dr. Auwal Adamu,

Department of Otorhinolaryngology, Aminu Kano Teaching Hospital, Kano, Nigeria.

E-mail: adamauwalu@gmail.com

**Submitted:** 27-Jan-2020 **Revised:** 29-Jun-2020

**Accepted:** 27-Aug-2020 **Published:** 13-Oct-2020

### Access this article online

Quick Response Code:



**Website:**  
www.nigeriamedj.com

**DOI:**  
10.4103/nmj.NMJ\_17\_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Abdullahi H, Adamu A, Hasheem MG. Penetrating arrow injuries of the head-and-neck region: Case series and review of literature. *Niger Med J* 2020;61:276-80.

to a vital structure. Therefore, the aim of this report is to highlight our experience and challenges in the management of penetrating arrow injuries to head and neck region and to review some literature reports.

## CASE REPORTS

### Case 1

A 60-year-old man presented to the accident and emergency of our center with arrow injury to the neck of 8 hours duration. The patient was shot with arrow by cattle rearers while trying to prevent their cattle from feeding on his crops. There was associated bleeding; however no difficulty in breathing, hoarseness, or dysphagia. On examination, he was conscious and not pale, arrow was seen [Figure 1] impacted in the lower aspect of the posterior triangle of the neck on the right side, there was tenderness, but no discharge or crepitus. X-ray soft-tissue of the neck revealed an impaled arrow in the posterior triangle of the neck [Figure 1], no emphysema or airway compromise. The patient had antibiotics and tetanus prophylaxis. The patient was prepared, and he had neck exploration and arrow removal under general anesthesia. Arrow was approached through the entry point because it is less related to the vital structures at the entry point, dissection continued until the fangs of the arrow were exposed, and they were then clipped together. The dissection was completed up to the arrow tip, and the arrow was removed gently. The patient did well postoperatively, no complication recorded and he was discharge 1 week after admission.

### Case 2

A 25-year-old Fulani man referred to our center with arrow injury in to the nose of 6 hours duration following fight over farmland. There was bleeding from the nose and the mouth, associated with odynophagia, no difficulty in breathing. Clinical examination revealed a young man conscious, not in respiratory distress with arrow impacted in the left side of the nose [Figure 2]. X-ray paranasal sinuses showed the arrow passed through the left side of the nose into maxillary antrum, the arrow went posterior-medially into the nasopharynx [Figure 2]. Arrow was removed under general anesthesia with orotracheal intubation. Arrow was approached through lateral rhinotomy incision along the entry point, dissection continued until the fangs of the arrow were exposed. The fangs were then clipped together, and the arrow was removed gently, and antral irrigation was done to drain blood that collected in the left maxillary antrum. The patient was stable postoperatively and was discharge, no complication was recorded.

### Case 3

A 28-year-old herdsman presented to our center with arrow shot injury to the root of the nose of 4 hours. The patient was shot in a community clash between the cattle rearers and farmers, he sustained injury to the root of the nose on the left side, there was associated bleeding from the wound site, and through the nose but no cerebrospinal fluid leak. The patient also developed

blurring of vision and diplopia on the same side. Examination revealed an impacted arrow in the medial canthus of the left eye [Figure 3], mucopurulent eye discharge, and decreased visual acuity on the same side. Contralateral eye was normal. Computed tomography (CT) scan shown impaled arrow that passed through the floor of the orbit obliquely downward in to maxillary sinus [Figure 3]. The patient had exploration and removal of the arrow through Lynch-Haworth incision, the floor of the orbit was repaired, and maxillary sinus was



Figure 1: Clinical picture and X-ray of case 1

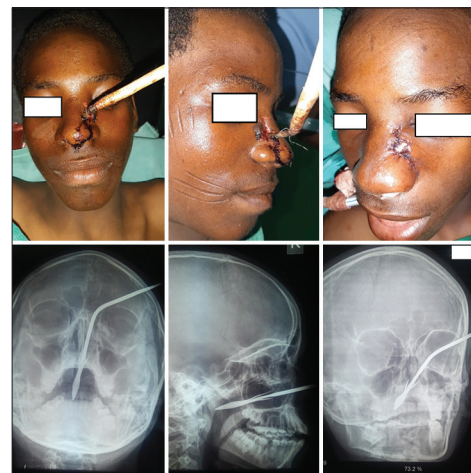


Figure 2: Clinical pictures and X-rays of case 2

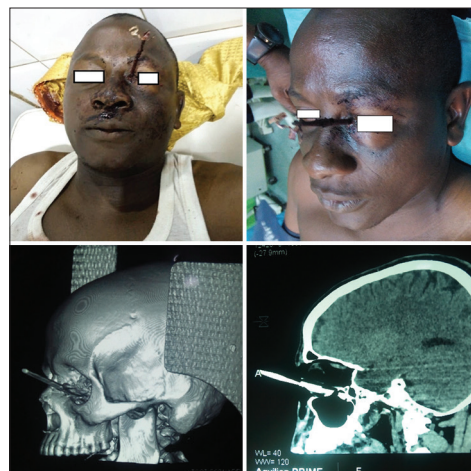


Figure 3: Clinical pictures and computed tomography scan of case 3

irrigated thoroughly. The patient did well postoperatively and was discharge. One month after, the patient noticed excessive tearing of the left eye, which was due nasolacrimal duct fibrosis. Patient later had dacryocystorhinostomy.

#### Case 4

Ear, nose, and throat team was called to the accident and emergency to review a 15-year-old cattle rearer, who was brought in death. The patient was attacked by cattle rustlers while moving their cows to grazing area 48 hours before presentation, he sustained an injury to the right eye, there was associated history of bleeding from the nose [Figure 4]. Parent confirmed that there was attempt at the removal of the arrow at home. Examination revealed lifeless body with no sign of respiration or cardiac activity, arrow was seen impacted into the right supra-orbital region, leading to the brain. There was



Figure 4: Clinical pictures of case 4

associated swelling that was diffused and soft. Likely, the patient had intra-cerebral hemorrhage or neurotoxicity from the arrow poison. The patient was certified death and the parent refused postmortem examination on the death body. Arrow was removed at the accident and emergency and corpse was released to the relatives [Figure 4].

#### DISCUSSION

In recent time, a number of cases of arrow injury have been reported in Nigeria, some of the cases involved the head-and-neck region [Table 1].

All the patients we presented in this study were males, the age of the patients range between 15 and 60 years. Male preponderance was noted in most of the reports, Madziga<sup>4</sup> reported 19 cases of arrow shot to the head and neck region, and all the patients were males with peak age of 31–40 years. Olasoji *et al.*<sup>2</sup> reported the four cases of arrow shot to head and neck region, all of the patients were males between the age group of 18 and 45 years. Adamu and Ngamdu<sup>15</sup> reported the two cases of arrow shot to the neck region, and all of them were males with age of 7 and 28 years. Similarly, Aliyu *et al.*<sup>5</sup> reported arrow shot injuries to the head and neck region in 9 out of the total of 33 patients with arrow shot to the body parts, most of the patients (81.81%) were under the age of 40 years. Male preponderance was noted in their report with a male-to-female ratio of 15:1. The rest of the authors<sup>9-11,14</sup> also reported the cases in males. Males were mostly affected because they tend to have more aggressive behavior, and they are the ones mostly involved in fight.

The clinical manifestation of penetrating arrow injuries to the head-and-neck region depends on the structure affected

Table 1: Published reports of arrow injury to the head and neck region in Nigeria

Number	Author and date	Title of the study	Number of patient	Site of impaction	Treatment
1	Madziga <sup>4</sup>	Arrow injuries in North Eastern Nigeria	19	Head and neck	Exploration and arrow removal, tracheostomy - 2
2	Ogunleye <i>et al.</i> <sup>11</sup>	Arrow injury to the base of the skull	1	Through nose to Pterygopalatine fossa	Arrow removal via Moure's incision
3	Olasoji <i>et al.</i> <sup>2</sup>	Penetrating arrow injuries of the maxillofacial region	4	Neck - 2 Supraorbital Region - 1 Eye - 1	Exploration and Arrow removal, Tracheostomy -1
4	Aremu and Dike <sup>14</sup>	Penetrated Arrow Shot Injury in Anterior Neck	1	Anterior neck	Neck exploration and arrow removal
5	Lawan and Danjuma <sup>10</sup>	Arrow injuries to the eye	2	Eye to the maxillary sinus - 1 Eye - 1	Evisceration and Arrow removal - 2 Antrostomy in 1
6	Sandabe <i>et al.</i> <sup>9</sup>	Arrow shot injury to the neck	1	Lateral neck	Neck exploration and arrow removal
7	Aliyu <i>et al.</i> <sup>5</sup>	Arrow Shot Injuries: Experience in a Referral Centre in North Eastern Nigeria	9	Head and neck	Exploration and arrow removal
8	Adamu and Ngamdu <sup>15</sup>	Management of Penetrating Arrow Neck Injury: A Report of Two Cases	2	Neck	Exploration and arrow removal

and severity of the injury. The degree and severity of the injury depends on the range at which the arrow is fired, the trajectory it pierce, the degree of penetration, and whether poisons were applied to the tip of the arrow or not.<sup>13</sup> Arrows embedded with poisons causes paralysis or serious wound infection depending on the nature of the poison.<sup>1,2</sup> Arrow shot to the neck can easily penetrate and injure major blood vessel, and patient may present with massive bleeding, expanding hematoma, or shock. Injury to the pharynx or esophagus may result in odynophagia, dysphagia, or hematemesis. The patient with laryngeal or tracheal injury may present with air blowing wound, expanding emphysema, or upper airway obstruction that require immediate surgical intervention. Brain and spinal cord injury may cause paraplegia, quadriplegia, ventricular hemorrhage, corning, or immediate death. Our patient presented with bleeding from the site of arrow injury, odynophagia, bleeding from the mouth and nose. No difficulty in breathing or dysphagia. One of the patients was brought in death likely he sustained brain injury and intracerebral hemorrhage from the manipulation of the impacted arrow by attempted removal at home. The patient that died also presented late about 48 hours after the injury. Delay in the presentation to the hospital is one of the factors that increase morbidity and mortality. Madhok *et al.*<sup>13</sup> reported that the common factor in all the patients that died with impacted arrow injury were an abnormal delay in the presentation.

The management of arrow injury to the head and neck region is difficult. Advanced Trauma Life Support (ATLS) protocols are usually followed, there should be rapid survey and assessment of airway, breathing, and circulation. Patients with injuries that are immediate threat to life should be managed as emergency. The patient with upper airway obstruction should have emergency tracheostomy to secure the airway. Vascular injuries with unstable hemodynamic status should be resuscitated with blood and emergency neck exploration and repair should be undertaken. Patients with arrow injuries that are clinically stable and have optimal hemodynamic status are subjected to investigations before taken decision to explore.<sup>16,17</sup>

CT scan is very vital investigation in the patient with arrow shot to the head and neck region. It is usually indicated in hemodynamically stable patient without hard signs of vascular or aerodigestive tract injury. CT scan is noninvasive diagnostic tools which help to determine the trajectory of the arrow and relationship with vital structures.<sup>18</sup> An attempt at blind extraction can cause serious disaster, especially if major vessels have been involved. In our series, only one of the patient afforded CT-scan due to financial constraints. In the rest of the patients, we depended on X-ray and clinical signs as a guide to the surgical exploration and arrow removal.

Surgical extraction of penetrating arrow in the head and neck region is guided by the principle of trauma surgery such as meticulous tissue dissection, adequate exposure, minimizing hemorrhage, prevention of additional injury, preservation of vital structures, debridement of death

tissues, thorough wound irrigation with normal saline, and application of drain depending on the depth of the wound.<sup>13</sup> The route through which the arrow is remove depends on the depth of penetration and relationship with vital structures. If the arrow is superficial, it is better remove through the entry point (retrograde), but if it is deep and the tip of the arrow can be palpated easily on the opposite side, then the surgeon can make new incision where he is feeling the tip of the arrow, dissect and then remove the arrow through the new incision (anterograde). Another factor that determines the route for arrow removal is the direction and number of fang of the arrow. The arrow may have anterior or posterior pointing fangs. The fangs of the arrow can be single or double. Arrow with the posterior pointing fangs are better removed anterograde, if this is not possible because of present of vital structure along the dissection tract the surgeons should go through the entry point and dissect until the fangs are exposed adequately, the fangs are then clipped together and the arrow is gently remove. If the arrow has entry and exit points, then the route of removal depends on the relation of the arrow to vital structure and direction of the fangs.

## CONCLUSION

In conclusion, penetrating arrow injuries of the head-and-neck region are common in our environment. The management is challenging, especially in a resource-limited setting. Resuscitation of such patient should be according to ATLS protocol, and the treatment is guided by the principle of trauma surgery. The outcome of the patient depends on the degree and nature of the injury and time of presentation at the hospital.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Milner GR. Nineteenth-century arrow wounds and perceptions of prehistoric warfare. *Am Antiq* 2005;70:144-56.
2. Olasoji HO, Tahir AA, Ahidjo A, Madziga A. Penetrating arrow injuries of the maxillofacial region. *Br J Oral Maxillofac Surg* 2005;43:329-32.
3. Parsons AC. Arrow and arrow wounds in Northern Nigeria. *Br Med J* 1909;1:212-3.
4. Madziga AG. Arrow injuries in North Eastern Nigeria. *WAJM* 2003;22:106-9.
5. Aliyu S, Ibrahim AG, Ali N, Lawan AM, Bakari AA. Arrow shot injuries: Experience in a referral centre in North Eastern Nigeria. *Int J*

- Sci Res 2014;3:1822-5.
6. Na'aya HU, Eni UE, Madziga AG, Kwari YD. Arrow injuries in North-Eastern Nigeria. *Port Harcourt Med J* 2012;6:350-7.
  7. Nwiloh J, Edaigbeni S, Danbauchi S, Balarabe AM, Oyati A. Arrow in the heart. *Ann Thorac Surg* 2010;90:289-92.
  8. Aliyu I, Ismail MI. Arrow in the heart: Our experience. *Niger J Cardiol* 2014;11:54-6.
  9. Sandabe MB, Waziri AM, Akinniran AA, Jatta A, Chibuzo IM. Arrow shot injury to the neck. *Int J Head Neck Surg* 2012;5:1-5.
  10. Lawan A, Danjuma SA. Arrow injuries to the eye. *Ann Afr Med* 2012;11:116-8.
  11. Ogunleye AO, Adeleye AO, Ayodele KJ, Usman MO, Shokunbi MT. Arrow injury to the skull base. *West Afr J Med* 2004;23:94-6.
  12. Sil K, Basu S. Craniocerebral arrow injury with survival. *Indian J Neurotrauma* 2011;8:111-2.
  13. Madhok BM, Roy DD, Yeluri S. Penetrating arrow injuries in Western India. *Int J Care Injured* 2005;36:1045-50.
  14. Aremu SK, Dike B. Penetrated arrow shot injury in anterior neck. *Int J Biomed Sci* 2011;7:77-80.
  15. Adamu A, Ngamdu YB. Management of penetrating arrow neck injury: A report of two cases. *MAMC J Med Sci* 2020;6:63-7.
  16. Biffi WL, Moore EE, Rehse DH, Offner PJ, Franciose RJ, Burch JM. Selective management of penetrating neck trauma based on cervical level of injury. *Am J Surg* 1997;174:678-82.
  17. Ngakane H, Muckart DJ, Luvuno FM. Penetrating visceral injuries of the neck: Results of a conservative management policy. *Br J Surg* 1990;77:908-10.
  18. Gracias VH, Reilly PM, Philpott J, Klein WP, Lee SY, Singer M, *et al.* Computed tomography in the evaluation of penetrating neck trauma: A preliminary study. *Arch Surg* 2001;136:1231-5.