

Penetrating Arrow Wound of the Chest - A Case Report

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Introduction

In ancient India arrow injury was prevalent as it was a one of the most frequently used weapon. With passage of time use of bow and arrow became restricted to tribal area and its use became limited mostly to hunting. But in the recent years with progressively increasing terrorist activity in some areas arrow injuries are becoming more and more frequent. Effect of injury depends not only on the site of impaction and associated tissue damage, but also to arrow material, associated poison if any and treatment methods. Surgical removal of arrow as early as possible along with appropriate post-operative measures still remains the gold standard of management of such injuries.

Case report

A 35 year old male patient (62 kg, 165 cm) presented with an arrow injury over left midchest while attending grazing of cows in a local field. He was rushed to a nearby hospital with the arrow stuck at that site and was treated with i.v. medicines, nebulisations and left intercostal tube drainage. Investigations done and patient was referred our institution for further management.

On examination, patient was alert, conscious and cooperative. Heart rate 112/min, blood pressure - 108/68. No pallor, cyanosis, jaundice, clubbing or oedema was present. Pupillary reactions were normal. Intercostal tube drain seen in situ. A 16 cm thin bamboo stick found to be emerging from left midchest at 6th to 7th intercostal space (Figure 1 and 2). It was moving both with respiration and heart beat. Diminished vesicular breath sound auscultated at left chest below 6th rib. Other systemic examinations were within normal limit. CT scan of chest revealed: large left pneumothorax, diffuse parenchymal opacities in left mid and lower zones, post traumatic contusion/ edema, gross left pleural collections- likely to be pneumothorax and a foreign body entering the thorax between 6th to 7th ribs at left thorax. NCCT & CECT whole abdomen and chest revealed: evidence of a pointed linear arrow shaped metallic density foreign body seen piercing the left lower hemi thorax, left hemopneumothorax with collapse of lower lobe of left lung with pointed end within lung parenchyma with signs of penetrating lung injury, the pointed end seen abutting the fundus of stomach with perigastric air – sign of penetrating stomach injury, left diaphragmatic penetrating injury is possible. However no herniation of abdominal organs was found. Free fluid is seen in pelvis & around perisplenic region was also noted. Examination of blood was normal and the values were: Hb- 13.4, TLC- 9000, (N81 L19). Platelet: 2,15,000/cmm, ESR-30. PCV: 41.9%, MCV- 87.7 fl, MCH- 28 pg, MCHC-320 g/dl. B.T.-1'50", C.T. - 6'10", P.T.- 13.15s, Control: 13.5s, INR- 0.97. Fasting Blood Glucose- 98, Urea- 28, Creatinine- 1. LFT: Bil-1.5, Direct: 0.4, Indirect: 1.1, SGOT-21, SGPT- 13, ALP: 123 Total protein- 6.6, Alb- 4.1, glob-2.3.



Figure 1



Figure 2

Figure 1 & 2: showing a 16 cm thin bamboo stick emerging from left midchest at 6th to 7th intercostal space

Patient was admitted in Intensive Care Unit, Dept. of Cardiothoracic Surgery. Immediately after admission the patient was examined, reports were reviewed and posted for emergency surgery. Surgical plan was exploration, removal of arrow and if necessary lobectomy. General anaesthesia with Double lumen tube insertion was employed and epidural analgesia considered for postoperative pain.

After receiving patient in O.T. intravenous access established with two wide bore (18 gauge) i.v. cannula. Following preoxygenation and premedication with glycopyrrolate 0.2 mg, fentanyl 100 mcg, ranitidine 50mg, anaesthesia was induced with propofol 100 mg. Succinylcholine 100 mg given to aid intubation. Endobronchial intubation done with a 37F cuffed portex double lumen tube. Position confirmed with EtCO₂ and chest auscultation with alternate clamping and fixed at 29cm at angle of mouth. Anaesthesia maintained with N₂O:O₂ :: 2:1, Changed to 100% O₂ with one lung ventilation, isoflurane and vecuronium as muscle relaxant. Intraoperative analgesia provided with diclofenac 75 mg and intermittent boluses of fentanyl 50 mcg. The chest wall opened with a posterolateral thoracotomy and the arrow track dissected down up to diaphragm. Although the pleura were found to be damaged, the collapsed lung expanded well with recruitment manoeuvre. Perioperative vitals were stable. After completion of surgery and exclusion of any vascular injury, epidural catheter placement was done at T7 –T8 intervertebral space by paramedian approach and 3ml lignocaine 2% with adrenaline introduced as a test dose. Patient was shifted back to recovery ward with muscle relaxation and mechanical ventilatory support and intercostal tube drainage.

Postoperative Care

Patient was weaned from ventilator gradually and extubated after 4 hrs in recovery room. For initial 24 hours analgesia maintained with continuous epidural infusion of Ropivacaine 0.2% and clonidine 3mcg/ml at the rate of 6 ml/hr. Later epidural catheter was removed and analgesia provided with Diclofenac 75 mg twice daily and tramadol 50 mg twice daily. Other post operative care included: nebulisations, antibiotics, respiratory physiotherapy, incentive spirometry etc. Patient was shifted to general ward after 48 hrs and discharged from hospital after 7 days.

Discussion

Problems in this case

Although the patient admitted after 40 hrs of injury and vitals were stable, from the position of the arrow and its pulsation with cardiac impulse, from clinical point of view we could not exclude injury to heart or any major blood vessels. This was supported further after having the CT scan in our hand. Epidural analgesia could not be given intraoperatively as we could not allow any possible source of hypotension during the procedure. Therefore we placed the epidural catheter after completion of surgery and exclusion of any vascular injury. Another problem was we were not quite sure that any arrow toxins were not used. It was further supported by grossly damaged pleura of the left side found after opening the thorax. Probably no major toxins were used because the patient did not develop any significant complication during the course. Obviously the follow up check up will be directed to find out any remote complications. We were fortunate to find out the collapsed lung expanding well after securing lung injuries and recruitment manoeuvre. Problems associated with thoracotomy and one lung ventilation were faced during the procedure and dealt accordingly (Figures 5, 6 and 7).

The initial surgical plan was to proceed to lobectomy if needed. There was also evidence of hydropneumothorax in CT scan and presence of bronchopleural fistula was also suspected. There was a small wound over diaphragm with a small injury over stomach. The wound was approachable via diaphragm and so minor that both the surgeon and the anesthetist team considered it to be unwise to put the patient to further operative stress of another major surgery like a laparotomy. Double lumen tube was inserted to protect the unaffected lung from noxious material from the opposite lung, to avoid bronchopleural fistula related ventilatory problems and to provide a good surgical view [1]. It would be also helpful and necessary if lobectomy was performed. Epidural analgesia was preferred as it is still now considered as gold standard measure to control post thoracotomy pain [2,3].

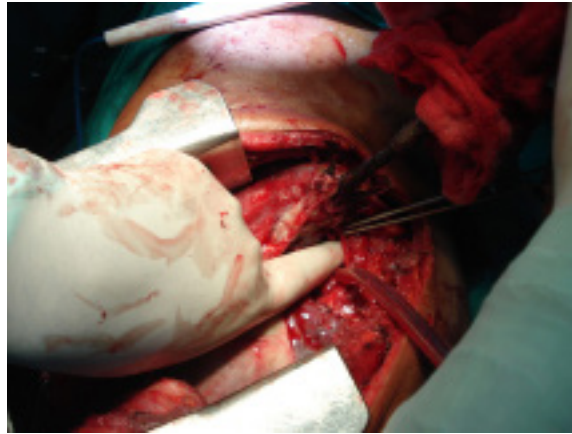


Figure 5

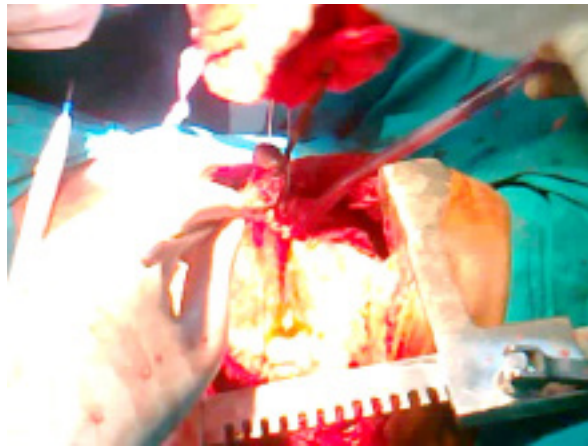


Figure 6

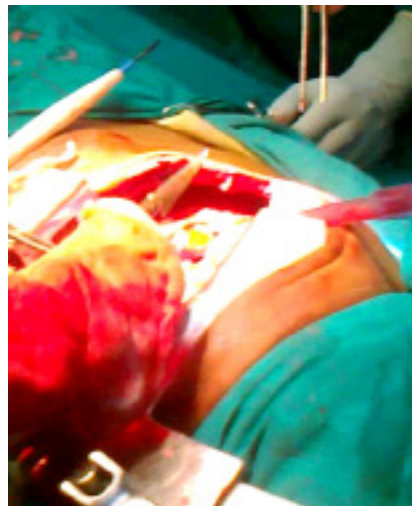


Figure 5,6 & 7: Arrow removed after confirming no injury to heart, pericardium or any great vessels.

Arrow injury

Arrow injury may present with different sets of problems and management differs accordingly. Arrows may be curved tip, angulated, with serrated margins. Arrow head structure also varies and it is always safe to have a good dissection of the area before removal of an arrow [4,5] (Figure 3 and 4). Sometimes some herbal extract or animal secretions are used to inflict more injuries. Common plant toxins are *Croton tiglium*, *Calotropis*, *Strychnos toxifera*, *Strophanthus* genera, *Antiaris toxicaria* etc. The sap or the juice or the plant extract is smeared on the arrowhead and dried. Sometimes some animal poisons are also used.

Arrow injuries are classified under low velocity missile injuries. The site of injury is of utmost importance. Metallic arrowhead can easily pierce through the soft tissues and can easily damage nerves, blood vessels or any nearby soft tissue structures [4,6]. Patient may present without bleeding but removal of the arrow may open up an injured blood vessel and may precipitate torrential bleeding [4].

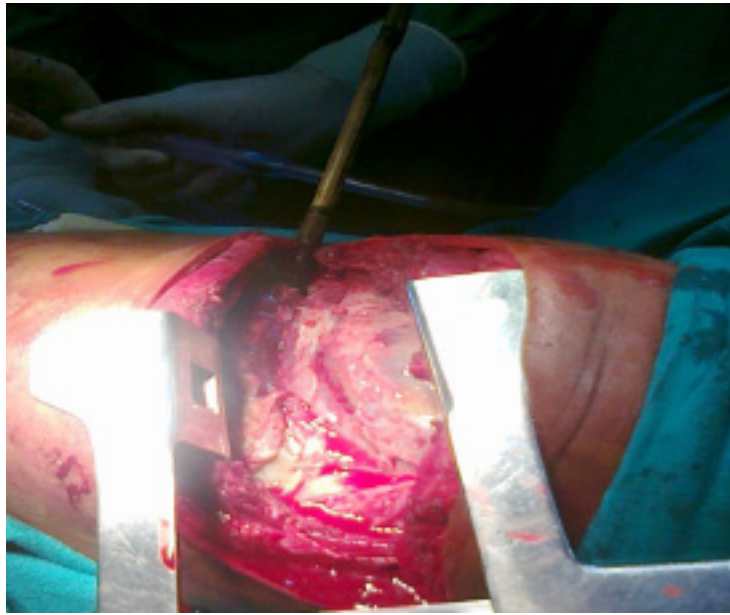


Figure 3

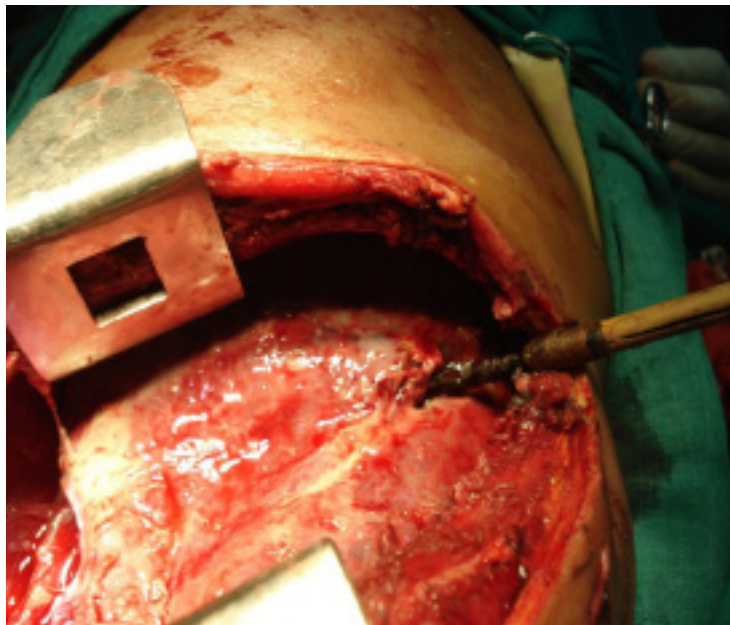


Figure 3 & 4: Dissection of arrow wound

In thoracic arrow injury there is every chance of damage to the heart or any major blood vessels [4]. Usually in such cases severe bleeding commences immediately. Damage to the lungs may present as bronchopleural fistula, lobar atelectasis, injury to the hilar structure or any major bronchus injury. Other mediastinal structures or nerves may be damaged as well. Long standing complications include: septicaemia, ARDS, delayed wound healing, chronic pain syndrome, permanent disfigurement and contractures etc., (Figure 8, 9 and 10).

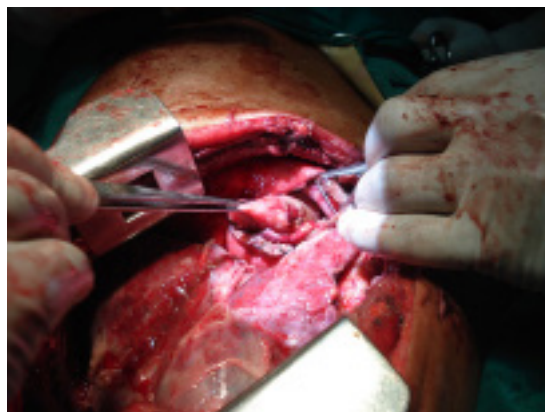


Figure 8

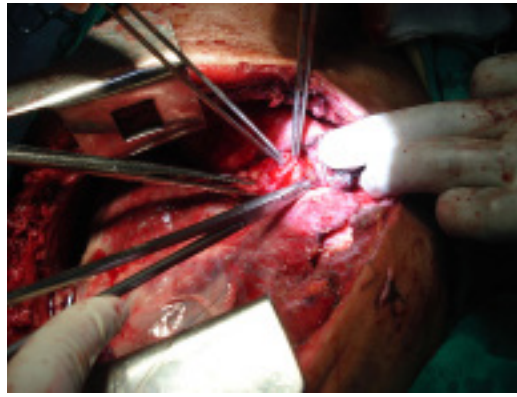


Figure 9

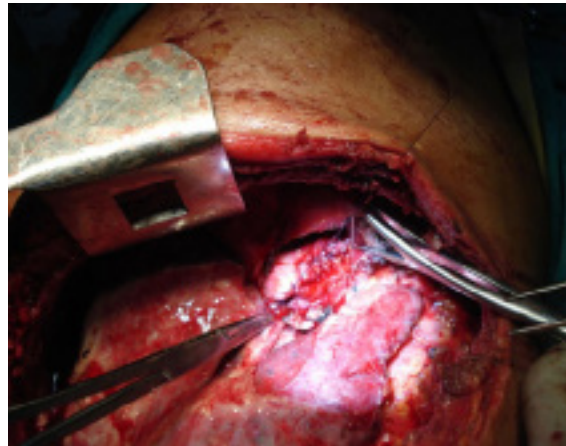


Figure 10

Figure 8, 9 & 10: Exploration of diaphragmatic and small gastric wound and closure.

Management Strategy

In all patients presenting with thoracic arrow injury initial resuscitation should be done as per ACLS protocol and chest drain placement must be considered. In patients presenting with cardiovascular injury with haemodynamic derangements volume resuscitation with blood should be started immediately and surgery should be done immediately after angiographic localisation of bleeding vessel. There are case reports of patients having major vessel injuries and survival following treatment [7,8]. In patients with stable haemodynamics, no probable vascular injury and if arrow poisoning is not suspected clinically, imaging workup should be done to delineate extent of damage to the lungs. Multidetector CT scan is the investigation of choice [9,10]. Digital angiogram may be done to check for vascular damage [4]. Full clinical examination with emphasis to central nervous system and examination of pupil should be carried out to exclude neurotoxins. Surgical removal of arrow and proper wound toileting should be done as early as possible. Videothoracoscopy may not be a good option in such scenario [4]. Anaesthetic drug dosage should be modified according to the patient condition, renal function and volume status. Double lumen tubes are helpful in this condition because, they protect the unaffected lung, allow one lung ventilation, provide a good surgical view and allow ventilation in the normal lung in presence of bronchopleural fistula [1]. Post operative mechanical ventilatory support should be considered if there is extensive tissue damage or patient haemodynamics are unstable. Post-operatively patient should be assessed for lung expansion and repeat chest roentgenogram should be done to detect residual atelectasis or development of ARDS. Pain control is best accomplished by thoracic epidural or paravertebral analgesia [2,3] (Figure 11).



Figure 11: Arrow after removal

Conclusion

With progressive terrorist activity at tribal areas, penetrating arrow injury is probably going to be more common in near future. While managing such cases, the authors suggest, do not just pull out the arrow [4], put a chest drain in thoracic injury, exclude poisoning, immediate resuscitation with fluids and blood if necessary, protect the heart, brain and kidneys and imaging workup and surgery as early as possible but do not delay surgery for imaging in unstable patients.

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