



## Radiodiagnosis

## THE ROLE OF RADIOLOGIST IN PENETRATING ARROW INJURY OF CHEST AND UPPER ABDOMEN – REVIEW OF TWO CASES.

<b>Dr. Nilesh Gupta*</b>	Assistant Professor, PTJN Medical College and BRAM Hospital, Raipur, Chhattisgarh, India. *Corresponding Author
<b>Dr Satya Bhuvan Singh Netam</b>	Professor and Head of Department, PTJN Medical College and BRAM Hospital, Raipur, Chhattisgarh, India.
<b>Dr Ashutosh Gupta</b>	Radiology Resident, PTJN Medical College and BRAM Hospital, Raipur, Chhattisgarh, India.

**KEYWORDS :** Arrow, CT scan, laceration, pneumothorax.

**INTRODUCTION :**

Arrow injuries were frequent in India and across the world few centuries ago as it was the most frequently used weapon , mostly for hunting activities. But in modern times with development of new weapons , use of bow and arrows have been limited to sports competitions. Its use is still prevalent in few tribal areas , occasionally used for Naxalite activities. Impact of injury depends on the site of injury and associated vital tissue damage.

**AIM:**

To assess the type of Arrow injuries , extent of injury and post management follow up study using appropriate diagnostic radiological procedures for triaging and subsequent management planning.

**Case 1 :**

One evening , a 20 year old fisherman was hunting in a pond at a tribal forest area when he was hit by an arrow from behind in the upper abdomen . He was in a forest area with no hospital nearby, transport facility or mobile coverage . Hence, he could be shifted the next day with the broken wooden stem of arrow and head inside and did some first aid home remedies. He was given primary care in the peripheral centre and was referred to our tertiary care institution for further management .

On examination , the patient was conscious, oriented , co-operative with arrow head inside the right side of lower part of chest/upper abdomen with small part of wooden stem protruding. Ooze of blood from the local site noted (Figure-1). Heart rate 120 per min, BP 110/70, respiratory rate 26 per min, no pallor/cyanosis/ clubbing or edema seen . Air entry was decreased on right side . Systemic examination were within normal limits. He was started on IV fluids , antibiotics, oxygen and supportive treatment in casualty, followed by blood tests, bed side chest x-ray & CT scan chest and abdomen.



Figure-1

**Chest X-ray PA and Lateral (Figure -2) views :** Arrow shaped metallic artifact below right hemidiaphragm in the liver parenchyma . Pneumothorax in right apical region and blunting of right costophrenic angle .

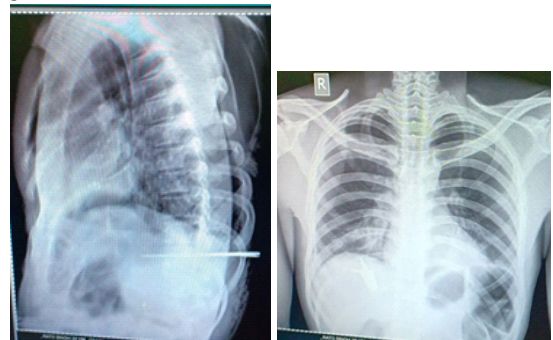


figure-2

**CT scan chest and abdomen (Figure-3): revealed**

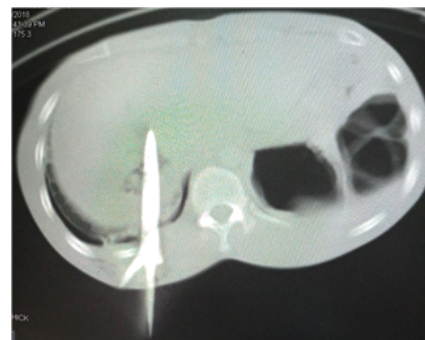


Figure 3



Figure-4

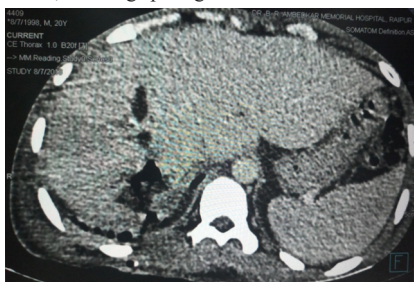


**Figure-5**

1. A metallic foreign body piercing through the right posterior abdominal wall, piercing through the right chest wall in the thoracic cavity across pleura ,diaphragm and reaching up to the liver ( segment V and VII). It was abutting the upper pole of right kidney (figure-4)
2. Illdefined area of non-enhancing hypodensity measuring approximately 9.2 (TR) x 8.2 (AP) x 5 (CC) cm , involving segment V and VII of right lobe of liver sparing the hilum s/o grade IV liver injury .
3. Rent in diaphragm was highly suspected.
4. Mild hydro-pneumothorax seen in right pleural cavity (Figure – 5 ).
5. There was no obvious evidence of pneumoperitoneum or collection in peritoneal cavity .

Patient was then shifted to emergency OT due to falling O2 saturation managed by intercostal chest drainage tube under water seal. Also, he was intubated and transfused with 3 pints of Blood. The wound was explored and arrow head was removed , hemostasis achieved and chest wound was closed with sutures. The exploratory laprotomy was reserved after follow up CECT chest-abdomen findings and observing his vitals for few few days. The patient did well without the need for laprotomy. Two days later , he was extubated and shifted to ward.

Repeat CECT chest and abdomen revealed 9cm x 3cm lacerated injury with blood clots and few air foci involving segment V and VII of right lobe of liver . A 5 mm rent was noted in the right hemi-diaphragm in its posterior part . Pneumothorax had been resolved. Surgical emphysema was noted in subcutaneous and intermuscular plane of posterior abdominal wall communicating with pleural cavity and liver capsule continuing into the liver parenchyma. Minimal collection noted in bilateral pleural cavity . Intercostal drainage tube was found in situ in right pleural cavity. Central line was found in situ entering right subclavian vein , reaching upto right atrium.



**Figure-6**

**CASE 2:**

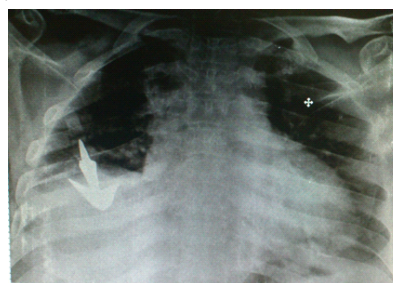
A 35 year old man sustained an attack with an arrow injury over right anterior chest while riding in his bicycle in a forest area on the way to village. The arrow traversed across his right forearm. Bleeding wounds from right forearm and chest wound noted. He was rushed to nearby clinic where he was given pressure dressings and IV fluids, followed by referral to our hospital . On local examination, he was conscious, oriented however had breathing difficulty. A broken wooden stick was protruding from his right anterior chest wall (figure- 1).



**Figure – 7**

General examination findings revealed tachycardia, tachypnoea absent breath sounds on right side. No pallor, cyanosis, jaundice, clubbing or oedema was present. Pupillary reactions were normal. His right ulnar artery was not palpable otherwise no obvious gangrenous changes in hand noted .

After starting basic supportive treatment, routine blood investigation Chest X-ray, CT chest and ultrasound /Doppler right upper limb were performed.

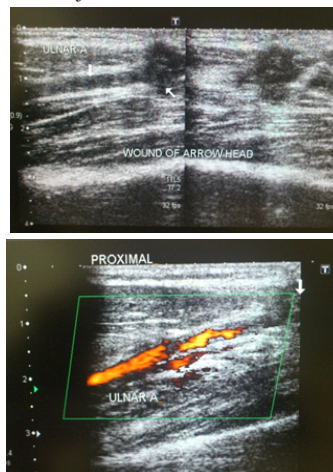


**Figure-8**

**Chest X-ray AP view (Figure-8) :**

1. Arrow shaped foreign body noted in right 6th intercostals space.
2. Gross right pneumothorax with subtotal collapse of right lung .
3. Moderate collection in right pleural cavity .

Ultrasound and Doppler of right upper limb was performed which revealed absent flow in ulnar artery distal to the incised wound (figure-9). Right radial artery and palmer arch however showed normal Doppler flow. Along with the vascular injury, he sustained flexor tendon injuries at the injured site.



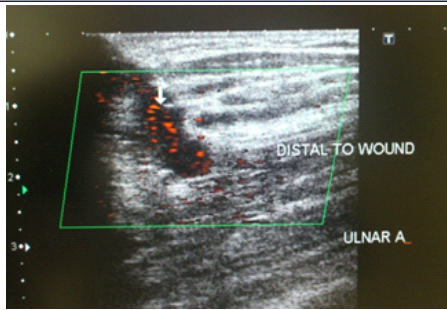


figure-9

Chest CT (Figure – 10a & b) revealed evidence of a pointed linear arrow shaped metallic density foreign body seen piercing the right mid hemi thorax into pleural cavity causing hemopneumothorax with collapse of lower lobes of right lung with pointed end injuring lung parenchyma with signs of penetrating lung injury, the pointed end seen abutting the posterior chest wall. There was subtotal collapse of right lung. Mild subcutaneous and intermuscular air foci seen suggestive of surgical emphysema. No obvious major vessels in the chest was injured.



Figure – 10a



Figure – 10b

He was taken into the operation theatre for removal of the arrow head and management of lung injuries. His forearm injuries were managed conservatively after attaining haemostasis with a plan of reconstruction of tendon in the back of the hand. Postoperative period was uneventful. He was discharged after 7 days of hospital stay and advice of plastic surgery opinion given.

#### DISCUSSION :

Liver injuries are common, more of them are caused by blunt trauma. Penetrating liver injuries, that to by an arrow is still rare. Early and accurate diagnosis with availability of advance diagnostic modalities like CECT have greatly change the approach to management protocol and have replaced old diagnostic modalities like diagnostic peritoneal lavage. Stable patients with isolated liver injuries, particularly those with low grade injuries, are now able to be managed non-operatively. Operative management can be as simple as packing, suture repair, and or application of topical hemostatics (gel foam pack) in less severe injuries. More complicated repairs such as resectional debridement, direct ligation of bleeding vessels, and major non-anatomic liver resections are sometimes needed to obtain hemostasis in major liver injuries. Hemostasis is obtained with packing and whatever other techniques are necessary. This is used as a bridge to angiographic embolization, which can be followed by unpacking and other operative

therapy as needed when the patient is more stable.

Our patient suffered deep penetrating injury in the right lobe of liver otherwise major vessels and hilum were spared. Surgeons decided focused exploration in emergency OT along with supportive care. Exploratory laprotomy was reserved and close monitoring with follow up CECT was decided. Small right hemidiaphragmatic rent was managed conservatively. Mild hydro-pneumothorax was treated with intercostals chest tube drainage under water seal.

Focused approach to management protocol following relevant advanced diagnostic approach in case 2, saved valuable time & resources leading to early interventions required.

#### CONCLUSION:

Knowledge of Arrow injuries, its spectrum and extent should be known to the radiologists since, he will guide the further triaging and management plans. Availability of advanced diagnostic modalities like CECT and accurate diagnostic interpretation plays a major role in deciding treatment approach.

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