A Child With Stray Bullet Injury To Sauer's Danger Zone: An Unusual Presentation – A Case Report

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ABSTRACT

Celebratory firings are common in many countries. These may cause significant harm to the victims who accidently get injured by a stray bullet. We report a 10-year-old male child who got injured by a stray bullet while he was sleeping at the roof top. A single entry wound was found on anterior chest on right side in third intercostal space just to the right of sternum. His general condition gradually deteriorated and needed chest intubation and packed cells transfusion. He responded to the conservative management and discharged after improvement. He survived in spite of significant mechanism of injury involving the danger zone of chest where bullet penetrated the body.

Key words *Stray bullet injury, Thoracic trauma, Sauer's Danger zone, Child.*

INTRODUCTION:

Penetrating thoracic injuries are relatively less common in children. The central part anterior chest is considered a danger zone. It is often referred to as Sauer's danger zone and "the box". This area extends superiorly from clavicles to costal line inferiorly. Laterally it is bounded by the midclavicular lines. Heart and great vessels are located in this zone.[1]

Stray bullet injuries are frequently reported from Pakistan. According to a study children bear the brunt of this mode of trauma where 78% of the victims were between 2 – 20-years of age. The thoracic region was less frequently involved. In many cases the injury is not even suspected thus delay in treatment is also reported.[2] In this case report we describe a child who was a victim of a stray bullet injury that penetrated the danger zone of the chest.

CASE REPORT:

A 10-year-old male was brought to the Emergency Room by parents early in the morning at 03:30 am with the complaint of bleeding from a right anterior chest wound three hours back. The boy was sleeping on the roof-top of his house when he was hit presumably by a stray bullet. The patient was able to talk with oxygen saturation of 98% in room air. However, nasal flaring with slight increase in respiratory rate of 25 breaths per minute were observed. High flow supplemental oxygen was supplied through non-rebreathing mask. Examination of the chest showed a tiny 1-cm x 1-cm wound about 1.5-cm above right nipple, approximately 2-cm lateral to sternal border in 3rd intercostal space with irregular margins (Fig. I). There was no active bleeding from the wound. On auscultation there was decrease air entry on right side of the chest in lower zone. A suspicion of pneumothorax was made. Chest x-ray was immediately advised that showed a bullet in right chest cavity near cardio-phrenic angle with haziness in lung field that was considered as pulmonary contusion (Fig. II). Intravenous access was made and warm crystalloid started. A decision of placement of chest tube was made. Tube thoracostomy revealed minimal hemorrhagic fluid and column movement was noted. Following chest intubation tachypnea was decreased. His GCS score remained 15/15 and no other injuries were found. The patient was then shifted to the intensive care unit for monitoring.

In ICU hourly monitoring was continued and child remained vitally stable though 50 ml serosanguinous drain was found in chest tube in following hour. After two hours he again developed tachypnea with the respiratory rate of 32 breaths per minute and 200

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ml blood was collected in chest tube drain. The heart rate also increased from 90 to 116 beats per minute. Counselling of parents was done for the possible need of surgery and one unit of packed red cell was transfused. OR staff and anesthetists were informed and preparations for thoracotomy were made. Continuous monitoring in ICU showed improvement in vitals sings and no further fluid was noted in chest drain. X-ray chest was repeated that showed right sided pneumothorax with collapse lung despite chest tube in place and column movement (Fig. III). It was decided to place another chest tube pre-emptively above the initially inserted drain so as to contain progressing pneumothorax. Child remained stable and later CT scan chest was done that showed presence of residual pneumothorax, significant pulmonary contusion with presence of bullet in right paravertebral gutter (Fig. IV).

Fig. I: The wound on entry on right anterior chest wall just lateral to the sternum.

Patient was kept in ICU for next five days. I/V analgesics, antibiotics, incentive spirometry, nebulization and chest physiotherapy continued. He was stepped-down to HDU on 6th post-admission day. Chest drain one was clamped and removed after 24-hours on 8th day followed by 2nd chest tube (Fig. V). Patient was discharged on 11th post-admission day with a plan to remove bullet thoracoscopically on elective list.

DISCUSSION:

Penetrating thoracic injuries can have fatal consequences if mediastinal structures are involved. Most of the victims die at the scene of accident or immediately after arrival in ER.[3] Fortunately, the

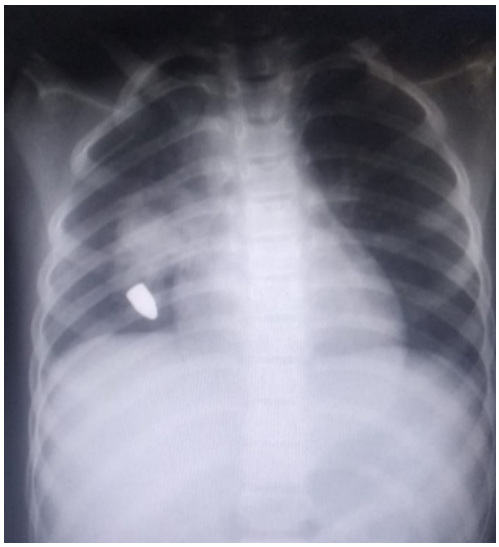

Fig. II: X-ray chest showing right sided pneumothorax.

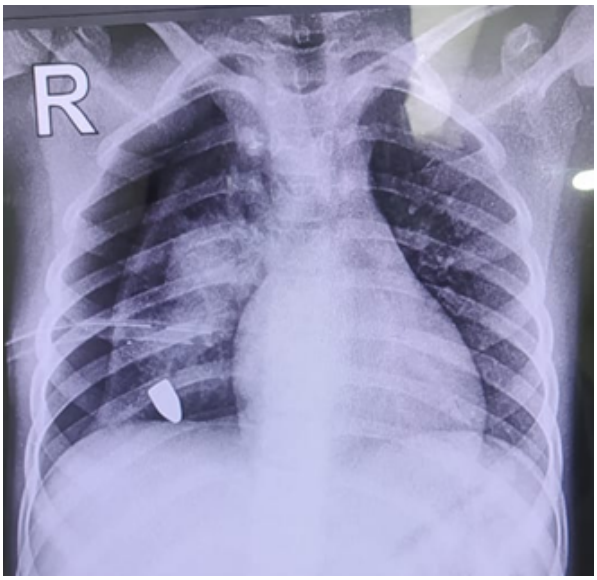

Fig III: X-cheat after placement of chest drain.

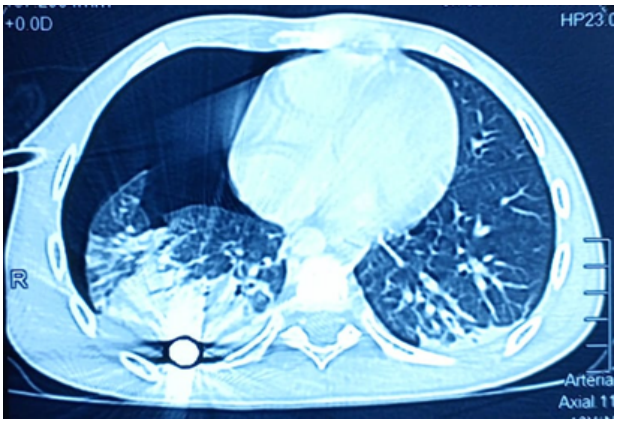

Fig. IV: CT scan chest shows residual pneumothorax, lung contusion and presence of bullet in right paravertebral gutter

Fig. V: X-ray at discharge of the patient from hospital showing inflated lungs and presence of stray bullet on right side.

danger cardiac box region is less commonly involved. In our patient though injury was in the Sauer's danger zone but vital structures were spared. The tangent of the projectile was such that it directed inferiorly and posteriorly with no exit wound. This also reflects the slow velocity of the stray bullet. As child was sleeping on the roof of the house a strong suspicion of bullet injury was made based upon illegal use of weapons in different ceremonies especially the weddings.[4] This has become a common culture in Pakistan.[5] Such incidents are also reported from other countries as well.[6]

The slow progression of the respiratory distress pointed towards gradual development of pneumothorax in our patient. The presence of pulmonary contusion further aggravated the respiration. This mandated the use of two chest drains as lung did not expand, most likely due to lung parenchymal injury. Air leak remained minimal and resolved in subsequent days. This highlights that most of the thoracic injuries that need only chest intubation and observations at times ventilator support with pain management. Thoracotomy is less often required.[7] Same was provided in our patient.

Advanced Trauma Life Support program emphasizes a systematic approach to an injured patient. We followed the same ABCDE protocol of primary survey with the use of adjuncts to assess the adequacy of the resuscitation. CT scan was done once the patient was stabilized. It provided further information about the pulmonary damage as well as the position of the bullet and the trajectory it followed.[8] Counselling was done with the parents about elective removal of the projectile. Thoracoscopic removal of bullet is reported in literature and we plan to use the same.[9]

CONCLUSION:

A standard approach of management according to the ATLS protocol resulted in a satisfactory outcome. Continuous monitoring in an intensive care set up and need based interventions like chest drains placement, produced a satisfactory outcome though a danger chest zone was hit by a stray bullet in the child.

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