

## Successful surgery of massive thoracic injury in a girl following Chest trauma

Faizan Imran Bawany,<sup>1</sup> Muhammad Shahzeb Khan,<sup>2</sup> Asadullah Khan,<sup>3</sup> Mudassir Dar<sup>4</sup>

### Abstract

Patients with penetrating thoracic injuries should be managed appropriately and rapidly under the supervision of multi-disciplinary team. We present a case of a 9-year-old female student who survived a major road traffic accident (RTA), a leading contributor to accidental deaths in Pakistan. The girl was hit by a public transport bus impaled by a metallic rod through the right axilla, and subsequently dragged for a distance, resulting in avulsion of a broad front of the mid-anterior and left precordial part of the chest wall. Although both the lungs and heart were exposed, she did not suffer any myocardial injury. Despite massive hypovolaemic shock with bilateral open pneumothoraces, the girl made an uneventful recovery. She was discharged on the 7th post-operative day. The report highlights the value of proper management of hypovolaemic shock and optimally timed and executed surgical intervention.

**Keywords:** Road traffic accidents, Thoracic-trauma, Exposed-heart.

### Introduction

Road traffic accidents are responsible for 1.24 million deaths yearly worldwide. This is supplemented with approximately 20 to 50 million non-fatal injuries, which add to the global disability problems. It is anticipated that by 2030, RTA would be ranked as the fifth leading cause of mortality, chiefly in low and middle income nations.<sup>1</sup> The incidence of penetrating thoracic trauma varies geographically with as low as 4% in Europe.<sup>2</sup> Patients normally present with a broad spectrum of injuries, including rib fractures, sternal fractures and thoracic wall lacerations.

In 2010, Pakistan suffered a total loss of 5192 lives due to RTA.<sup>1</sup> We present a case of a severe chest trauma following a commercial vehicle accident and remarkable recovery following some prompt emergency treatment. She made

remarkably quick recovery, with resumption of normal activities in 2 weeks' time.

### Case History

A 9-year-old female student was presented to the cardiac surgery department in an unconscious state in December 2012. She had suffered an RTA wherein she was impaled by a metallic rod through the right axilla and subsequently dragged for approximately 0.25 kilometers. At presentation to the emergency department, she was bleeding profusely and was in a state of hypovolaemic shock. On examination she was cold and clammy with blood pressure of 50/30mmHg. The pulse was feeble with a tachycardia of 150-160 beats/minutes. There was a huge laceration on the anterior chest wall of approximately 7 inches by 4 inches that spread from top of the right nipple to the bottom of the left nipple in an oblique fashion. Another wound of approximately 3 inches was present in the right axilla which was linked to the anterior chest wall internally (Figure-1). It was told to us that a sharp metallic pipe had pierced into axilla and came out from the chest wall. The wound was covered with dust and debris. The lungs were visibly collapsed bilaterally without any pulmonary lacerations, and sternum was broken from the lower half into two pieces. There were multiple air leaks in



**Figure-1:** Image showing the oblique wound spreading from the superior aspect of the right nipple to the lower aspect of the left nipple.

<sup>1,2</sup>Medical Students, Dow University of Health Sciences (DUHS), Karachi,

<sup>3,4</sup>Cardiac Surgery Department, Civil Hospital, DUHS, Karachi.

**Correspondence:** Muhammad Shahzeb Khan. Email: shahzebkh@gmail.com



**Figure-2:** Image showing post operative stage of the girl in conscious state.

both the lungs. The pericardium was lacerated exposing the right ventricle in view without any myocardial injury. Right internal mammary artery and its adjoining intercostal arteries were bleeding profusely. As there were no visible injuries on head, neck and limbs, computed tomography (CT) scan of these regions was not performed. Furthermore, as urgent surgery was required due to the critical condition of the girl, cardiac enzymes test was not considered a priority. Moreover a 12 lead electrocardiogram (ECG) was also not performed, but the ECG lead 2 on the monitor was normal. Hence the patient was immediately taken to the operation theatre.

In the first step of management, endotracheal intubation was performed to open the airways to provide oxygen and medication, along with intravenous (IV) fluid replacement. Anti-tetanus serum was also given as prophylaxis for anaerobe *Clostridium Tetani*. After the wound was exposed further, dead tissue was debrided. The chest cavity was thoroughly cleansed with povidone solution and normal saline. The pericardium was closed using a 4/0 prolene suture and a pericardial drain of size 28 was left. The internal thoracic artery was ligated at both the ends and the intercostal arteries were electro-cauterised. The sternum was closed using single overlapping figure of 8 stainless steel wire sutures. The skin and muscles were closed using 20 vicryl sutures. Two drains were left in both the pleura and one drain was also left in anterior mediastinum. The patient was then shifted to intensive care unit (ICU) where she was ventilated for a

period of 24 hours. The next day, ventilator support was gradually removed and thereafter the patient was extubated.

After the surgery, 12 lead ECG, chest X-ray and echocardiogram were performed which were unremarkable. The post-operative cardiac enzymes were also within normal limits. The girl was discharged on the 7th post-operation day with no complications (Figure-2). However, the haemoglobin level was low due to profuse bleeding, and, as such, iron supplements were prescribed for anaemia. On 1 week follow-up post-discharge, her vital signs were normal and she reported no complaints. The child resumed her schooling and daily activities shortly.

### Discussion

Penetrating chest trauma is less prevalent than blunt trauma, but is more dangerous and deadly.<sup>3</sup> The most common etiology of penetrating thoracic injuries is motor vehicle accident which contributes to 70% of these cases.<sup>3</sup> Most of these injuries are of mild severity and seldom require operative correction.<sup>3</sup> The case under study required operative care and had profuse bleeding which needed urgent surgical intervention.

The girl presented with a severe impalement injury with a metallic pipe. Impalement injuries involving thorax are uncommon in civilian settings. Moreover, most of these cases are potentially lethal, and, if not surgically treated, could lead to mortality.<sup>4</sup> The girl initially seemed inconsistent with life, but proper management of hypovolaemic shock and optimally timed and executed surgical intervention saved her life. Evident impalement injuries can easily be seen piercing the body and allows quick and straightforward management and decision-making compared to a concealed injury. Fortunately, in our case, the girl presented with an evident impaling injury that allowed uncomplicated and quick decision-making.

The first step in the initial management of a critical trauma patient is immediate fluid<sup>4</sup> and blood replacement along with decompression of tension pneumothorax, if present. In our case, there was an open pneumothorax only, as the wound was open. It is important to understand that in majority of the cases the impaling object must be left as it is during transport to the hospital. Removal of the impaling object at the site of collision or during transport may result in massive haemorrhage and complicate the condition.<sup>5</sup> However, our patient was presented with the piece already removed, thus showing lack of knowledge of handling trauma patients among the common people. Medical professionals should carry out awareness programmes about the need not to remove the penetrating by a lay person. The uniqueness of this report

is that though the girl had experienced a horrifying accident, she recovered in a short time with no complications. Our literature search shows very few case reports in which a pedestrian girl survived after being hit by a bus causing severe thoracic trauma with heart and lungs exposed.

Drugs of abuse like ethanol and marijuana impairs the concentrating ability of drivers leading to changes in perceptions and prolongs reaction time. A previous study by Bener et al.<sup>6</sup> showed that use of mobile phone while driving is associated with reduced concentration and increased risk of RTA. Another study showed that around 50% of drivers with a history of RTA were disturbed and had been eating and drinking.<sup>7</sup> Lack of pedestrians' sidewalks, as in our case report, could also lead to major RTA. This puts the onus on the government as well to ensure a proper road infrastructure.

### Conclusion

The case report reinforces the fact that the lives of patients with severe thorax trauma can be saved based on the treatment and its timing. Nonetheless it is imperative that low-income developing countries should enforce measures that solve the problem at the root through

proper sidewalks, traffic rules enforcement and, above all, comprehensive awareness programmes for urgent management of traumatic patients.

### Acknowledgement

We are grateful to the patient and her parents for granting consent to publish the case report and the images.

### References

1. Global Status Report on Road Safety 2013: Supporting a Decade of Action. Geneva, Switzerland: World Health Organization; 2013.
2. Yates DW, Woodford M, Hollis S. Preliminary analysis of the care of injured patients in 33 British hospitals: first report of the United Kingdom major trauma outcome study. *BMJ* 1992; 305: 737-40.
3. Locicero J 3rd, Mattox KL. Epidemiology of chest trauma. *Surg Clin North Am* 1989; 69: 15-9.
4. Chui WH, Cheung DL, Chiu SW, Lee WT, He GW. A non-fatal impalement injury of the thorax. *JR Coll Surg Edinb* 1998; 43: 419-21.
5. Foot CL, Naidoo P. Breaking the rules: a thoracic impalement injury. *MJ Aust* 1999; 171: 676-7.
6. Bener A, Lajunen T, Ozkan T, Haigney D. The effect of mobilephone use on driving style and driving skills. *Int J Crashworthiness* 2006; 11: 459-65.
7. Burgut HR, Bener A, Sidahmed H, Albuz R, Sanya R, Khan WA. Risk factors contributing to road traffic crashes in a fast-developing country: the neglected health problem. *Ulus Travma Acil Cerrahi Derg* 2010; 16: 497-502.