

A girl with a traumatic bronchial injury

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Keypoints

Multidisciplinary team approach is essential in managing a paediatric trauma patient. High index of suspicion and prompt diagnosis will determine the direction of management. Meticulous ventilatory strategies are mandatory for a favourable outcome.

Abstract

Anaesthetic management for traumatic tracheobronchial injuries is challenging and requires advance airway management. We report a case of right bronchial injury of a 11 year old girl who was involved in a high speed car collision. She sustained bilateral lung contusion with haemopneumothorax, massive subcutaneous emphysema, sternal fracture and punctate haemorrhage at the left basal ganglia. Diagnostic workout revealed a right bronchus injury with total right lung collapse. Patient was immediately taken up for right thoracotomy after a conservative management did not turn out well.

Keywords

Paediatric, trauma, bronchial injury, anaesthesia

Introduction

Managing a trauma patient involved in a road traffic accident poses its own challenges. It requires multidisciplinary team approach depending on the type of injuries. In our case, we had to deal with a paediatric aged group patient involved in a high impact road traffic accident. There were many important aspects that we

should never missed as we manage this group of patients, such as the haemodynamic stability, airway issues, pain management, the complications that may arise, the need of emergency surgeries, so on and so forth. On the hindsight, there were many other important points that we tend to pay less attention to ; these include the communications with the parents or the care takers, the duration of hospital stay and the days of absence from school. Furthermore, the psychological consequences of the injury such as post traumatic stress disorder also need to be considered. In this case we also emphasized the importance of high index of suspicion and early diagnosis to determine the direction of the definitive treatment and ultimately to a better outcome.

Case report

An 11 Year old girl, alleged with road traffic accident involving high speed cars collision. She sustained blunt chest trauma consisting of bilateral haemopneumothorax, bilateral lung contusion, pneumomediastinum, and a sternal fracture. She was intubated for a respiratory

distress and bilateral chest tube were inserted and put on (BILEVEL: FiO₂: 1 PH28 TH 2.5 PS 12).

Upon admittance to the Intensive Care Unit, she developed massive subcutaneous emphysema extending from lower thorax until the abdomen and also involved the pelvis and bilateral inguinal region. She was referred to a tertiary centre for further management as she was suspected of having right main bronchus injury.

Urgent CT Thorax was done and the findings were as followed; There was a defect at the anterior right main bronchus (1.3 cm from bifurcation) with minimal distortion. There was also another distortion noted at the posterior wall at the distal right main bronchus before branching of the ascending and descending bronchus.

She remained ventilated for the subsequent 6 days, with low setting (ASV: 30%), her haemodynamic parameters were stable and the arterial blood gases readings throughout her stay in ICU were good. She was then extubated to NIV for subsequent 7 days (BIPAP: I 8, E4) then to (CPAP 6). On the following days, she was able to be put on VM 50% and transferred out to general ward.

Her general condition in the general ward was initially good but deteriorated after several days. She complained of chest discomfort, shortness of breath on and off, and there was reduced air entry on the right lung with SpO₂ of 89-95%. There were evidences from the CXR film to indicate the collapse of the whole right lung.

She was then electively intubated for bronchoscopy examination. There was stenosis of the right main bronchus with thick mucus and granulation tissue. Repeated CT scan revealed, total right lung collapse with upper displacement of right hemidiaphragm, only short segment of right main bronchus visualised measuring 0.5cm from the carina.

The patient was subsequently transported by air to the paediatric centre, situated 440km away for continuation of care and for surgical intervention. The patient was put onto the ventilator with low setting with minimal sedation consisted of intravenous infusion of propofol
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30mg/hr and fentanyl 20 mcg/hr. She was calm and conscious, opening eyes spontaneously and followed commands. She underwent right thoracotomy with double lumen tube insertion. Intraoperatively noted total stricture of the right main bronchus from 5mm of the carina till 5mm to the upper lobe bronchus. It was replaced by fibrous tissue with no lumen seen.

Resection and end to end anastomosis was done which took a total duration of 6 hours. Postoperatively, she was managed in the Pediatric ICU and was extubated post op day 2. She was put on NIV to provide PEEP to open up the right bronchus. Subsequently she was weaned down to nasal oxygen and remained stable (Fig. 1,2).

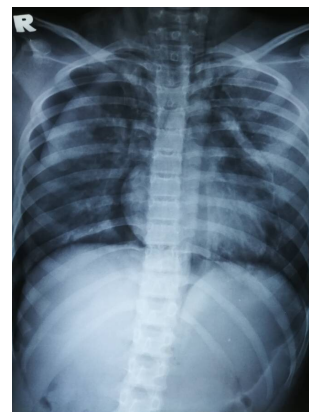


Figure 1. CXR on arrival

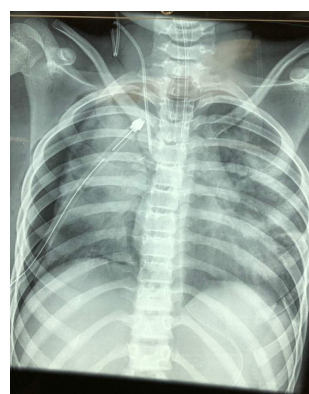


Figure 2. Postoperative CXR

Discussion

The occurrence of chest injury is uncommon in children. The pliability of the child's cartilage and bony structures, make it 10 times less likely to be injured compared to an adult's (1). Nevertheless, compared to an adult population, the rate of morbidity and mortality is

higher. The prevalence of thoracic trauma is increasing steadily concurrent with the high-speed travel and violence in 21st century. Proper triage of an injured child is crucial in accordance to the updated version of Advanced Trauma Life Support protocol.

The large trials done a decade ago in a Paediatric Trauma Centre indicated that the most common chest injury in a childhood population is a blunt chest trauma as a result of RTA. Contributing factors that have been identified includes suburban road lay-out, poor driving and negligence in child-care. The studies done also noted that the highest mortality rate involved the children who suffered from multiple severe injuries (2).

Most chest injuries occurred 2cm from the carina, and the most frequently found and diagnosed earlier is the injury to the right main bronchus. The left bronchus is often spared because it is protected from the aorta. The clinician should pay high index of suspicion of possibility of airway injury in cases where there is persistence of pneumothorax despite of chest drainage (3). For a small injuries, that encompass less than a third of the airway circumference, non operative management could still be attempted. However, for major injuries, studies have also shown that the outcome from the non operative approach is less favourable than surgical intervention. (4)

Shimazu et al. and Wulf et al, reported the use of double lumen endotracheal tube without application of high pressure to facilitate surgery without compromising further the pulmonary function. Other techniques which have been reported included, the use of Univent tube, bronchial blocker and there was also reported case of using jet ventilation using intrabronchial catheter (5).

We believe that the successful story of our patient was owed to the prompt diagnosis and management and also the involvement of multidisciplinary team and centres. Besides, adequate analgesia and physiotherapy do play a major role in reducing the duration of artificial ventilation. We are recommending that urgent measures should be carried out to ensure utmost safety for child-care
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practices and enforcement of Law on Children playing areas that should be located safely and far from areas such as roadsides with heavy traffics.

References

1. M Kaptanoglu, K Dogan, A Nadir, U Gonlugur et al. Tracheobronchial rupture: a considerable risk for young teenagers. *Int J Pediatr Otorhinolaryngol* 2002; 62:123-128
2. P Roux, RM Fisher. Chest injuries in children: an analysis of 100 cases of blunt chest trauma from motor vehicle accidents. *J Pediatr Surg* 1992;27:551-555
3. JH Skerman. Anaesthetic management of craniofacial trauma and trauma to the airway. *Middle east journal of emergency medicine* 2002
4. A Cheaito, A Tillou, C Lewis, H Cryer. Traumatic bronchial injury. *Int Journal Surg Case Rep* 2016; 27:172-175
5. K Naghibi, SL Hashemi, P Sajedi. Anaesthetic management of tracheobronchial rupture following blunt chest trauma. *Acta anaesthesiology Scandinavica* 2003;47:901-3