

" A Case of Multiple Rib Fractures Fixation In A Mechanically Ventilated Patient"

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Abstract

Background:

Chest trauma is the most frequent cause of death and morbidity in patients with blunt trauma of the trunk. Rib fractures account for up to 10% of the total number of traumatic hospitalizations (Michelitsch et. al. 2018) (Lafferty et.al. 2011). Surgical fixation of rib fractures can significantly improve ventilation while decreasing reliance on ventilators and the incidence of complications like pneumonia, duration of stay, mortality and disability rates (Fraser et. al. 2017).

Case presentation:

A 47-year-old gentleman was admitted in the intensive care unit (ICU) after being involved in a road traffic accident. He had left hemopneumothorax in addition to left lung collapse and contusions induced by the fracture of the third to the ninth left ribs, (Figure-1). Despite the insertion of a left intercostal tube together with invasive positive pressure ventilation, left lung expansion and weaning trials failed over eight days.

Because of the significant mechanical compression encountered by the fractured ribs on the left hemithorax, it was decided to fix the angulated fractured ribs. The 4th to the 7th ribs were fixed using 2 mm thickness plates via a posterolateral thoracotomy (Figure-2).

Seventy-two hours later, the patient was successfully weaned off mechanical ventilation and extubated after complete re-expansion of the left lung (Figure-3).

The chest tube was removed four days after and he was discharged one week after.

After two weeks, postoperative stitches were removed, the wound was clean, and the patient was breathing normally.

At three months follow up, the patient was back to his healthy life.

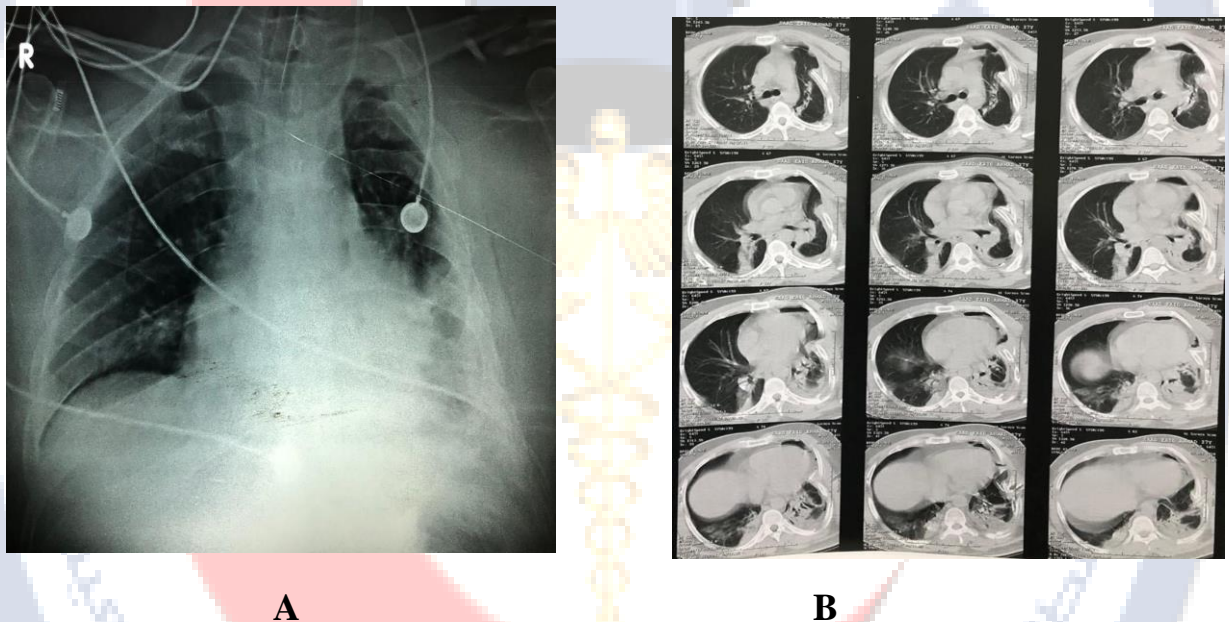


Fig 1: A. X ray showing left lung collapse

B. CT showing left lung



Fig 2 : Fixation of 4th to 7th rib using 2mm thickness plates via posterolateral approach.

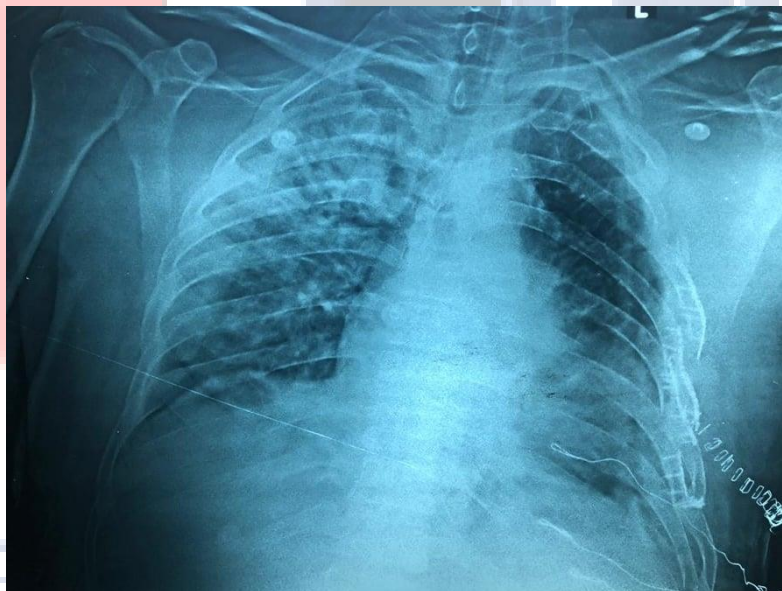


Fig 3: X ray showing full left lung expansion after ribs fixation

Discussion:

Many studies showed better results of open reduction and internal fixation of multiple rib fractures in traumatic flail chests compared with non-operative treatment (Schuurmans et. al. 2017) (Pieracci et.al. 2017).

Several studies with a flail and non-flail chest patients have shown excellent effects of surgical fixation with less pneumonia, less hemo- and pneumothorax, less need for mechanical ventilation, lower mortality, shorter duration of hospital and ICU stay, and faster return to normal activity (Majercik et.al. 2015) (Liang et. al. 2019) (Wu et. al. 2015).

Indications of rib fracture fixation are still not worldwide standardized. Also, no specific technique was proved to be better compared to others (Beks et. al. 2019). However, it is most valuable in neurologically intact ventilator-dependent flail chest patients in addition to those who have three or more ribs with displacement more than 15 mm overlap between broken rib segments, and patients requiring continuous intravenous analgesia. The timing of early operative intervention is controversial, ranging from 24 up to 72 hours of injury; however, it is contraindicated in patients of incomplete resuscitation and severe traumatic brain injury (de Campos et. al. 2018).

The fourth to tenth ribs contribute significantly in the chest stability and movement. However, the deeply located first to third ribs have limited contribution in chest movement and are difficult to expose. For that reason; a balance should be in mind between surgical damage and fixation benefits. So, surgical fixation should not be done in all of rib fracture sites (He et.al. 2019).

Plating with bicortical screws, absorbable plates, Judet struts or Judet-like struts, Kirschner wires, and intramedullary rods or splints are the currently available hardware options for rib fixation (Beks et. al. 2019).

Plating with bicortical screws is the most commonly used method. Studies revealed its encouraging flexibility and ease of use (Mitchell et. al. 2017).

In this case, mechanical compression on the left hemithorax by multiple inwards ribs angulation inducing left lung contusion and collapse in addition to the requirement for continuous intravenous infusion of analgesia and sedation was the main indication for surgery on the eighth day of injury. Only from the fourth to seventh ribs were reduced and fixed by 2 mm thickness plates. Lung expansion was noticed intra-operative. The postoperative requirement for analgesia was significantly reduced. Successful weaning of mechanical ventilation and extubation was achieved after seventy-two hours.

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