

## Case Report

# Double Rib Sign on Computed Tomography of the Chest-Indication for Surgical Stabilization of Rib Fractures

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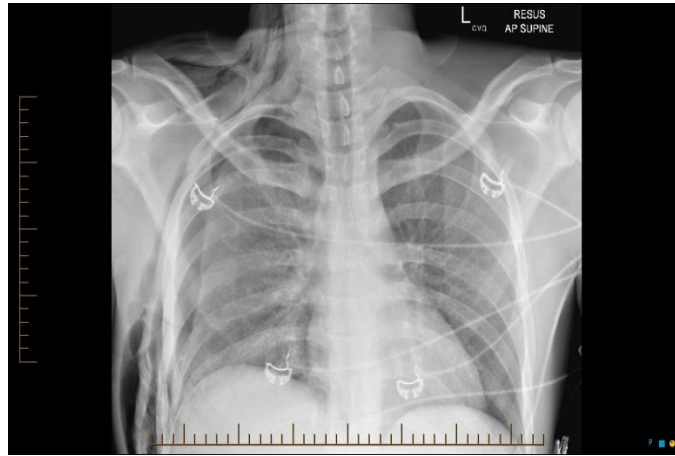
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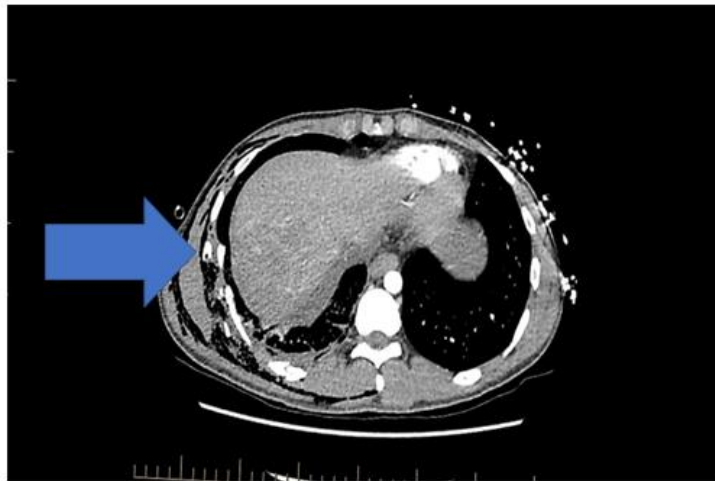
**Keywords:** Computed Tomography; Surgical Stabilization; Rib Fractures

### 1. Case Report

A 30-year-old man presented to our Level I trauma centre being rolled over in a car crash at 90km/hr. The patient was alert and oriented but complained of significant pain on the right lower chest wall and upper abdomen. On clinical examination of the chest, Trachea was central, but he had right sided tenderness and reduced air entry. X Ray chest (Figure 1) was suggestive of hemopneumothorax and fracture ribs on the Right side which was managed with an intercostal catheter. He underwent Trauma Series Computed Tomography scan(CT). The Chest CT (Figure 2, 3) was suggestive of Right-sided rib anterior and posterior 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup> (constituting flail segment), and posterior 10<sup>th</sup>, 11<sup>th</sup> fractures. There is up to 13 mm of trans axial displacement of fragments at the 7<sup>th</sup>, 8<sup>th</sup> rib fractures and up to 5 mm displacement at the 10<sup>th</sup>, 11<sup>th</sup> rib fractures. The CT abdomen was suggestive of American Association for Severity of Trauma (AAST) Grade IV liver injury and AAST Grade IV right kidney injury notably without clear evidence of ongoing haemorrhage. As the patient was hemodynamically robust, he was transferred to High Dependency Unit for close observation. Over a period of 24 hours, despite various modalities of pain control utilised by our specialist service he was only able to achieve 500cc on the incentive spirometer. We then proceeded to surgical stabilisation of Rib fractures on day 2 of his admission (Figure 4). He tolerated the procedure well and was discharged home on day 5.



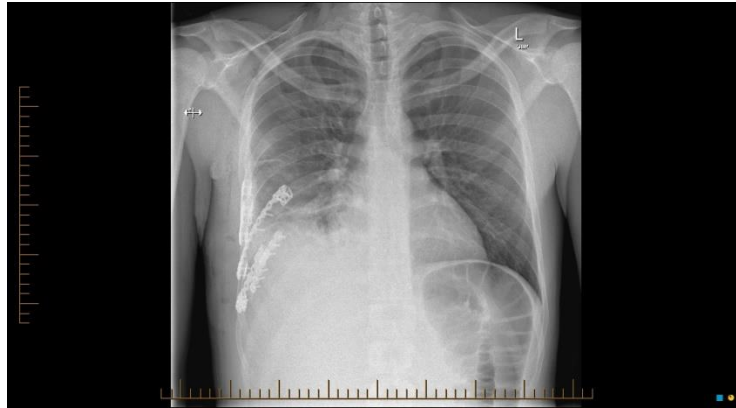
**Figure 1:** Chest X ray suggestive of Hemopneumothorax and Fracture ribs.



**Figure 2:** CT scan suggestive of Double rib sign.



**Figure 3:** Sagittal CT view suggestive of Double Rib Sign.



**Figure 4:** Post -Operative X- Ray Chest.

## 2. Discussion

Surgical stabilisation of Rib fractures is the modality of management in the acutely unstable chest wall<sup>1,2</sup>. However there has been no clear definition of the flail or unstable chest wall [3]. Similarly, there has been no literature documentation of radiological features which may guide chest wall stabilisation surgeons with regards to early intervention for fixation. Our Institution has initiated a surgical stabilisation of rib fracture program since 2014. We have to date stabilised 60 rib fractures both anterior and posterior following early intervention when the CT scan suggests a double rib sign. This is defined as two fragments of single rib being seen on the same slice in both Transverse and Sagittal views of the Chest in the Bone window (Figure 2, 3). We regularly look out for the double rib sign as an indicator of early surgery. The volume of our work has gradually increased over the last 5 years with not only having reduced the ventilator days but also reduction in hospital days when compared to those patients not being offered an operative intervention. The procedure has been

carried out with minimum morbidity and no mortality. We think this sign could provide future chest wall stabilisation surgeons as a good indicator for early intervention.

## References

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