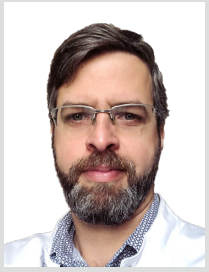
Case Study

Open Rib: Opening new insights in thoracic trauma reporting

"We perform approximately 520 polytrauma CT scans per year and have incorporated Open Rib for all our diagnostic reads. This allows for all ribs to be analyzed quickly and directly from our PACS.

Our reading times have been reduced by up to 54%[1] which has important implications for trauma patients where every second counts. This application has become an established part of our routine trauma imaging paradigm that we cannot do without."



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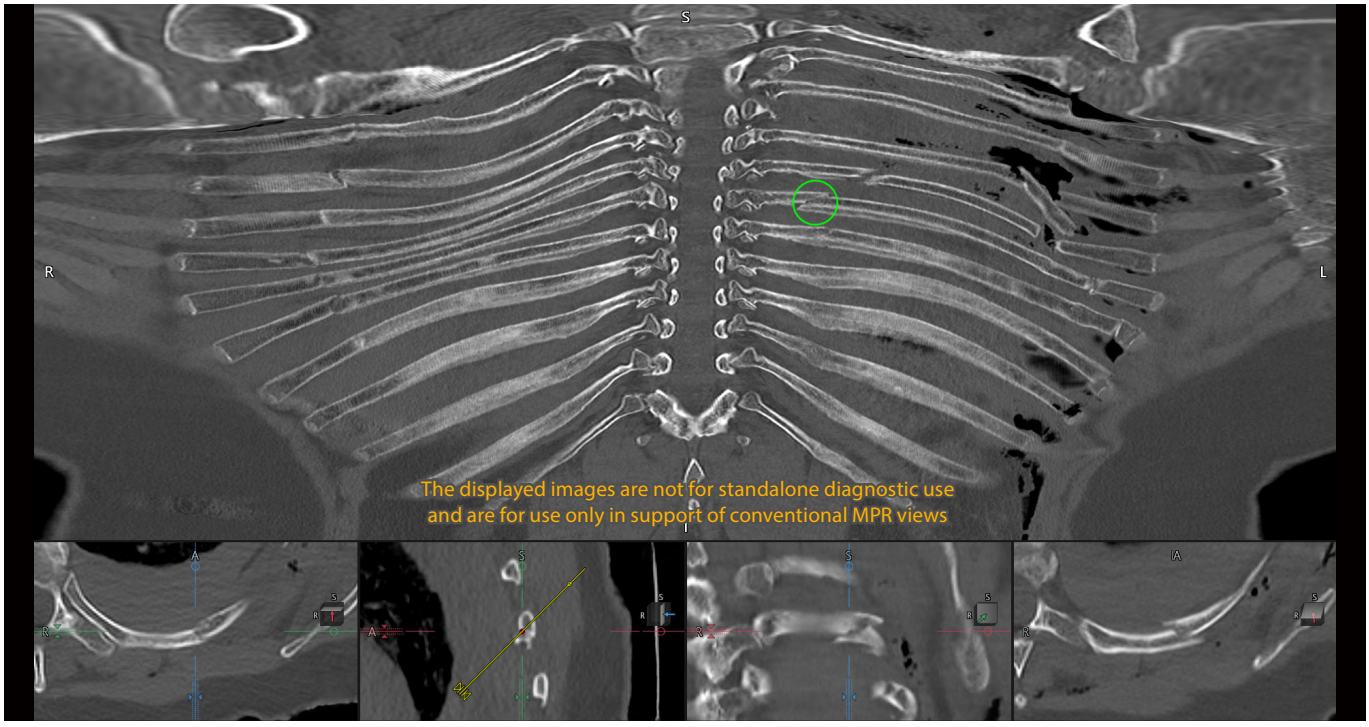
Patient History

A 58-year-old female arrived at the emergency department after a motorcycle accident and a trauma CT scan of the chest, abdomen and pelvis was ordered. The trauma protocol also included Open Rib processing which automatically generates an unfolded view of the thoracic rib cage and sends this volume directly to PACS.

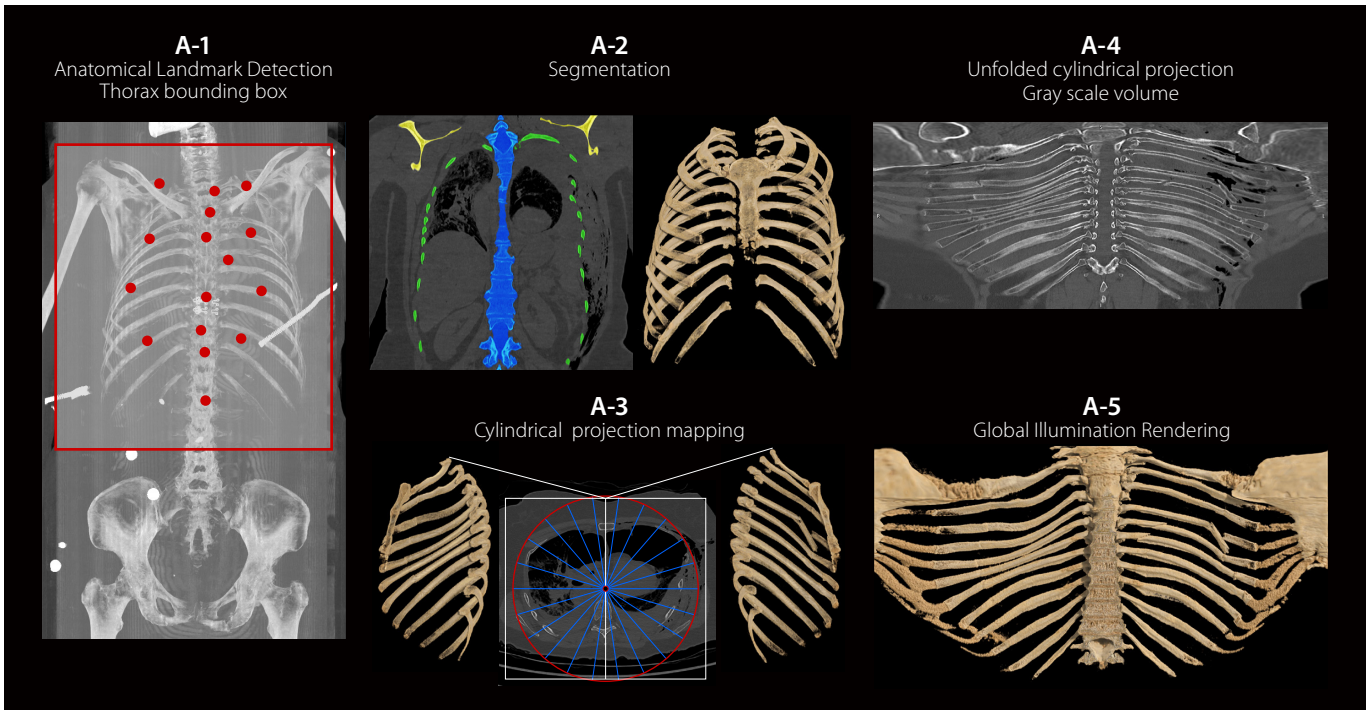
Results



The Open Rib application provides an unobstructed view of all 12 ribs bilaterally. On the right side, multiple non-displaced fractures can be rapidly identified on ribs two through eight laterally. On the left side there is a single fracture on the eighth rib and two fractures on each of the third, fourth, fifth, sixth, and seventh ribs which constitutes a flail chest, a potentially life-threatening condition.

Technology

The Open Rib application has three primary automatic steps to output the unfolded unobstructive view of the rib cage[2]. First, the application sets the bounding box for the atlas-based segmentation (A-1). Once the bounding boxes are placed, the bony thoracic wall is detected and segmented (A-2). The unfolding step uses a cylindrical projection to map the bony thoracic wall to a complex coronal plane (A-3). The result is an unfolded unobstructive 3D volume of the thoracic rib cage displayed in a single view (A-4) and (A-5).



Conclusion

Due to the curvature of the ribs, conventional reporting to assess rib pathology requires the physician to continually review and adjust multiplanar reconstructions. Each rib must be evaluated sequentially rib by rib and side by side. This is a tedious and time-consuming task. The Open Rib view aims to simplify this task by automatically displaying the entire rib cage, in a single plane to assist in the visualization of thoracic anatomy.

In this patient, the Open Rib view quickly allowed the assessment of several displaced and non-displaced fractures in multiple ribs bilaterally resulting in a flail chest on the left side.

Key Benefits

- Simultaneous representation of all ribs in a single view
- Visualization of costochondral cartilage and soft tissue
- Read and report the Open Rib view directly from PACS with automatic processing
- Effective communication and collaboration with referring physicians

1 Urbaneja, et al, 2019, European Journal of Radiology, 110, pp.121-127.

2 Tobon-Gomez, C, et al, 2018, Computational Methods and Clinical Application in Musculoskeletal Imaging, pp. 36-47.

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Open Rib is an option available on Vitrea Advanced Visualization platform providing automatic image generation and transfer to PACS.

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