

Case Study

CARESTREAM OnSight 3D Extremity System Clinical Case Studies



Wrist-Hand Trauma

Patient History

Patient presented in pain from falling on an outstretched hand. Standard 2D X-ray imaging was performed (3 view) followed by imaging on the CARESTREAM OnSight 3D Extremity System.

Findings

A Colles' fracture is clearly seen on the 2D radiographs. Typical treatment would be cast immobilization or surgical fixation.

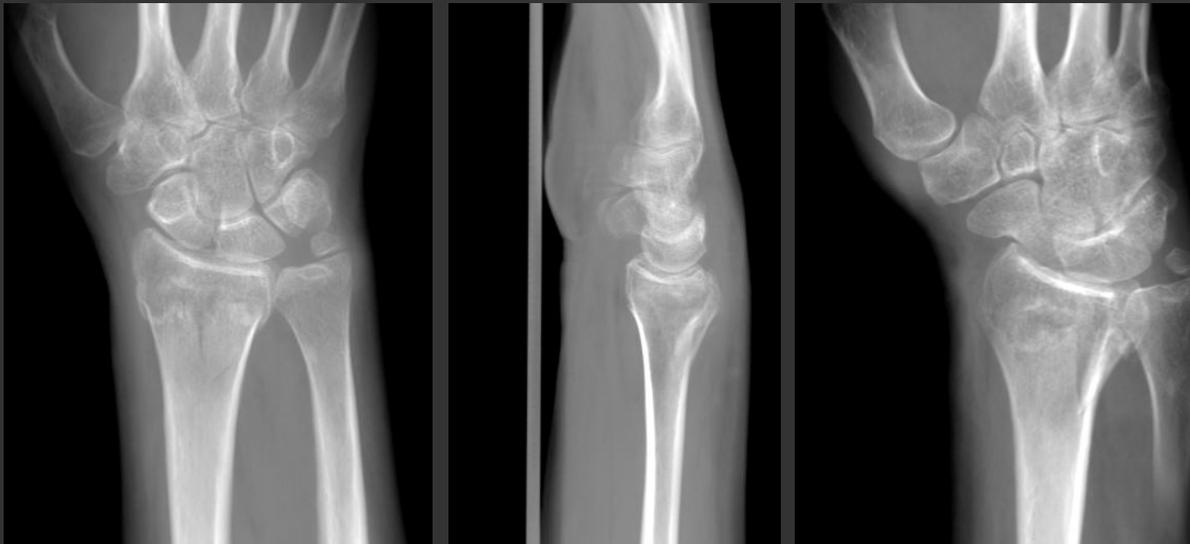
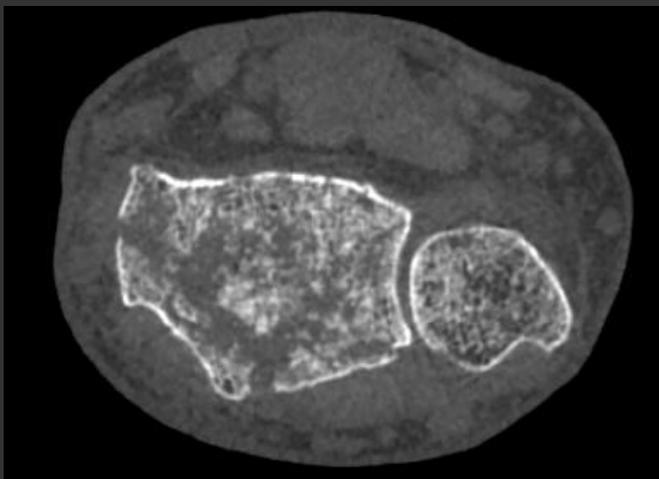


Figure 1 Standard 3-view 2D X-ray with evidence of Colles' fracture (Distal Radius Fracture)

If an Extremity CT was used, the following images could have been obtained:



Case Study | CARESTREAM OnSight 3D Extremity System

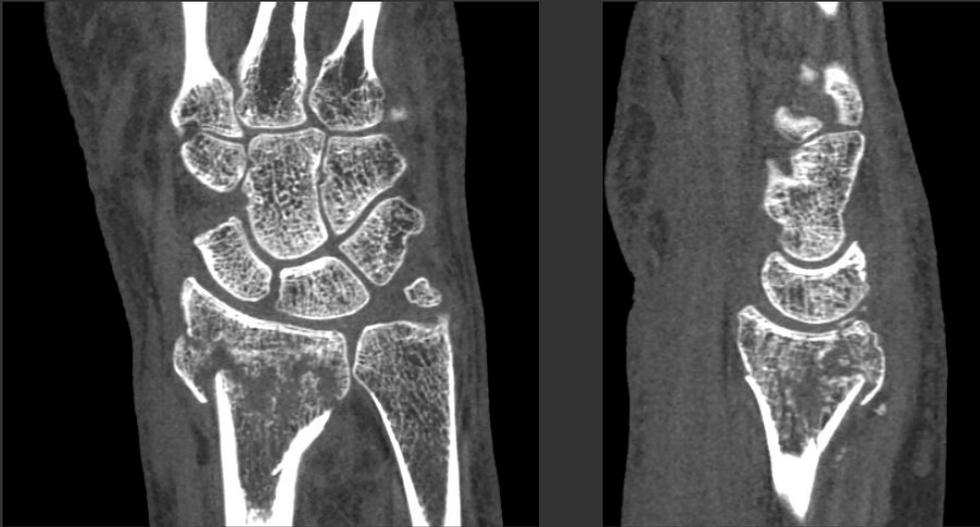


Figure 2 MPR slices from the patient in Figure 1 acquired with the OnSight extremity CT system showing a clear comminuted Colles' fracture of the distal radius with an associated fracture of the trapezium.

Diagnosis for this patient could potentially identify both the Colles' and trapezium fracture as it is easily seen in the extremity CT scan compared to 2D radiographs. Fractures of the trapezium are very important to detect and treat early given the importance of the trapezium in the carpometacarpal joint in actions such as grip and pinch¹. Typical treatment could be cast immobilization or surgical fixation for both fractures in one treatment.

¹DN Ramoutar, C Katevu, AG Titchener, and A Patel Trapezium fracture - a common technique to fix a rare injury: a case report Published online 2009 Sep 17. doi: [10.4076/1757-1626-2-8304](https://doi.org/10.4076/1757-1626-2-8304) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2769426/>

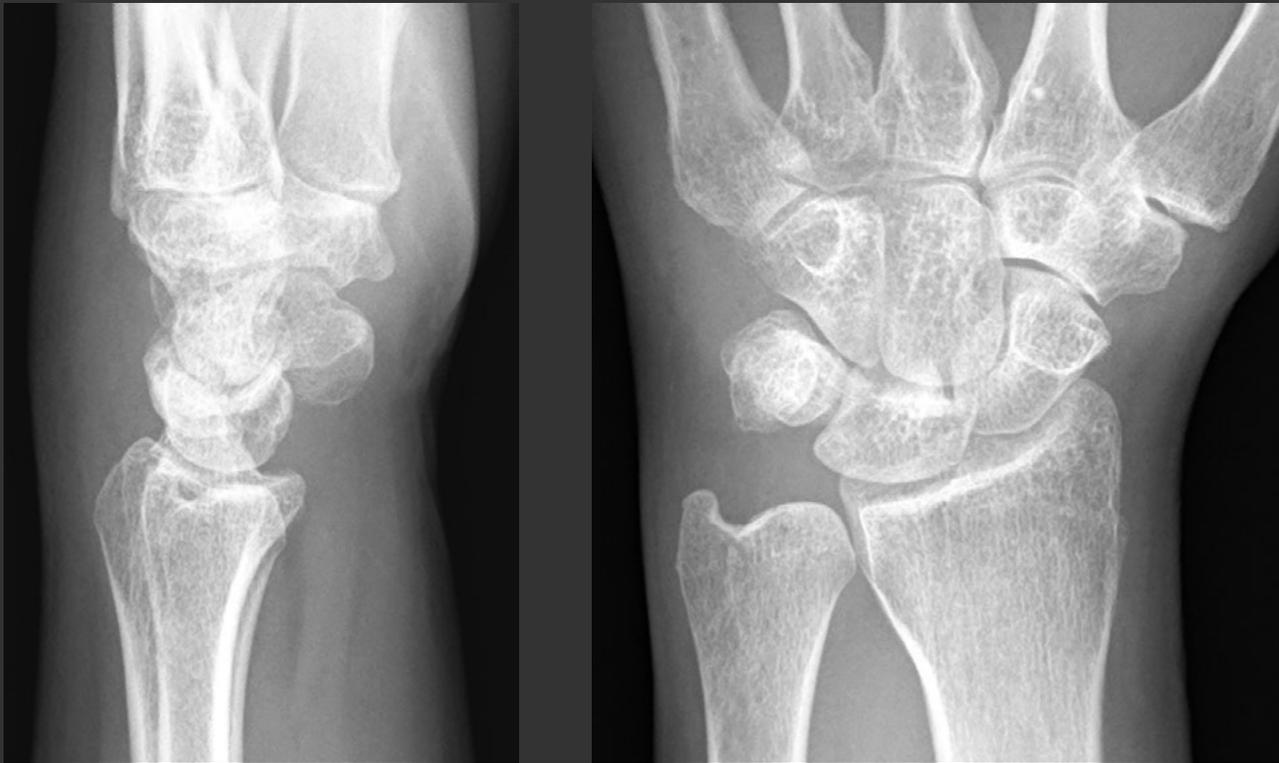
Wrist Trauma

Patient History

57-year-old woman presented with wrist trauma. Standard 2D X-ray imaging was performed as the routine imaging choice. Imaging with the CARESTREAM OnSight 3D Extremity System was ordered due to inconclusive findings on the 2D radiographs.

Findings

The traditional 2D projection X-rays (see Figure 1) did not show any evidence of a fracture but the patient was experiencing clear pain on the first row of the carpus (ulnar side).



*Figure 1
Standard 2D
X-ray of
wrist trauma
patient with
no obvious
fracture
seen.*

Figures 2 and 3 show various MPR slices from a 3D scan of the patient taken on the OnSight extremity CT, clearly indicating a large fracture of the triquetrum.

Case Study | CARESTREAM OnSight 3D Extremity System



Figure 2 MPR slices from the patient in Figure 1 acquired with the OnSight extremity CT system identifying a clear fracture of the triquetrum not seen in Figure 1.



Figure 3 Coronal and axial views of the triquetrum fracture.

This important finding means the patient will be in a cast for a longer period of time than would have been indicated from the negative 2D X-rays. In addition, this type of injury can be a trigger factor for lunate dislocation and should be checked for consolidation and to ensure the fragments do not displace more with time. This example highlights the value of the inherently high image quality and 3D nature of the data provided by the OnSight extremity CT system.

Elbow Trauma

Patient History

39-year-old male presented with elbow trauma. Standard 2D X-ray imaging was performed as the routine imaging choice. Imaging on the CARESTREAM OnSight 3D Extremity System was ordered due to inconclusive findings on the 2D radiographs.

Findings

The standard X-ray indicated significant intra-articular joint fluid consistent with a fracture, but no evidence of this was seen in either the AP or lateral X-rays that traditionally form the basis of the normal imaging workup for such a patient (see Figure 1).



Figure 1 Standard 2D X-ray of elbow trauma patient with evidence of intra-articular fluid build-up consistent with a fracture, but no evidence of fracture seen.

Evidence of a clear trabecular fracture of the radial head became apparent when the patient was scanned on the CARESTREAM OnSight 3D Extremity System. This is shown in Figure 2. The nature of the fracture, where most of the cortical bone was intact, meant that it was very difficult to appreciate on the 2D radiographs. This type of trauma required the patient to be placed in a cast rather than allowing elbow motion as might have been the diagnosis from the 2D radiograph. This case demonstrates the value of acquiring high-resolution 3D data for patients where fracture is suspected but not confirmed with traditional imaging protocols.

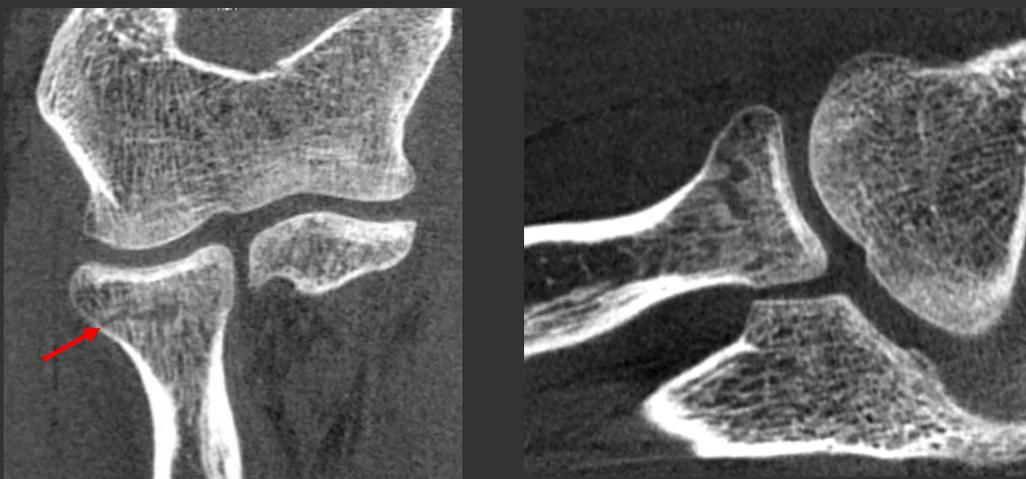


Figure 2 MPR slices from the patient in Figure 1 acquired with the OnSight extremity CT system showing a clear trabecular fracture of the radial head that was not visible on the standard 2D radiographs.

Elbow Trauma

Patient History

45-year-old woman presented with elbow trauma. Standard 2D X-ray imaging was performed as the routine imaging choice. Imaging on the CARESTREAM OnSight 3D Extremity System was ordered due to inconclusive findings on the 2D radiographs.

Findings

The traditional X-ray shows obvious dislocation of the elbow. (See Figure 1 for pre- and post-reduction X-rays.)



Pre-reduction



Post-reduction

*Figure 1
Standard 2D
X-ray of elbow
trauma patient
with obvious
dislocation pre-
and post-
reduction.*

With this type of trauma, the main concern for patient prognosis is for nervous and vascular lesions, and the dislocation should be reduced as quickly as possible. However, in addition to the dislocation, the 2D radiograph shows an additional bone fragment. The determination of the source of this fragment and whether there are any other consequences of the trauma is crucial in the successful reduction of the injury. It is not possible to identify the source of the fragment or to definitively rule out additional injury from the 2D radiographs.

Case Study | CARESTREAM OnSight 3D Extremity System

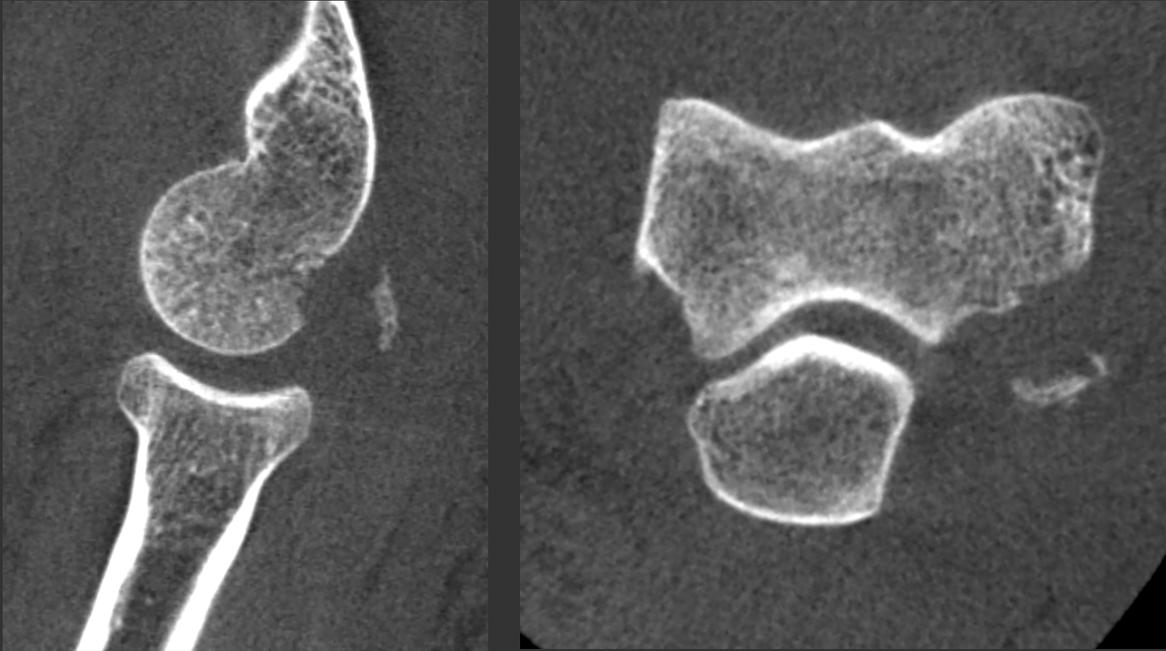


Figure 2 MPR slices from the patient in Figure 1, acquired with the OnSight extremity CT system, identifying the source of the bone fragment seen in the 2D radiographs as a lateral epicondyle avulsion.

In addition to this diagnosis, further inspection of the 3D data set revealed a small un-displaced radial head fracture resulting from impaction during the dislocation (see Figure 3). This injury would be impossible to identify on the traditional 2D radiographs.



Figure 3 Evidence of a small radial head fracture probably caused by impaction during the dislocation injury not readily appreciated on the 2D radiographs of this patient.

These types of additional findings can have a significant impact on the treatment plan for the patient and ultimately on their prognosis, and are an indication of the value of the high-resolution 3D data acquired using the OnSight extremity CT system.

Knee Trauma

Patient History

18-year-old male patient presenting with knee trauma. Standard 2D X-ray imaging was performed as the routine imaging choice. Imaging on the CARESTREAM OnSight 3D Extremity System was ordered due to inconclusive findings on the 2D radiographs.

Findings

The traditional 2D projection X-rays (see Figure 1) show no clear evidence of fracture but did show intra-articular fluid. Patient was unable to walk, which is not typically consistent with ligament/soft tissue damage and a tibial plateau fracture was suspected. Normal protocol would be for the patient to be given an MRI at 2-3 weeks post injury.



Figure 1 Standard 2D X-ray of knee trauma patient. Evidence of intra-articular fluid, but with no obvious fracture seen.

Figure 2 shows an axial and sagittal slice from the patient's CARESTREAM OnSight 3D Extremity System scan that shows a classic impaction fracture of the posterior aspect of the lateral tibial plateau missed on the 2D X-rays.

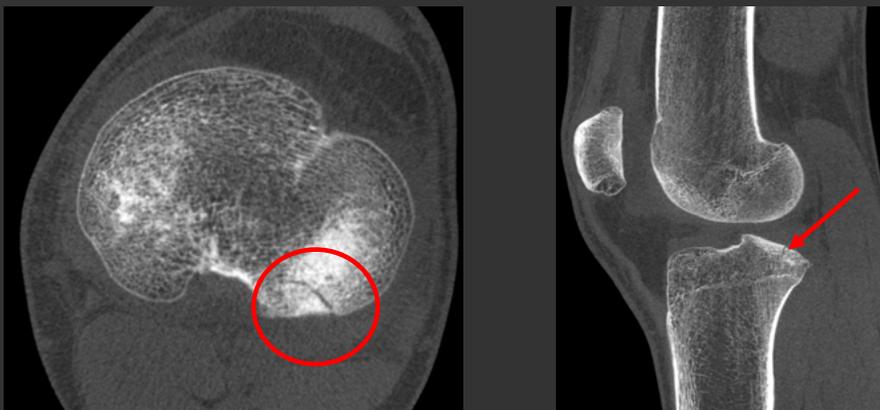


Figure 2 Axial and sagittal slices from the patient acquired with the OnSight extremity CT system identifying a clear impaction fracture of the lateral aspect of the posterior tibial plateau not seen in Figure 1.

It is important that this type of fracture is identified and addressed since it can lead to osteoarthritis if left untreated. It also helps to determine the length of time the patient should be in a cast. This example highlights the value of the inherently high image quality and 3D nature of the data provided by the OnSight extremity CT system.

Foot Trauma

Patient History

32-year-old female patient presenting with foot trauma. Standard 2D X-ray imaging was performed as the routine imaging choice. Imaging with the CARESTREAM OnSight 3D Extremity System was ordered due to inconclusive findings on the 2D radiographs.

Findings

The traditional 2D projection X-rays (see Figure 1) shows evidence of a small fracture on the lateral side of the lateral cuneiform bone and the lateral aspect of the proximal epiphysis of the third metatarsal. This presentation is indicative of a Lisfranc injury and there is a need for a precise lesion assessment to uncover additional injuries and ensure proper treatment for the patient. Failure to identify all aspects of this type of injury can have significant negative impact on the prognosis for full recovery. Historically, 2D imaging is known to miss a significant number of aspects of Lisfranc injury, with clinicians relying heavily on identifying pain during physical exam as a final arbiter of the full scope of the injury.



Figure 1 Standard 2D X-ray of foot trauma patient showing small fractures on the lateral side of the lateral cuneiform and the lateral aspect of the proximal epiphysis of the third metatarsal, indicative of a possible Lisfranc injury.

Imaging with the CARESTREAM OnSight 3D Extremity System showed a number of further injuries. Figure 2 shows multiple fractures of the base of the second metatarsal:

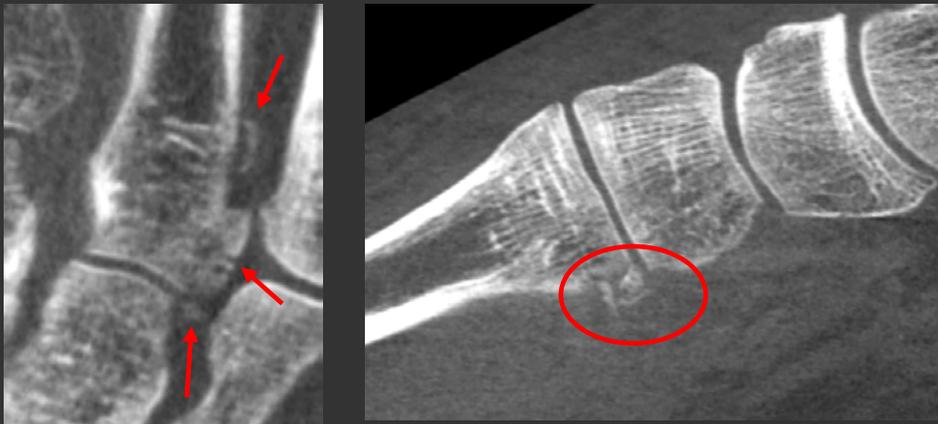


Figure 2 MPR slices from the patient acquired with the OnSight extremity CT system identifying multiple fractures of the base of the second metatarsal not seen in Figure 1.

Case Study | CARESTREAM OnSight 3D Extremity System

Figure 3 shows evidence of another evulsion fracture of the lateral side of the medial cuneiform bone as well as a fracture of the base of the first metatarsal bone, both unappreciated in Figure 1:



These additional injuries are important to identify and indicate that this patient will require a cast for a significant length of time.