

## Fracture of the Lunate: Radiographic Findings and Case Report

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We present a case of lunate fracture diagnosed which was diagnosed with cross sectional imaging. Lunate fractures are rare, and most cases in the literature were reported almost exclusively before the era of computed tomography (CT) and magnetic resonance imaging (MRI). We present the imaging findings in our patient with a brief review of the literature.

### Case Report

A 46-year-old, right hand dominant female presented with wrist pain. This pain had been present for several years, and had been ascribed to a ganglion. Her pain had worsened recently but she could give no clear history of injury. On physical exam, the patient demonstrated a small ganglion which was remote from the site of pain.

A radiograph of the wrist showed a faint sclerotic line in the lunate, with moderate positive ulnar variance (Fig1).

MRI showed fairly diffuse edema on T2-weighted images but a clear sagittal cleavage plane on the T1-weighted coronal image, indicative of a fracture (Fig 2-5).

CT confirmed a sclerotic linear band in the same location (Fig 6).

### Discussion

Lunate fractures are extremely rare. Cetti showed an incidence of 1.1% (3 in 10 years) versus 14 patients with Kienbock's disease during the same period (1). In a relatively large series Teisen found 17 patients in 31 years giving an incidence of 0.5%. However, eight patients had ad-



**Figure 1.** Anteroposterior radiograph of wrist, showing a faint, oblique, sclerotic line across the lunate. Moderate positive ulnar variance is noted.

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**Abbreviations:** CT, computed tomography, MRI, magnetic resonance imaging

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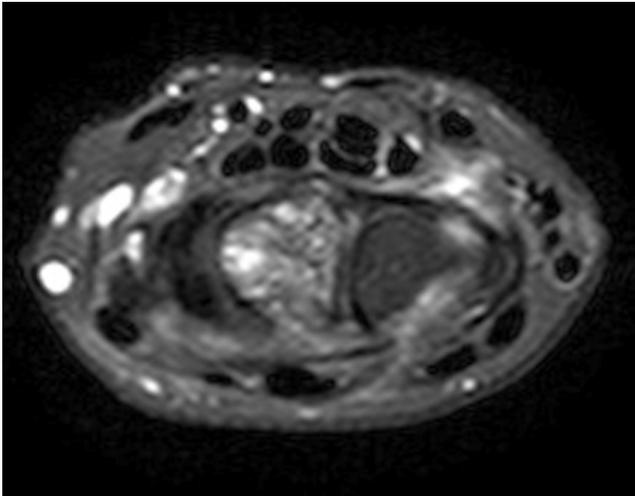


**Figure 2.** Coronal T1-weighted MR image of the wrist, demonstrating an oblique line of low signal intensity, corresponding to the sclerotic line seen on the radiograph.

**Figure 3.** Coronal T2-weighted MR image of the wrist, demonstrating diffuse and heterogeneously increased signal in the lunate.

**Figure 4.** Sagittal T2-weighted MR image of the wrist, demonstrating diffuse and heterogeneously increased signal in the lunate.

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**Figure 5.** Axial T2-weighted MR image of the wrist, demonstrating diffuse and heterogeneously increased signal in the lunate.



**Figure 6.** Coronally reformatted CT image of the wrist, demonstrating an oblique, sclerotic band in the lunate, corresponding to the findings on radiography and MR.

ditional fractures, making the incidence of isolated lunate fractures even lower (2). No patients had preexisting lunate disease such as Kienbock's or old injury.

Teisen et al classified lunate fractures into five groups (2) (Table I).

Teisen Classification	Anteroposterior View	Lateral View	Type
I			volar pole
II			chip fracture
III			dorsal pole
IV			sagittal
V			transverse

By this classification our patient was a Type IV.

Lunate fractures are often caused by a fall on an outstretched hand, but may also be related to a direct blow (3, 4). These fractures may be difficult to diagnose (5). Underdiagnosis is frequently due to difficulty visualizing the fracture line. In our patient diagnosis was aided considerably by the addition of cross-sectional imaging. A high index of suspicion is necessary since these fractures are so unusual. It is likely that a number of such fractures are never diagnosed.

A potential pitfall in the diagnosis of lunate fractures is the bipartite lunate, although this entity is very rare (3). However, mistaking a bipartite lunate for a fracture will not lead to underdiagnosis.

The prognosis for lunate fractures is usually good, with radiographic healing and return of function as the norm (3). Osteonecrosis of the lunate is an unusual complication.

Stress fractures of the lunate may also occur. In elite tennis players, two of 139 developed lunate stress fractures over a period of two years, possibly related to the type of grip they used (4).

Kienbock's disease of the lunate may also produce edema in the lunate on MRI. However a linear band of sclerosis, such as that seen with all modalities in our patient, should be absent in uncomplicated Kienbock's. It should be noted that our patient did have mild positive ulnar variance, which has been associated with ulnar impaction syndrome. Kienbock's, on the other hand, has been linked to negative ulnar variance (6, 7).

The differential diagnosis for lunate fracture should also consider the possibility of pathological fracture, particularly due to a ganglion cyst. Intraosseous ganglia are relatively common in the wrist, with an estimated prevalence of 9.6% (8), and are probably the result of mucoid degeneration of adjacent ligaments. Occasionally these ganglia can cause pain, and may require curettage and bone grafting (9-11).

In summary, we describe a case of lunate fracture, which might have gone undiagnosed without cross-sectional imaging. These rare fractures may be significantly underdiagnosed if only radiography is employed. We speculate that more widespread use of cross-sectional imaging such as CT and MR could lead to increased recognition of this unusual injury.

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