




Acquired Madelung's deformity as a cause of recurrent monoarthritis in a young patient

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Madelung's deformity is characterized by an increased radial inclination and volar tilt of the distal radius, proximal migration of the lunate with triangulation of the carpus, and dorsal displacement of the ulna.¹ It typically arises due to the premature closure of the medial volar aspect of the distal radial physis.² The origins of this deformity can be traced back to 1878, when Otto Madelung first documented it.³ A notable aspect is the female predominance in the occurrence of this condition.¹ The clinical presentation of Madelung's deformity is variable, spanning from asymptomatic cases to instances of radiocarpal pain and diminished grip strength that hinders daily activities.² In rarer cases, this deformity of a single joint can resemble other conditions, such as degenerative or inflammatory arthritis, particularly within specific age groups.

In this case report, we emphasized the case of a young female patient who sought medical attention due to recurring left wrist pain and swelling that raised suspicions of monoarticular rheumatoid arthritis over a span of three years. Despite conducting comprehensive laboratory

and serological investigations yielding normal results, a magnetic resonance imaging (MRI) of the affected wrist indicated potential signs of Madelung's deformity.

A previously healthy 27-year-old female patient presented to the clinic with a three-year history of recurring pain and swelling in the left wrist. The pain was described as vague and had started suddenly three years before the presentation. The patient noted that nonsteroidal anti-inflammatory drugs and acetaminophen provided some relief. She denied any trauma to the wrist and hands. Additionally, she had no family history of inflammatory arthritis.

The vital signs were within the normal range. Extensive laboratory tests, including complete blood count, comprehensive metabolic panel, erythrocyte sedimentation rate, C-reactive protein, rheumatoid factor, cyclic citrullinated peptide, and antinuclear antibodies, all yielded unremarkable results.

An X-ray of the left wrist (Figures 1a, b) revealed significant narrowing and collapse of the radiocarpal joint space, accompanied by surface irregularities, subchondral sclerosis, and subchondral cyst formation. No posttraumatic bone fractures were detected, and the soft tissues appeared normal. Subsequent imaging with MRI showed a further increase in the pronounced narrowing and collapse of the radiocarpal joint space, along with bone marrow edema in the subchondral region. Osteophytes were detected, along with subchondral cystic changes. Notably, marked synovitis was observed in the radiocarpal and distal radial ulnar joints. Mild radiocarpal and

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Figure 1. (a) An anteroposterior view radiograph of the left wrist revealing significant narrowing and collapse of the radiocarpal joint space, accompanied by surface irregularities, subchondral sclerosis, and subchondral cyst formation. (b) A lateral view radiograph of the left wrist revealing significant narrowing and collapse of the radiocarpal joint space.

ulnar deformity was present, characterized by increased radial length and an ulnar slant angle, mild distal ulnar subluxation, and hypertrophy of the ulnar styloid process, consistent with the features of Madelung's deformity (Figure 2).

To manage inflammation, the patient was prescribed a short course of oral corticosteroids and was referred to the orthopedics department for further evaluation and management. Comprehensive genetic testing, including investigations for abnormalities, such as mutations in the short-stature homeobox gene (SHOX) associated with Léri-Weill dyschondrosteosis and the 45, X karyotype associated with Turner syndrome, yielded negative results.

In the majority of cases, Madelung's deformity involves the distal radius, although a minor portion of patients can have an involvement of the entire radius.⁴ The involvement of the entire radius is usually more severe in terms of clinical presentation.⁵ The severity of Madelung's deformity can be also assessed radiologically by the presence of ulnar tilt, lunate subsidence, lunate fossa angle, palmar tilt, or palmar carpal displacement.⁵ In our case, the patient presented with disabling chronic pain and swelling of the left wrist, suggesting a possibility of monoarticular rheumatoid arthritis. The presentation of both entities can rarely overlap, and the treatment of each is different from the other.⁶



Figure 2. A magnetic resonance imaging of the left wrist demonstrating pronounced narrowing and collapse of the radiocarpal joint space, along with bone marrow edema in the subchondral region. Mild radiocarpal and ulnar deformities are present, characterized by increased radial length and an ulnar slant angle, mild distal ulnar subluxation, and hypertrophy of the ulnar styloid process.

Plain X-rays can detect pathognomonic findings for Madelung's deformity (Table 1).⁷ The patient presented in this case had a severe form of Madelung's deformity. Although advanced imaging are not necessary to confirm the diagnosis, an MRI delineates three-dimensional deformity, the extent of growth plate involvement, and the presence of a Vickers ligament.⁸

Mild deformities are usually managed conservatively by sequential imaging.⁷ On the contrary, moderate or severe forms or certain types of symptomatic deformities require surgical intervention. It is important to note that certain advanced asymptomatic deformity usually presents near skeletal maturity.⁵ It is also important to note that Madelung's deformity may be secondary

Table 1. Severity of Madelung's deformity based on plain X-ray findings⁷

Severity	Findings
Mild	No findings
	Settling of the coronal lunate fossa
	Flexing of the sagittal distal radius
Moderate	Lunate subsidence
	Formation of an upside-down pyramid shape or Triangle by the proximal carpal row
	Curvature of the distal radius
Severe	Obscure of the visualization of the lunate fossa
	Frank dislocation of the distal ulna

to genetic defects, such as SHOX deficiency or Turner's syndrome.⁹

In summary, Madelung's deformity, whether congenital or acquired, can mimic other conditions such as monoarticular seronegative rheumatoid arthritis, particularly among the young population. This underscores the importance of considering this diagnosis in young female patients experiencing chronic wrist pain without a history of trauma or laboratory abnormalities. Treatment strategies for this condition vary according to its severity, which can be assessed through plain radiography.

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