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Case Report
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Madelung Deformity: A Case Report with Radiographic and Magnetic Resonance Findings

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Abstract

Madelung deformity is due to early closure of the medial aspect of the distal epiphysis of the radius. The main aim of this case report was to focus on the importance of early diagnosis of this deformity based on clinical and radiographic examination. Considering the rarity of the deformity and particularly taking into account the importance of early conservative management, it is clear that the presentation of this clinical case represents a major contribution to better understanding of madelung deformity.

Keywords: Madelung deformity; Radioulnar joint; Salter-Harris fracture

Introduction

Madelung's deformity of the wrist is a rare condition, usually bilateral, developing at the distal end of the forearm of young individuals between the ages of 8 and 20 years [1]. Eighty percent of such deformities appear between the ages of 11 and 15 years [1,2]. The deformity is essentially an antero lateral curvature of the distal third of the radius, with dorsal prominence of the joint end of the ulna. Contrary to early descriptions, it is not associated with an irreducible dislocation of the wrist. The lesion progresses slowly and by the end of one or two years the deformity is complete. During the active developmental stage, pains may or may not be present [2,3].

This report describes a unilateral, non-dominant case of madelung deformity of the left wrist which clinically presented as left wrist pain and deformity. This report highlights the importance of early diagnosis based on radiographic and magnetic resonance imaging findings.

Case Presentation

A 14-year-old female reported with the chief complaint of swelling, pain and deformity of the left wrist of one month duration. The patient had a past history of trauma to the left wrist following a fall two years prior.

Initial radiographs following the trauma showed an undisplaced fracture of the distal radius which was managed conservatively with plaster-of-Paris. However patient developed progressive dinner-fork deformity of the left wrist with progressive outward bowing of the left forearm at presentation. She was well cooperative and mentally and emotionally stable with normal vital signs. She was 143 cm tall.

On examination, there is widening of the left wrist with garden spade deformity, fixed pronator deformity and bowing with normal warmth. No reddening or tenderness seen on palpation. There was no limitation of movement of the left wrist joint. No gait disturbance seen. The general systemic examination was normal. No organomegaly seen. The laboratory investigations were unremarkable.

Magnetic resonance imaging (Figure 1) shows a hypo intensity of the distal radius and ulna on T1WI and corresponding hyper intensity on T2WI/STIR suggestive of osseous edema. The triangular fibro cartilage was not totally intact. There is a hypo intense soft tissue collection in the wrist joint and corresponding intermediate signal in T2WI/STIR. There is increased radial bowing. There is shortening of the distal radius which shows a dorsal and an ulnar curve resulting in a positive ulnar variance. There is posterior dislocation of the distal ulna. There is an enlarged and distorted ulnar head which appears eroded with overhanging edges. There is a "V-shaped" proximal carpal row with palmer subluxation. There is wedging of the triangular-shaped carpus between the distal radius

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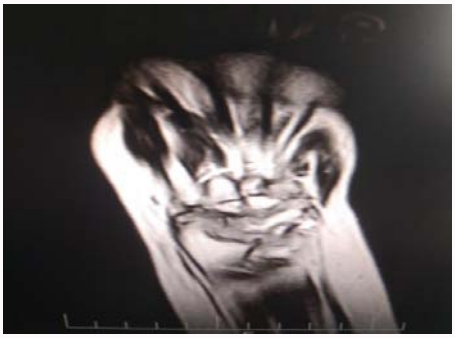
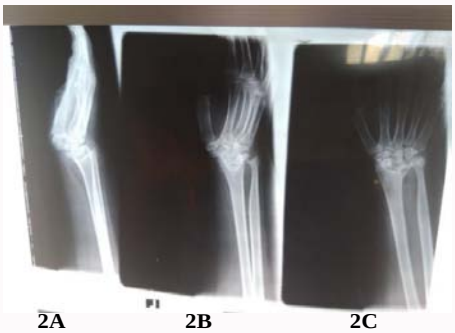


Figure 1: Coronal T2- weighted MRI of the left wrist.



2A 2B 2C

Figure 2A: Lateral radiograph of the left wrist.
Figure 2B: Oblique radiograph of the left wrist.
Figure 2C: Anteroposterior radiograph of the left wrist.

and ulna. There is anomalous thickening of the volar radiotriquetral ligament. There is patchy enhancement of the subcutaneous soft tissue on intravenous contrast administration.

Roentgenogram (Figure 2) shows a bayonet deformity of the wrist joint with an exaggerated radial inclination. There is shortening of the distal radius which shows a dorsal and an ulnar curve resulting in a positive ulnar variance. The epiphysis of the distal radius has the shape of a triangle. There is irregularity of the distal radial articular margin with overhanging edges with increase bone density. There is posterior dislocation of the distal ulna. There is an enlarged and distorted ulnar head which appears eroded with overhanging edges. There is a "V-shaped" proximal carpal row with palmer subluxation. There is wedging of the triangular-shaped carpus between the distal radius and ulna.

She was diagnosed of Madelung deformity and orthopedic consultation was advised. Conservative management was subsequently instituted.

Discussion

In Madelung deformity, there is increased curvature of the distal radius that results in a palmer subluxation of the hand in relation to the distal radioulnar joint. Madelung deformity is relatively uncommon, with prevalence less than 2% and female predominance with female: male ratio is 5 to 3:1 compared with male patients. The deformity can be seen in both hands in 50% to 66% of patients and is rare in children between 1 to 6 years [1-3]. Madelung deformity is predominant between 10 to 14 years of age which is a period of pubertal rapid growth [3-5]. Madelung deformity could be due to trauma or to a birth disorder [6-9].

The increased pubertal growth spurt worsens the deformity of the medial aspect of the distal radial epiphysis [8,9]. The present case helps support the above statements. Patients who present with Madelung deformity could have inhibited movement of the distal radioulnar joint [5,6,8].

On clinical examination of the hands of patients with Madelung deformity anterior subluxation of the carpal bones in relation to the distal radioulnar joint can be seen. They could also complain of pain on the medial aspect of the wrist [1-5]. Roentgen graphic findings seen with Madelung deformity includes radial tilt of the distal radius, a triangular appearance of the carpal bones, and relative increased length of the distal ulna relative to the radius [8-12].

The etiology of the madelung deformity is equivocal, but incursion in the growth of the distal radial epiphyses has been proffered [13]. Aetiologic pathogenesis of Madelung deformity include agnogenic, dysplastic, hereditary, and trauma [6,14,15-17]. Dysplastic Madelung deformity is usually associated with decease length of the radius/ulna and tibia/fibula [16-18]. Hereditary Madelung deformity has been clinically associated with genetic disorders [6-12]. Trauma is also a leading cause of madelung deformity [16-20].

Madelung deformity can be treated conservatively with rest. Surgical repair can also be done. However, in the absence of symptoms, the surgical alternative is not needed [10-18]. Surgery is usually undertaken for pain or for cosmetic reasons with remarkable improvement and resolution noted in a majority of cases [19,20].

Conclusion

Madelung deformity involves increased radial and dorsal curvature of the distal radius that results in a palmer subluxation of the hand in relation to the distal radioulnar joint. Madelung deformity is relatively uncommon and pathogenesis could be agnogenic or due to trauma. Conservatic management is the gold standard for asymptomatic patients. Surgical management is reserved for cosmetic reasons or symptomatic patients.

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