



Unveiling the uncommon: a case report of avascular necrosis in the triquetrum bone without trauma

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Introduction and importance: Avascular necrosis (AVN) is a rare occurrence in the carpal region, especially in the triquetrum bone, which presents a diagnostic puzzle due to its infrequency and lack of trauma history. This case study explores the signs, diagnosis, and treatment of AVN in a healthy 22-year-old individual, emphasizing the need for early identification using suitable imaging methods.

Case presentation: A 22-year-old patient complained of persistent wrist pain, specifically on the ulnar side, without any history of injury. Clinical examination revealed tenderness without signs of inflammation, with normal sensation and movement. Initial X-ray results were inconclusive, prompting further investigation with MRI, which showed a decrease in signal intensity in the triquetrum bone, leading to the diagnosis of AVN.

Clinical discussion: The development of AVN involves compromised blood flow, often due to various factors. While AVN affecting carpal bones is uncommon, the triquetrum bone's robust blood supply typically protects against such conditions. However, this case highlights an exceptional occurrence. Gelberman's classification underscores the triquetrum's vascular nature, explaining why AVN is rare in this bone. MRI plays a crucial role in detecting AVN, especially when symptoms do not align with X-ray findings.

Conclusion: Avascular necrosis should be considered in carpal bones, even without a history of trauma, with a focus on MRI for early detection. Although AVN of the triquetrum is rare, this case underscores the importance of timely recognition and conservative management. Further research is necessary to establish optimal treatment strategies for this unusual presentation.

Keywords: avascular necrosis, carpal bones, case report, conservative treatment, triquetrum bone

Introduction and importance

Avascular necrosis (AVN) of the bones, although uncommon in the carpal region, poses a diagnostic challenge when encountered^[1].

This case presentation delineates the manifestation, diagnosis, and treatment of an unusual occurrence of AVN affecting the

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HIGHLIGHTS

- **Uncommon occurrence:** This case report reveals a rare instance of avascular necrosis (AVN) affecting the triquetrum bone in the wrist, which is unusual in the carpal region, particularly when there's no history of trauma.
- **Clinical presentation:** The patient, a healthy 22-year-old individual, presented with enduring wrist pain localized to the ulnar aspect, devoid of any trauma history, highlighting the unusual character of the condition.
- **Imaging findings:** Initial X-ray results yielded inconclusive findings, whereas MRI revealed diminished signal intensity in the triquetrum bone, aiding in the definitive identification of AVN.

triquetrum bone in a previously healthy individual aged 22. AVN, characterized by compromised blood flow resulting in bone tissue death, typically arises from various causes such as trauma, tumors, or osteoarthritis^[2]. However, the occurrence of AVN in carpal bones, notably the triquetrum, without a history of trauma or fracture is exceedingly infrequent. The scarcity of documented cases highlights the importance of recognizing this condition and utilizing appropriate diagnostic methods, such as MRI, for prompt intervention. This report delves into the clinical findings, imaging results, and management strategies in this atypical presentation of AVN, emphasizing the importance of early

detection and conservative treatment approaches. This case report was prepared in accordance with SCARE guidelines^[3].

Case presentation

A previously healthy 22-year-old patient presented to the hospital clinic with a complaint of pain in the right wrist for several months which worsened with daily activities, without any history of trauma. The pain was located over the ulnar aspect of the wrist, and the patient had been using over-the-counter painkillers for relief, specifically paracetamol and ibuprofen. His medical history was otherwise unremarkable. The patient does not smoke, does not consume alcohol, and does not take any drugs. There are no diseases in his family history such as diabetes, high blood pressure, or other diseases.

Clinical examination revealed discomfort and tenderness at the extensor carpi ulnaris tendon insertion point, with no signs of inflammation or swelling. Sensory and motor functions were normal, but passive wrist extension was painful and uncomfortable. A triangular fibrocartilage-complex integrity test was done, and the result was negative. Blood tests were within the normal limits.

An X-ray of the right wrist was then taken, which revealed nothing specific and provided no clinical orientation. (Fig. 1).

MRI of the right wrist was subsequently ordered and revealed a reduction in signal intensity in the triquetrum bone on T2W1, the carpal bones were otherwise normal. (Fig. 2).

Following further medical discussions, a diagnosis of avascular necrosis of the triquetrum bone was established.

The patient was managed with conservative treatment consisting of a COX-2 NSAID, calcium, and ascorbic acid (vitamin C). During follow-up after 3 months, the symptoms were under control. Drug therapy was prescribed with the following treatment plan: Pain analgesics when necessary, NSAIDs for four weeks, ascorbic acid 500 mg once a day, Calcium 500 mg once a day, and vitamin D 5000 international units three times a week.

All medications were administered orally.

Clinical discussion

A variety of pathologies can cause Bone tissue necrosis, which is an abnormality that can happen whenever major cell stress occurs (tumor, osteoarthritis...). However, when the only, or largely predominant, abnormality is a massive necrosis of bone AVN is defined^[4].

AVN development involves mechanisms that contribute to the compromise of blood perfusion, which if not corrected will develop to irreversible osteonecrosis and this includes several factors. Intraluminal factors such as, focal clotting, emboli and sickle cells anemia or extraluminal factors that results in increased intraosseous pressure.

Rarely avascular necrosis is found in Carpal bones without a fracture, which frequently seen in Kienbock's disease (AVN of the lunate, the most affected carpal bone) followed by Preiser's disease (AVN of the scaphoid), the literature describes very few cases of avascular necrosis in other Carpal bones, and the first reported case of avascular necrosis of the triquetrum was in 2005 by Por *et al.*^[5].



Figure 1. (A, B) Radiograph (X-ray) of the right wrist and carpal bones. (A) Lateral view. (B) Anterior posterior view.

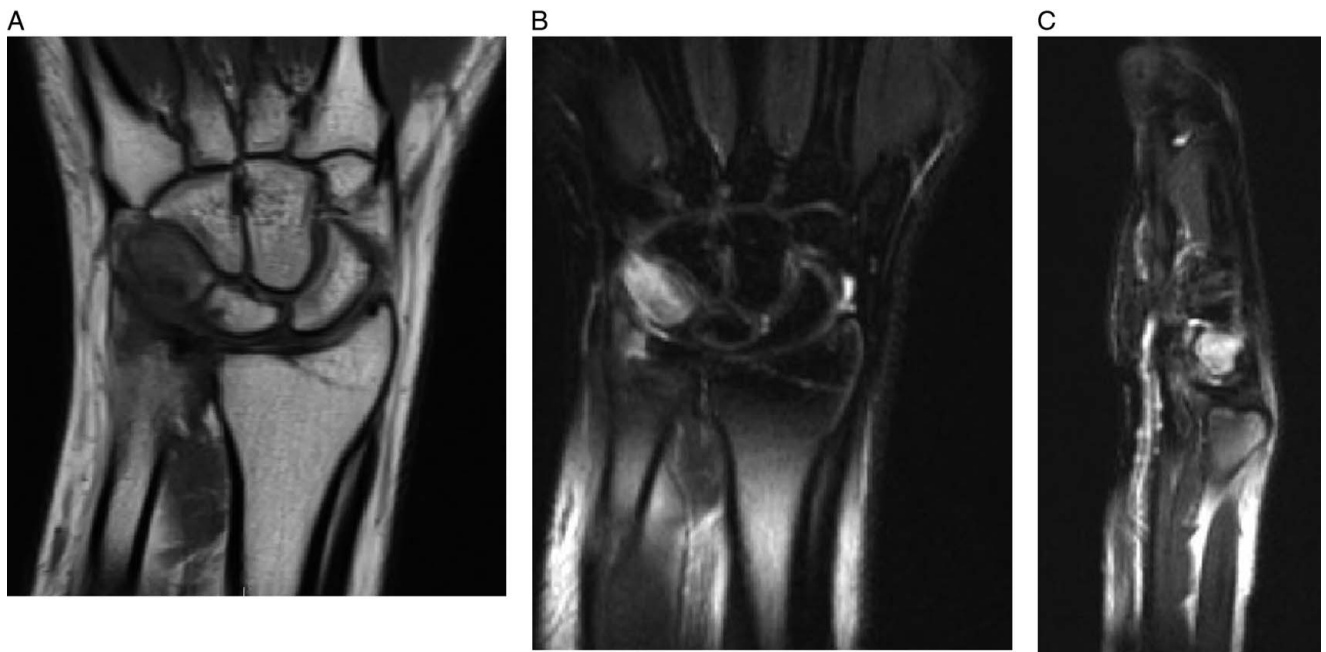


Figure 2. (A) T1 MRI coronal view of the right wrist shows increased signal intensity in the triquetrum. (B) T2 MRI coronal view of the right wrist shows increased signal intensity in the triquetrum. (C) T1 MRI sagittal view of the right wrist shows increased signal intensity in the triquetrum.

To our knowledge this case is the first report of AVN in the triquetrum with no history of trauma or previous fracture, and one of very few reported cases.

Gelberman *et al.*^[6] classified the carpal bones into three groups (Table 1) after studying the extra osseous and intraosseous vascularity^[7] of the carpal bones. The classification was based on three major factors (the presence or absence of intraosseous anastomoses, size and location of nutrient vessels, and the dependence of large areas of the bone on a single intraosseous vessel)^[8]. The triquetrum is in Group III of Gelberman classification, which is described by (Consistent intraosseous anastomoses, Nutrient arteries through two non-articular surfaces and no large areas of bone dependent upon a single vessel)^[8], therefore it has rich vascularity, which explains the rarity of AVN in this bone, counter wise Group I of Gelberman classification is the most affected by Avascular necrosis^[8].

Imaging of suspected AVN starts with simple radiographs, MRI is far more sensitive than other forms of Imaging with an overall sensitivity of 91%^[9], and was found to be more sensitive than bone scan in diagnosing osteonecrosis^[10]. MRI can be used for patients with clinical symptoms not correlating with radiographs^[11].

Due to rarity of cases there is no specific approach for the management of triquetral AVN and no optimal treatment is

described, and there is little evidence to support any operative treatment, therefore it is managed conservatively.

Conclusion

AVN of the carpal bones should be considered even in the absence of a detectable fracture following trauma. Although AVN of the triquetrum is less commonly discussed in the literature, our case and existing reports indicate that it can occur without a clear history of trauma. This case underscores the critical role of MRI in diagnosing AVN, as early detection is crucial for implementing conservative treatment measures. Our findings contribute to the existing literature by highlighting the possibility of AVN in the triquetrum without obvious trauma and emphasize the potential for reversal with timely conservative management. The key learning points are: the necessity of considering AVN in differential diagnoses for wrist pain even without a fracture, the value of MRI in early diagnosis, and the effectiveness of conservative treatment in managing early-detected cases of AVN.

Ethical approval

Given the nature of the article, a case report, no ethical approval was required.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Table 1

Gelberman classification

Group III	Group II	Group I
Trapezium, triquetrum, pisiform and 92% of lunates	Trapezoid and hamate	Scaphoid, capitate and 8% of lunates

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Author contribution

All authors contributed to this manuscript. J.S.: collected the data, drafted, discussed and edited the manuscript. M.M. and A.N.M.: wrote the final draft, reviewed the manuscript and edited it. A.K. and A.A.: drafted and searched for similar cases in the literature. E.S.: the supervisor, critically revised the article and approved the final manuscript.

Conflicts of interest disclosure

The authors declare no conflicts of interest.

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Not applicable.

Guarantor

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Data availability statement

All the relevant data and material are presented in the case.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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