

Traumatic Osteonecrosis of the Distal Ulna

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A 46-year-old male was referred to our clinic for persistent ulnar-sided wrist pain 9 weeks after sustaining a traumatic injury while playing volleyball. The patient unsuccessfully underwent nonoperative management for a suspected injury to the triangular fibrocartilage complex. After magnetic resonance imaging revealed a lesion of the distal ulna, he was treated with diagnostic wrist arthroscopy and Bowers hemiresection. The diagnosis of osteonecrosis was confirmed through histology. While traumatic osteonecrosis of the carpal bones has been described, no previous literature was found on traumatic osteonecrosis of the distal ulna. Treatment with diagnostic wrist arthroscopy and Bowers hemiresection resulted in an excellent outcome at 12 months after surgery. (*J Hand Surg Am.* 2022;47(8):798.e1-e3. Copyright © 2022 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Avascular necrosis, Bowers hemiresection, distal ulna, osteonecrosis, traumatic.



WHILE TRAUMATIC OSTEONECROSIS of the carpal bones has been described, no prior literature or descriptions were found on traumatic osteonecrosis of the distal ulna. We present a case where a patient initially presented with symptoms to suggest an injury to the triangular fibrocartilage complex (TFCC) and was found to have traumatic osteonecrosis of the distal ulna.

CASE REPORT

A 46-year-old male was referred to our clinic 9 weeks after sustaining a right wrist injury while playing volleyball. He denied any antecedent wrist pain. The patient had persistent ulnar wrist pain over the 9 weeks. The physical examination

showed a positive fovea sign. Radiographs did not reveal any evidence of an osseous injury (Fig. 1). The diagnosis was thought to most likely be a TFCC injury, so he was treated with a wrist corticosteroid injection, bracing, and physical therapy. Despite this treatment, he remained symptomatic 6 weeks later and began functional cast therapy (FCT). He was fitted with a customized, thin, removable, univalve cast that was thinner than a regular cast to allow pliability. It held the wrist in slight extension and immobilized the wrist to flexion and extension while allowing full use of the fingers. His wrist pain continued to worsen after a period of immobilization of 8 weeks of FCT, and a magnetic resonance imaging scan was performed. This raised a concern of either a bone tumor or osteonecrosis in the radial aspect of the distal ulna without injury to the TFCC (Fig. 2). With the absence of antecedent wrist pain prior to the volleyball injury, it was more likely that he had traumatic osteonecrosis of the distal ulna. After discussion of the treatment options, the patient elected to undergo diagnostic wrist arthroscopy with Bowers hemiresection.

The procedure was performed under regional anesthesia and monitored anesthesia care. With the

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FIGURE 1: Anteroposterior and lateral x-rays during the patient's initial presentation.

wrist placed in 10 to 15 pounds of traction, standard 3-4 and 4-5 portals were established. The volar ligaments, as well as the scapholunate ligament, were visually confirmed to be intact. The TFCC was assessed and did not demonstrate any significant pathology.

After the arthroscopic examination, an incision was made along the ulnar aspect of the fifth dorsal compartment, incorporating the 4-5 portal incision. The skin and subcutaneous tissue were dissected and the extensor retinaculum over the fifth compartment was divided. With the extensor digiti minimi retracted radially, the radial aspect of the ulna was exposed. The radial aspect of the ulnar articular surface was resected using a bone saw, staying radial to the fovea. The excised bone was sent for pathology examination. A sterile dressing and sugar-tong splint were applied. The patient was discharged home the same day without complication. The patient was instructed not to put weight on the wrist and made plans to follow up in 2 weeks for a wound check.

At the 2-week follow-up, the incision appeared clean, dry, and intact without complication and the sutures were removed. The patient was placed in a

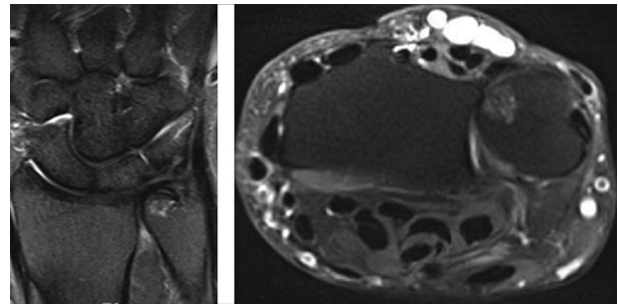


FIGURE 2: T2-weighted magnetic resonance image revealing hyperintense signal on the radial aspect of the distal ulna.

Muenster cast. The tissue sent for pathology was consistent with avascular necrosis (Fig. 3A, B). Our pathologist's review of the tissue sample noted an absence of viable osteocytes within the bony trabeculae and saponification, as well as focal calcification of the bone marrow. At the 5-week follow-up, the patient continued to progress without complication and began physical and occupational therapy (Fig. 4).

At the 10-week postoperative visit, the patient had improved range of motion. He was instructed to wean out of FCT and was allowed to place weight through the extremity. At the 5-month postoperative visit, he reported a return to physical activity, including pickleball, but supination was limited to 30°. After instructions to wear a JAS Brace (Joint Active Systems Inc.), this improved to 60° after a month. Ultimately, he recovered full wrist flexion, extension, and pronosupination equivalent to the contralateral side after 9 months.

DISCUSSION

While rare, cases of traumatic osteonecrosis of the carpus and atraumatic osteonecrosis of the distal radius and ulna have been reported.^{1,2}

Though no aberrant vasculature was encountered during surgery for this patient, the distal ulna is reported to have an ample vascular supply. The anterior interosseous artery gives off a large dorsal branch distal to the interosseous membrane and gives 3 small- to medium-sized branches to the distal metaphysis of the ulna. The ulnar styloid receives a branch directly off of the ulnar artery.³ Thus, it follows that osteonecrosis of the distal ulna is rare.

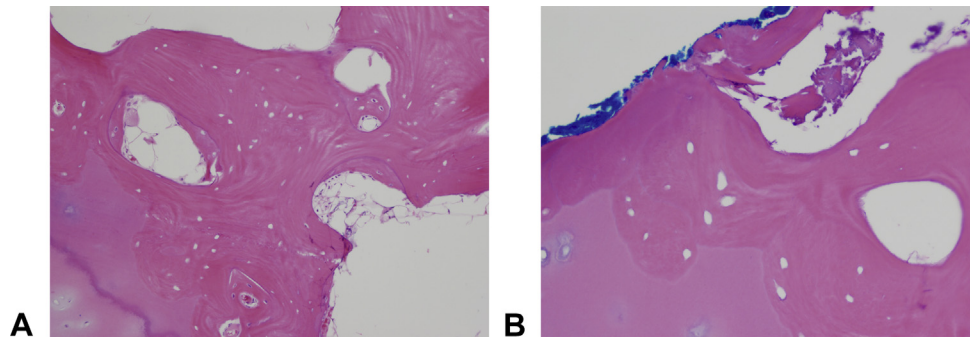


FIGURE 3: **A** Necrotic bone with empty lacunae and saponification of the bone marrow (magnification $\times 100$). **B** Calcification within the bone marrow as well as an absence of viable osteocytes in the surrounding bony trabeculae (magnification $\times 200$).



FIGURE 4: Anteroposterior and lateral wrist x-rays from 5 weeks after surgery.

Persistent pain in the wrist despite nonoperative management may require further investigation with advanced imaging, as was performed in this case.

Patient factors influence treatment recommendations for this condition. Operative treatment options for this diagnosis could include Bowers hemiresection, the Darrach procedure, and curettage and grafting. Due to the intra-operative finding of an intact TFCC, the decision was made to pursue Bowers hemiresection instead of a Darrach procedure.⁴ With appropriate postoperative therapy, the patient had an excellent outcome at 12 months after surgery.

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