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## Case Report

## Excision of a Rare Triquetral Body Fracture Nonunion

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Aside from the more common dorsal avulsion fractures, isolated triquetral body fractures are a rare injury and often missed. When they are identified, conservative treatment via immobilization is often the standard of care for initial treatment. Rarely, triquetral body fractures can develop into symptomatic nonunions, causing considerable pain and disability. Multiple classification schemes have been described to categorize triquetrum fractures; however, distal triquetrum fractures fit into none of the established models. There is scarce literature describing treatment of triquetral body fracture nonunions. The few reports that exist often use a variation of open reduction internal fixation with or without grafting as treatment. We present the case of an unusual triquetral body fracture nonunion that was successfully treated via surgical excision of the ununited distal fragment.

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After scaphoid fractures, triquetral fractures are the second most common carpal fracture and are often associated with other carpal injuries. The triquetrum is well-vascularized and fractures typically heal satisfactorily without operative intervention.<sup>1</sup> Hocker and Menschik<sup>1</sup> classified triquetral fractures as dorsal chip fractures, vertico-frontal fractures of the dorsal edge, or fractures of the body. In their series, dorsal chip fractures were by far the most common, whereas fractures of the body made up only 3% of triquetral fractures. Aside from the most common dorsal avulsion fracture, isolated triquetral fractures are relatively rare and are easily missed. Indications for conservative treatment versus operative fixation of acute triquetrum fractures depend on the fracture pattern. Most triquetrum fractures receive a course of nonsurgical treatment via cast or immobilization involving the placement of an orthosis. However, large avulsions, displaced body fractures, and body fractures combined with carpal instability require operative stabilization. Headless compression screws are commonly used to fix carpal fractures.

Aside from the more common dorsal avulsion fracture, nonunion is rarely seen; however, it has been described in the literature.<sup>2–6</sup> Nonunion should be addressed in a patient with a history of a triquetral fracture and persistent pain, because this complication can be associated with considerable disability. We present a case of a distal triquetral fracture nonunion treated with excision of the distal fracture fragment.

## Case Report

An active, 25-year-old, left-handed man presented with persistent ulnar-sided left wrist pain. The patient had fallen onto the outstretched left hand and injured the wrist while playing recreational soccer approximately 1 year before presentation. A triquetral fracture was diagnosed and the injury was initially treated nonsurgically with cast immobilization at an outside facility for 6 weeks; however, he continued to have persistent pain with sports and daily activities. Examination revealed that the patient had tenderness over the ulnar aspect of the wrist. There was no evidence of instability at the wrist and no paresthesias. There was no instability or pain with palpation or compression of the pisiform. On plain radiograph (Fig. 1), a small ossific density was noted adjacent to the triquetral bone distally, which appeared to be an old

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**Figure 1.** Posteroanterior plain radiograph of left wrist approximately 1 year after injury. The image demonstrates a small ossific density adjacent to the triquetrum, likely representing a chronic fracture fragment.

fracture fragment. Furthermore, a magnetic resonance imaging scan (Fig. 2) suggested an isolated chronic triquetral distal oblique fracture nonunion. In this case, the patient presented with a magnetic resonance imaging scan that was adequate to make the diagnosis; however, a computed tomography image would have been an alternative imaging modality to make the diagnosis. The patient underwent surgical intervention for symptomatic triquetral fracture nonunion.

A dorsal approach to the triquetrum was used. Careful dissection allowed exposure of the triquetrum, and the nonunion site was identified using fluoroscopic guidance. Under direct visualization, scar tissue over the triquetrum fracture nonunion site was removed with a rongeur followed by excision of the approximately  $5 \times 1.5 \times 2$ -mm fracture fragment at the distal aspect of the triquetrum. The fragment did not articulate with the pisiform. The patient was placed in an orthosis that was discontinued at the first follow-up visit. The patient was seen 2 and 6 weeks and 6 months after surgery, at which time he was pain free (visual analog score of 0) and had returned to his full preinjury activity level.

## Discussion

The distal fracture pattern does not fit neatly into any of the classification schemes previously reported for triquetral fracture. It might be best described as a distal transverse body fracture. Because of this fracture's location and the low concern for associated instability, nonsurgical treatment with immobilization appears to be the logical initial treatment. Nonunion of triquetral body fractures is exceedingly rare; however, when these nonunions occur, they are associated with notable morbidity and impairment of daily activities. Few cases of



**Figure 2.** Coronal magnetic resonance imaging scan of the left wrist approximately 1 year after injury. The image demonstrates a nonunion fracture at the distal aspect of the triquetrum.

triquetral body fracture nonunion have been reported in the literature. One was treated conservatively with 3 months of casting, with a poor result.<sup>6</sup> With regard to the surgical treatment of nonunion of triquetral body fractures, only 6 previous reports were identified during our review of the literature (Table 1). In those reports, 5 achieved good results after treating the nonunions with some form of open reduction internal fixation (ORIF) with or without bone graft.<sup>2–7</sup> Of those treated with ORIF, 4 patients had 2 relatively large fracture fragments, which allowed them to be treated with compression screw fixation. Sin et al<sup>4</sup> also achieved a good result with ORIF, even with a smaller distal fragment, although the fragment was noted to involve the articular surface. Johnson et al<sup>8</sup> saw a successful outcome after treating a dorsomedial triquetral fracture nonunion via surgical excision of the fracture fragment. Although that report describes a different fracture pattern and the patient was immobilized for a longer time after surgery, it is similar to the one presented here, further supporting fragment excision as a viable alternative to ORIF given an appropriate fracture pattern with a small fragment size for a symptomatic distal triquetral fracture nonunion. With a smaller fragment size, excision is technically easier and more reproducible than fixation. Although defining the upper limit of fragment size amenable to excision has yet to be determined, these 2 cases demonstrate that fragments up to 6 mm can have good results. We would advocate caution with excising any fragment that involves an articular surface that or is associated with instability.

## Conclusion

Although triquetral body fracture nonunions are rare, they can lead to considerable disability and therefore should be part of the differential in a patient with ulnar-sided wrist pain after a fall. We present a symptomatic nonunion of a unique fracture pattern, which was successfully treated with fragment excision.

**Table 1**  
Case Reports of Triquetral Body Nonunions With Treatment Described and Outcome by Year

Author	Year	Fracture Characteristics	Method of Treatment	Outcome	Presence of Pain
Durbin	1950	Midbody transverse	Cast immobilization	Observed for 3 mo. Poor result reported (union not achieved, presence of pain and activity limitations)	Yes
Abboud et al	2003	Midbody transverse	ORIF with iliac crest bone grafting using headless compression screws. No mention of whether patient was immobilized after surgery	Observed for 1 yr. Good result reported (union achieved, returned to preinjury activity level)	No
Kawakami	2007	Distal body transverse, large fragment	ORIF with iliac crest bone grafting using headless compression screws followed by 8 wk of immobilization	Observed for 1 yr. Good result reported (union achieved, pain-free, no limitation of range of motion)	No
Sin et al	2012	Distal dorsomedial body, small fragment	ORIF with bone grafting from the distal radius using standard screws and AO lag screw technique. No mention of whether patient was immobilized after surgery	Observed for 6 mos. Good result reported (union achieved, pain-free, returned to preinjury activity level)	No
Al Rashid et al	2012	Midbody oblique	ORIF without bone graft using headless compression screws followed by 2 wk of immobilization	Observed for 12 wk. Good result reported (union achieved, returned to preinjury activity level).	Not specified
Rasoli et al	2012	Midbody oblique	ORIF without bone graft using headless compression screws. No postoperative immobilization	Observed for 12 wk. Good result reported (union achieved, returned to preinjury activity level)	Not specified
Johnson et al	2019	Distal dorsomedial body, small fragment	Fragment excision followed by 4 wk of immobilization (removable wrist orthosis)	Observed for 4 wk. Good result (pain-free and returned to preinjury activity level)	No
Current patient	2020	Distal body transverse, small fragment	Fragment excision followed by 2 wk of immobilization	Observed for 6 mo. Good result achieved (pain-free, no limitations to range of motion, returned to preinjury activity level)	No

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