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Sauvé-Kapandji as a Symptom-Directed Salvage Procedure in a Malunited Distal Radius Fracture: A Case Report

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Abstract

Malunion after distal forearm fractures, in addition to causing deformity, can produce distal radioulnar joint (DRUJ) dysfunction, secondary arthritis of both the radiocarpal and the DRUJ, and functional limitation. Identifying the predominant symptomatic pathology is important when considering a corrective osteotomy or joint-specific salvage.

We report the case of a 63-year-old man who presented six months after cast treatment of distal radius and ulna fractures with persistent ulnar-sided wrist pain, difficulty gripping and lifting, and painful forearm rotation. Examination demonstrated focal DRUJ tenderness and marked pain during DRUJ ballottement testing, without focal radiocarpal tenderness. Radiographs showed distal radius malunion with associated distal ulna non-union, subtle DRUJ osteophytes, and no clear radiocarpal articular step-off. Based on clinical-radiographic correlation, the DRUJ was considered the predominant pain generator, and a Sauvé-Kapandji procedure was performed. At six weeks, the Visual Analogue Scale (VAS) pain score decreased from 8/10 to 3/10, and the patient could perform activities of daily living independently. At six months, the VAS score was 1/10, the recorded wrist flexion-extension arc increased from 75° preoperatively to 130° at six months, and the patient reported returning to his usual work without restrictions. Radiographs at six months demonstrated DRUJ fusion.

This case illustrates a symptom-directed approach to distal radius malunion with associated distal ulna non-union and predominantly symptomatic DRUJ pathology. Pain reduction and functional recovery were observed over six months. However, the single-patient design, absence of a comparator, lack of quantitative grip strength measurement, and short follow-up limit the generalizability of the conclusions regarding comparative efficacy or long-term durability.

Categories: Trauma, Orthopedics
Keywords: distal radioulnar joint, distal radius malunion, post-traumatic arthritis, sauvé-kapandji procedure, wrist salvage

Introduction

Malunion after distal forearm fractures can alter radial alignment, ulnar variance, load transmission, and joint congruity [1,2]. The distal radius forms part of two important joints in the upper limb, and therefore, the aforementioned changes may affect both the radiocarpal joint and the distal radioulnar joint (DRUJ). The DRUJ is the articulation between the distal radius and ulna that permits forearm pronation and supination, and a pathology in this joint commonly presents as ulnar-sided wrist pain, restricted forearm rotation, reduced grip strength, and instability [1,2].

The clinical consequences of malunited distal radius fractures are diverse, showing a spectrum of presentations from completely asymptomatic to crippling pain and functional limitation, as demonstrated in the various published literature on this topic [2]. Corrective osteotomy is principally used when radial malalignment, loss of radial height or inclination, radiocarpal incongruity, or deformity-related mechanical dysfunction is responsible for the patient's symptoms. Studies of corrective osteotomy have demonstrated improvement in pain and function in appropriately selected patients with symptomatic distal radius malunion [2,3]. However, osteotomy may not address the main source of symptoms when symptoms arise predominantly from secondary DRUJ arthritis rather than from radiocarpal malalignment itself, especially when the radiocarpal articulation is relatively preserved [4]. This distinction is clinically relevant, as the same initial pathology has the potential to cause multiple pain generators.

A DRUJ-dominant presentation is suggested by focal ulnar-sided or DRUJ tenderness, pain with forearm rotation or loading of the distal ulna, and loss of pronation or supination, particularly when radiocarpal tenderness, substantial radiocarpal arthritis, or an intra-articular step-off is absent. In contrast, radiocarpal-driven symptoms are more likely to include pain centered over the radiocarpal joint, painful wrist flexion and extension, crepitus, or radiographic evidence of radiocarpal incongruity or arthritis [1]. Although the

frequency of isolated DRUJ pathology after distal forearm malunion is not consistently reported, there is considerable clinical relevance, as DRUJ dysfunction can be the predominant pain generator in malunited distal radius fractures [5].

Management of symptomatic DRUJ arthritis is individualized, with several popular procedures described in the literature. The Darrach procedure, or resection of the distal ulna, removes the painful arthritic articulation and can provide pain relief, but loss of the ulnar head may reduce ulnar support and can lead to instability or impingement, particularly in those who are younger or physically active. Hemiresection-interposition arthroplasty preserves part of the ulnar head and interposes soft tissue between the remaining articular surfaces; it may be considered when some functional DRUJ stabilizing structures and reconstructible cartilage remain [6].

The Sauvé-Kapandji procedure, described in this case report, combines arthrodesis of the DRUJ with creation of a proximal ulnar pseudoarthrosis. Arthrodesis relieves pain while providing support to the ulnar side of the wrist, and the pseudoarthrosis allows forearm pronation and supination [1,7].

This case is presented to highlight symptom-directed decision-making in distal forearm malunion and the continued relevance of a practical salvage procedure when the DRUJ is the dominant pain source [5,7]

The project has been approved by the Institutional Ethics Committee vide file No.: IEC Sno: IEC/2026/134, and the author received no funding for this study.

Case Presentation

A 63-year-old right-hand-dominant man presented with persistent pain on the ulnar side of the left wrist six months after a fall on an outstretched hand. He had been treated elsewhere with an above-elbow plaster cast for four weeks after sustaining fractures of the distal radius and ulna. After cast removal, the pain persisted, and the patient had functional limitations, which manifested as loss of power in gripping and lifting.

Clinical examination was performed in the outpatient clinical setting without anesthesia. The patient reported pain along the ulnar border of the wrist, with focal tenderness over the DRUJ and no focal radiocarpal tenderness. Passive wrist motion, measured with a goniometer, comprised palmar flexion of 30°, dorsiflexion of 45°, radial deviation of 15°, and ulnar deviation of 30°, giving a flexion-extension arc of 75°. Forearm rotation was 0°-50° of supination and 0°-60° of pronation and was painful throughout the range of motion. During DRUJ ballottement testing, stress applied to the ulnar head produced a marked increase in pain. Grip strength was clinically estimated at approximately 50% of the contralateral side, but no quantitative measurement was obtained. The preoperative Visual Analogue Scale (VAS) pain score was 8/10.

Figure *1* shows the assessment of wrist motion after a regional block, immediately before surgery. These photographs are distinct from the passive wrist-motion measurements obtained during the preoperative clinical examination without anesthesia.

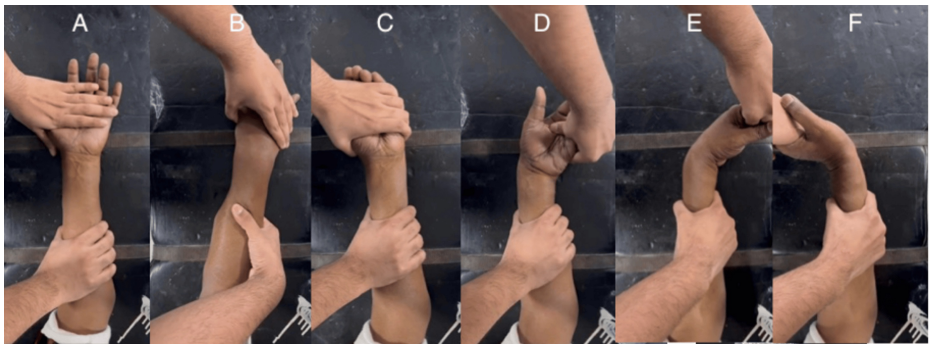


FIGURE 1: Preoperative wrist-motion assessment after regional block, immediately before the Sauvé-Kapandji procedure

Individual panels demonstrate the following:

A: Supination, B: Pronation, C: Radial deviation, D: Ulnar deviation, E: Palmar deviation, and F: Dorsiflexion.

Preoperative radiographs (Figure *2*) demonstrated distal radius malunion with 10° of dorsal tilt, 38° of radial inclination, and an ununited distal ulna fracture. Subtle osteophytes were visible at the DRUJ, consistent with degenerative changes. No clear radiocarpal articular step-off was identified, and there were no

substantial radiocarpal degenerative changes. Radial height was not calculated. The combination of ulnar-sided pain, focal DRUJ tenderness, marked pain during DRUJ ballottement testing, painful forearm rotation, and corresponding DRUJ degenerative changes, together with the absence of focal radiocarpal tenderness, supported the DRUJ as the predominant pain generator. A Sauvé-Kapandji procedure was therefore selected as the most appropriate symptom-directed salvage procedure.

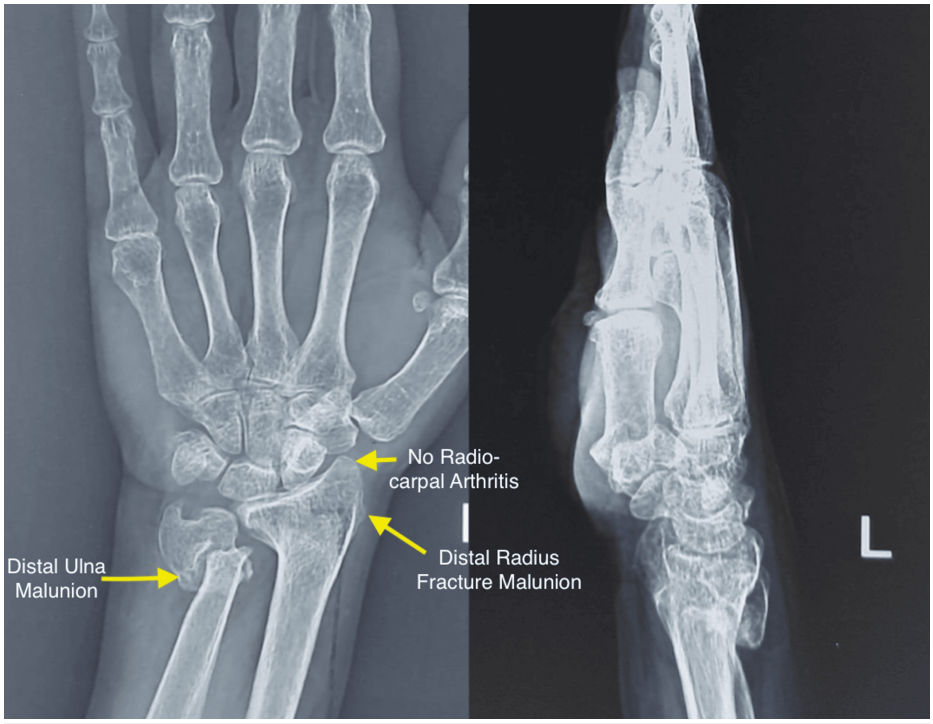


FIGURE 2: Preoperative radiographs demonstrating distal radius malunion with non-union of fracture of distal Ulna (marked with yellow arrows). No clear radiocarpal articular step-off is visible

Through a dorsal approach, the DRUJ was prepared and arthrodesed. A segmental resection of 4 cm of the ulna was then performed just proximal to the fusion site, at the non-union site to create a pseudoarthrosis, thereby preserving forearm rotation while eliminating painful pathological DRUJ motion. The arthrodesis was stabilized with internal fixation using two 4-mm cannulated cancellous screws. Figure *3* shows the immediate postoperative X-ray. Postoperatively, the limb was immobilized for four weeks with an above-elbow plaster of Paris (POP) slab and then mobilized under supervision.

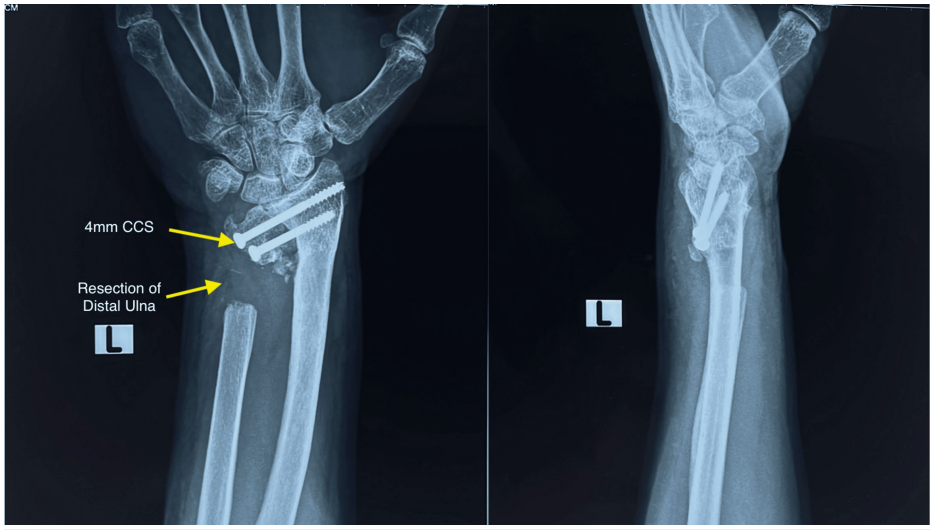


FIGURE 3: Post op X-ray at four weeks post-plaster of Paris (POP) removal. Yellow arrows indicate the hardware used and site of resection gap created

At six weeks, pain improved to a VAS score of 3/10, and the patient was able to perform activities of daily living independently. At six months, pain had reduced from a VAS 8/10 to 1/10; the wrist flexion-extension arc improved from 75° to 130°, pronation increased to 0°-80°, and supination increased to 0°-90° (Figure *4*). The Mayo Wrist Score was 80/100, and the patient returned to unrestricted work as a salesman without restrictions or analgesic use. Grip strength was clinically estimated at approximately 90% of the contralateral side at six months. Neither the pre-op nor follow-up value was obtained using quantitative dynamometry. Six-month radiographs demonstrated fusion at the DRUJ arthrodesis site (Figure *5*). The clinical course and available outcome measures are summarized in Table *1*. These outcomes are reported descriptively because this case report describes a single patient. No statistical analysis has been performed because there was no comparator.

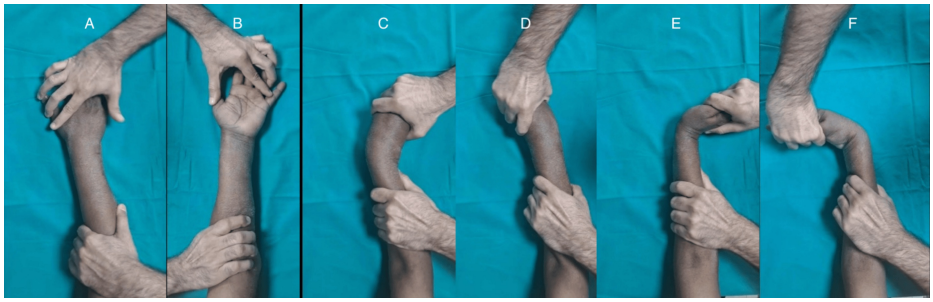


FIGURE 4: Range of motion at six months

Individual panels demonstrate the following:

A: Pronation, B: Supination, C: Radial deviation, D: Ulnar deviation, E: Dorsiflexion, and F: Palmar flexion.



FIGURE 5: Six-month postoperative radiographs demonstrating fusion at the DRUJ arthrodesis site (marked), maintained distal ulna alignment (marked) and maintained resection gap

Outcome	Preoperative	Six weeks	Six months
VAS pain score, 0-10	8	3	1
Wrist flexion-extension arc	75°	Not documented	130°
Mayo wrist score, 0-100	50	Not documented	80
Grip strength relative to contralateral side	Approximately 50%; clinical estimate, not quantitatively measured	Not documented	Approximately 90%; clinical estimate, not quantitatively measured
Functional status	Difficulty gripping and lifting heavy objects	Independent in activities of daily living	Returned to unrestricted work

TABLE 1: Clinical status before surgery and during postoperative follow-up

Discussion

The key teaching point in this case is that distal forearm malunion should not be treated on radiographic appearance alone. Corrective osteotomy is logical when the deformity itself is the dominant cause of disability [2,8], but the present patient had symptoms localized mainly to the DRUJ. Because the radiocarpal joint was clinically quiet and there was no articular step-off, a focused salvage strategy was more rational than reconstructive osteotomy [2].

The Sauvé-Kapandji procedure remains an effective option for post-traumatic DRUJ arthritis because it eliminates the painful arthritic articulation while preserving rotation through a proximal pseudoarthrosis [7,8]. It is especially useful when pain is ulnar-sided, forearm rotation is limited, and the patient is active enough that a Darrach procedure, which involves resection of the distal ulna, may be less desirable [7]. In this setting, the procedure offers a good balance between pain relief, stability, and preservation of function [8].

This case is also relevant to routine practice. Delayed presentation after non-operative management of distal forearm fractures is common, and surgeons may be inclined to focus primarily on deformity correction [2]. However, in carefully selected patients with isolated post-traumatic DRUJ arthritis, the Sauvé-Kapandji can provide excellent pain relief and functional restoration without undertaking corrective osteotomy when there is no tenderness in the radiocarpal joint and no degenerative changes in radiographs [7,8]. Therefore, this report describes a symptom-driven, à la carte strategy in which the treatment targets the symptomatic articulation.

This report is limited by the absence of a quantitative baseline grip strength measurement. In addition, a diagnostic intra-articular DRUJ local anesthetic injection was not performed. Localization of the predominant pain generator therefore relied on clinicoradiographic correlation, and triangular fibrocartilage complex integrity was not documented with MRI. Follow-up was limited to six months, which permits assessment of early clinical recovery and radiographic fusion but not long-term durability or late complications. Longer follow-up is required to assess complications such as proximal ulnar stump instability, radioulnar convergence, hardware irritation, and re-ossification at the pseudoarthrosis site [8].

Conclusions

This case demonstrates a symptom-directed treatment of distal radius malunion with associated distal ulna non-union and predominant DRUJ pathology. Following the Sauvé-Kapandji procedure, this patient reported reduced pain and improved function at six months. The findings illustrate the potential value of identifying the predominant symptomatic pathology (DRUJ vs the radiocarpal joint) when selecting treatment for malunited distal radius fractures, rather than relying on radiographic parameters alone. This case report, however, does not establish comparative efficacy, long-term durability, or superiority over corrective osteotomy or alternative DRUJ salvage procedures.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Abhishek Nagarajan, Chillakuru K. Sindhu, Aashish Tiwary

Acquisition, analysis, or interpretation of data: Abhishek Nagarajan

Drafting of the manuscript: Abhishek Nagarajan, Aashish Tiwary

Critical review of the manuscript for important intellectual content: Abhishek Nagarajan, Chillakuru K. Sindhu

Supervision: Chillakuru K. Sindhu

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Armed Forces Medical College issued approval IEC/2026/134. The project has been approved from an ethical angle w.e.f. April 24, 2026. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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