Case Report | Journal of Orthopaedic Case Reports 2024 December:14(12):Page 192-196

Atraumatic Painful Pseudotendon of Flexor Carpi Radialis: A Literature Review and Case Report

Jon E Hammarstedt[1], William B Hogan[2], Jaewon Chang[1], Damian Slifer[1], Steven Regal[1]

Learning Point of the Article:

FCR pseudotendon may present with an identifiable cause and may be treated successfully with FCR tenotomy with minimal clinical deficits.

Abstract

Introduction: Rupture of the flexor carpi radialis (FCR) tendon is a rare phenomenon that is often described in the setting of rheumatoid arthritis or following trauma. Pseudotendon formation is seen commonly among extensor tendons of the antebrachium, typically as a sequelae of traumatic injury, spontaneous rupture in rheumatism, or postoperatively. Less frequent is the presence of pseudotendon in flexor tendons of the forearm. The development of a pseudotendon tends to result from the preservation of the tendon sheath with subsequent fibroblast proliferation. This results in a functionally deficient structure, often incapable of effective tension resistance.

Case Report: We present a case of painful pseudotendon of the FCR in a patient with no identifiable common risk factors. A partial tear was identified on magnetic resonance imaging at the level of radiocarpal articulation and the patient was treated with debridement of tenosynovium and excision of the FCR tendon. The patient subsequently achieved 100% pain relief at 3 months follow-up with complete preservation of sensory and motor function and strength, and no functional complaints. We discuss the etiology of painful pseudotendon of the FCR and discuss relevant literature.

Conclusion: The significance of this report stems from the evidence that pseudotendon may form through non-classical pathways idiopathically. Our case demonstrated successful removal of tenosynovium, the pseudotendon sheath and FCR tenotomy is safe, effective, and demonstrates minimal clinical deficits.

Keywords: Pseudotendon, flexor carpi radialis, volar wrist pain.

Introduction

Rupture of the flexor carpi radialis (FCR) tendon is a rare phenomenon that is often described in the setting of rheumatoid arthritis (RA) or following trauma [1]. FCR tendon rupture is uncommon in patients without RA but may be seen following an injection of cortisone for tenosynovitis or in conjunction with arthritis at the scaphoid-trapezium-trapezoid joint [2]. The majority of patients with FCR tendon rupture will exhibit minimal disability and functional loss [1,3]. This distinguishes FCR rupture from other digital flexor tendon ruptures, which more commonly present with a dramatic loss of function [4]. Patients may report pain with gripping and wrist extension due to attempted use of a weakly regenerated tendon [5]. Following rupture, pseudotendon formation is commonly seen as disrupted tissue attempts to regenerate. Pseudotendon formation is seen commonly among extensor tendons of the antebrachium, typically as a sequelae of traumatic injury, spontaneous rupture in rheumatism, or postoperatively [6]. Less

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2024.v14.i12.5070

Author's Photo Gallery


Dr. Jon E Hammarstedt


Dr. William B Hogan


Dr. Jaewon Chang


Dr. Damian Slifer


Dr. Steven Regal

[1]Department of Orthopaedic Surgery, Allegheny General Hospital, United States,
[2]Department of Orthopaedic Surgery, The Warren Alpert Medical School of Brown University, United States.

Address of Correspondence:
Dr. Jon E. Hammarstedt,
Department of Orthopaedic Surgery, Allegheny General Hospital, United States.
E-mail: jon.hammarstedt@gmail.com

Submitted: 11/09/2024; Review: 16/10/2024; Accepted: November 2024; Published: December 2024

DOI: https://doi.org/10.13107/jocr.2024.v14.i12.5070

frequent is the presence of pseudotendon in flexor tendons of the forearm [7]. The development of a pseudotendon tends to result from preservation of the tendon sheath with subsequent fibroblast proliferation. This results in a functionally deficient structure, often incapable of effective tension resistance [8].

Herein we present the interesting case of a patient presenting with a painful pseudotendon of the FCR, despite a complete lack of known risk factors. The patient reported no precipitating traumatic event, no history of rheumatic disease, no prior surgical procedures, and no use of corticosteroid therapy. However, a high-grade partial tear of the FCR tendon at the level of the radiocarpal articulation was identified on Magnetic resonance imaging (MRI) and was treated operatively with debridement and excision of the pseudotendon. The clinical presentation, pathology, treatment, and literature review of this rare entity are discussed.

Case Report

A 58-year-old female presented to our clinic with longstanding right wrist pain and the development of a volar mass. The patient described a slow onset of painful symptoms over 1–2 months without inciting event, trauma, or fall. She reported a painful range of motion with the wrist that was worse when writing and lifting. The patient reported no concerns of numbness or tingling.

On examination, swelling and tenderness to palpation were appreciated over the radial aspect of the wrist. Limited thumb range of motion due to pain was noted with some restriction in wrist range of motion as well due to pain.

Wrist X-rays were negative. MRI imaging studies demonstrated hypertrophic tendinopathy, tenosynovitis, and high-grade partial tearing involving the FCR tendon at the level of the radiocarpal articulation. The patient was diagnosed with partial tendon rupture of the FCR tendon. The senior author recommended a debridement and excision versus repair of the FCR and the patient elected to proceed.

Surgical technique

The patient was anesthetized with a regional anesthetic involving sedation and a peripheral nerve block. The patient was placed supine with a hand table on the operating room table with bony prominence well padded.

A longitudinal incision was made overlying the FCR and extended across the wrist crease at a 45° angle. Sharp dissection carried down to FCR sheath where there was abundant tenosynovium and hypertrophic tissue overlying the FCR tendon at the level of the radiocarpal articulation. There was a high-grade tear with > 70% pathologic tissue of the tendon at this level. Decision was made to proceed with a tenosynovectomy and tenotomy. The FCR tendon was then further mobilized utilizing dissection scissors. Tenosynovium was sharply excised off the tendon and the wrist was then flexed to incise the FCR as proximal as possible. The FCR was then transected at the most distal portion of the incision. All pathologic tissue was removed. The scaphotrapezial joint was palpated and there was no evidence of osteophyte or degenerative changes. Wound was then thoroughly irrigated with normal saline. The tourniquet was deflated. Subcutaneous bleeding was easily controlled with bipolar electrocautery. The wound was then closed with 4–0 nylon suture. Sterile dressings were then placed followed by well-padded volar wrist splint. This completed the procedure.

Pathology report

The pathology report described soft-tissue exhibiting tenosynovitis with minimal fibrosis. Skeletal muscle demonstrated focal chronic inflammation. No giant cells or calcification were identified. No features of atypia or malignancy were appreciated.

Follow-up

At 3 months follow-up, the patient reported 100% pain relief with complete restoration of strength and range of motion. The patient had participated in a prescribed home exercise program for the range of motion of the wrist.

Discussion

We present a case of painful pseudotendon of the FCR in a patient with no identifiable common risk factors. A partial tear was identified on MRI at the level of radiocarpal articulation and the patient was treated with debridement of tenosynovium and excision of the FCR tendon. The patient subsequently achieved 100% pain relief at 3 months follow-up with complete preservation of sensory and motor function and strength, and no functional complaints.

The clinical presentation of volar wrist pain can result from multivariate etiologies. This includes carpal tunnel syndrome, FCR tendinitis, distal radial fracture, and less commonly: Pseudotendon formation [9]. Pseudotendon formation has been described as a complication of surgical intervention, RA, osteoarthritis, traumatic injury, osteophytes, and corticosteroid therapy [7,10-13]. Spontaneous idiopathic pseudotendon formation of the FCR has not been well described in the literature. Here, we shall review the anatomy pertinent to the case to be discussed as well as examples of potentiating factors found in the literature.

The FCR is a bipennate muscle that originates on the medial epicondyle at the common flexor tendon, inserting at the second and third metacarpals. The chief actions are flexion and abduction of the wrist, with innervation provided by the median nerve. As the tendon traverses the carpal bones distally, it occupies over 90% of the sheath, coming in direct contact with the trapezium. It is at the scaphotrapezium junction where most FCR tendon dysfunction occurs. As the tendon traverses the carpal tunnel, osteophyte formation can precipitate microlacerations in the tendon sheath. Granular tissue formation stemming from rheumatic inflammatory changes can predispose the sheath vincula to tissue disruption upon contact with bony spurs [7]. Irwin et al., describe a review of dozens of cases involving painful tenosynovitis in scaphotrapezial arthritis, with and without bony spiculations [12]. The authors discuss a specific case of rupture secondary to osteoarthritis with the development of a painful "reparative fibrous response." Henry describes a case series involving six patients with stenosing tenosynovitis of the FCR resulting in spontaneous tendon rupture post-steroid therapy [2]. The hallmark of the presentation was pain out of proportion to injury or functional deficit [14]. The mechanism leading to the disproportionate pain found in patients is poorly understood.

Bowe and Fitzgerald et al. affirmed prior treatment with injectable corticosteroids to be associated with spontaneous rupture of the FCR with subsequent painful tendinous lesion development [11,15]. Despite these incidences, Fitzgerald does not suggest discontinuation of corticosteroid therapy in select cases, as the benefits outweigh the rare risk. Less commonly, distal radial fractures are a well-elucidated mechanism of flexor tendon disruption [16]. Extensor tendons such as extensor carpi ulnaris or extensor pollicis longus are more frequently implicated in this injury pattern than flexor tendons, possibly due to the splinting effect of the pronator quadratus [17]. The concurrence of fracture and tendon rupture presents a challenge due to contradictory management protocols.

RA is another common precursor predisposing patients to FCR rupture [1]. Ruptures in these patients occur due to either attrition on bone spurs or by direct invasion into the tendon by hypertrophic tenosynovium. In RA, the attrition ruptures typically occur within the carpal canal. Ertel et al. (1988) examined 115 flexor tendon ruptures in patients with RA [18]. 91 tendons ruptured at the wrist, with 61 ruptures caused by attrition on bone spurs and 30 caused by direct invasion by the tenosynovium. Patients whose ruptures were caused by attrition demonstrated better functional outcomes. Overall range of motion was poor, however, and the authors advocated for operative intervention early in the disease course to improve outcomes.

Overall, FCR tendon rupture is a rare clinical phenomenon. Patients with FCR tendon rupture often do not present with significant disability or loss of function. Other injuries to digital flexor tendons typically cause notable loss of function, making FCR rupture a unique clinical entity. One of the first reports of pseudotendon formation was by Kulick et al. (1985), who described pseudotendon formation as a consequence of attempted biologic self-repair following injury to flexor digitorum superficialis and flexor digitorum profundus tendons [8]. They described findings of disrupted tendon architecture and appearance, as noted in our patient, who appeared to exhibit limited tensile strength.

The pathophysiology of pseudotendon formation is similar to classical fibrotic changes associated with soft-tissue injury. Various matrix metalloproteinases have been described in the literature to exhibit degradative effects on the collagen composition of the tendon sheath. This is seen in synovial exudate found in capsule disruption of the distal radioulnar joint [10]. Collagen deposition is mediated by growth factors including transforming growth factor-β, platelet-derived growth factor, and vascular endothelial growth factor [19,20]. The final result is an amalgamation of the extracellular matrix that renders the newly deposited tissue functionally deficient. Gross examination of pseudotendon reveals a dull grey sheath as differentiated from the pearly opalescence of a healthy tendon [6,12]. The tendon can range in size from 1 to 13 cm, with a markedly lower tensile strength.

Physical examination of the forearm in the presence of FCR pseudotendon formation can be challenging [1]. Often, the regenerated tendon will appear as normal; though a lump may be present approximately 6 cm proximal to the carpal bones, representing a retracted and/or hypertrophied native FCR tendon. The FCR tendon exhibits substantial regenerative potential; Naidu et al. (2006) studied 39 patients with FCR harvesting for thumb carpometacarpal (CMC) arthroplasty and found partial FCR regeneration in 79% of patients and complete FCR regeneration in 14% of patients [21]. As seen in our patient, weakness with gripping and wrist extension is commonly seen. MRI/arthrogram is a common imaging modality for evaluating these injuries, although ultrasound could provide sufficient diagnostic value in many cases with improved cost-efficacy.

Conservative treatment remains the first-line therapy for FCR rupture and/or painful pseudotendon [1,2]. Non-operative modalities include non-steroidal anti-inflammatory drugs, physical therapy, activity modification, splinting, and cortisone injections. Surgery is reserved for refractory cases with moderate to severe symptoms. Debridement and complete

excision of the pseudotendon and proximal tendon are most commonly recommended, although tendon transfer has been described as an alternative [22]. Support for the operative treatment of FCR tendon rupture stems from the good to excellent clinical outcomes observed following FCR harvesting for CMC arthroplasty [21].

Henry described the largest series to date of FCR tendon ruptures, reporting on six patients who had developed ruptures following cortisone injection and remained symptomatic following conservative therapy [2]. The patients were treated with excision of both pseudotendon and FCR stump. All six patients reported complete relief of symptoms postoperatively, with a statistically significant improvement in Disabilities of the Arm, Shoulder, and Hand scores from a mean of 32 (±8) to 3 (±2) ($P < 0.05$). Our patient also reported complete relief of symptoms following the same operative course.

In this case, the patient presented with unilateral wrist pain that had increased over 1–2 months. The MRI/arthrogram of the wrist showed a high-grade partial tear of the FCR tendon at the level of the radiocarpal articulation, with evidence of hypertrophy, tendinopathy, and tenosynovitis. This radiographic finding is analogous to the description of "pseudotendon" by Henry and the "neotendon" described by Irwin et al. and is likely due to FCR tendon regeneration [2,12].

Based on literature supporting harvesting of the FCR for CMC reconstruction, complete excision of the pseudotendon and retracted tendon stump was performed [2,21]. The patient reported substantial improvement of symptoms with no complaints at 3-month follow-up.

Conclusion

The significance of this report stems from the evidence that pseudotendon may form through non-classical pathways idiopathically. As stated previously, our patient presented without any of the aforementioned risk factors commonly associated with the formation of painful pseudotendon. A high index of suspicion should be kept for this in the setting of atraumatic wrist pain that is negative for carpal tunnel examination. Differentiating between tenosynovitis, tendinitis, and pseudotendon of the FCR has major implications on disease management. The former may be managed nonoperatively with splinting and physical therapy while pseudotendon is preferentially excised for symptom resolution. Our case demonstrated successful removal of tenosynovium, the pseudotendon sheath and FCR tenotomy is safe, effective, and demonstrates minimal clinical deficits.

Clinical Message

FCR pseudotendon formation may be successfully treated with FCR tenotomy and removal of pseudotendon sheath with minimal clinical deficits.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Van Demark RE, Helsper E, Hayes M, Hayes M, Smith VJ. Painful pseudotendon of the flexor carpi radialis tendon: A literature review and case report. Hand (N Y) 2017;12:NP78-83.

2. Henry M. Pseudotendon formation causing painful tethering of ruptured flexor carpi radialis tendons. J Hand Microsurg 2013;5:1-3.

3. Kanevsky J, Zammit D, Brutus JP. Rupture of the flexor carpi radialis tendon secondary to trauma: Case report and literature review. Plast Aesthetic Res 2015;2:138-9.

4. Rogowski I, Creveaux T, Genevois C, Klouche S, Rahme M, Hardy P. Upper limb joint muscle/tendon injury and anthropometric adaptations in French competitive tennis players. Eur J Sport Sci 2016;16:483-9.

5. DelSignore JL, Zambito K, Ballatori SE. Suture suspension arthroplasty for thumb carpometacarpal arthritis reconstruction: 12-to 14-year follow-up. Hand (N Y) 2023;18:105-12.

6. Anzel SH, Covey KW, Weiner AD, Lipscomb P. Disruption of muscles and tendons; An analysis of 1, 014 cases. Surgery 1959;45:406-14.

7. Mannerfelt L, Norman O. Attrition ruptures of flexor tendons in rheumatoid arthritis caused by bony spurs in the carpal tunnel. A clinical and radiological study. J Bone Joint

Surg Br 1969;51:270-7.

8. Kulick MI, Kilgore ES Jr., Newmeyer WL 3rd. Pseudotendon formation after flexor tendon injury. J Hand Surg Am 1985;10:638-40.

9. Weeks PM. A cause of wrist pain: Non-specific tenosynovitis involving the flexor carpi radialis. Plast Reconstr Surg 1978;62:263-6.

10. Hashimoto A, Sonohata M, Senba H, Mawatari M. Spontaneous flexor tendon rupture due to primary distal radioulnar joint osteoarthritis. Case Rep Orthop 2019;2019:7604897.

11. Fitzgerald BT, Hofmeister EP, Fan RA, Thompson MA. Delayed flexor digitorum superficialis and profundus ruptures in a trigger finger after a steroid injection: A case report. J Hand Surg Am 2005;30:479-82.

12. Irwin LR, Outhwaite J, Burge PD. Rupture of the flexor carpi radialis tendon associated with scapho-trapezial osteoarthritis. J Hand Surg Br 1992;17:343-5.

13. Tonkin MA, Stern HS. Spontaneous rupture of the flexor carpi radialis tendon. J Hand Surg Br 1991;16:72-4.

14. Fitton J, Shea FW, Goldie W. Lesions of the flexor carpi radialis tendon and sheath causing pain at the wrist. J Bone Joint Surg Br 1968;50:359-63.

15. Bowe A, Doyle L, Millender LH. Bilateral partial ruptures of the flexor carpi radialis tendon secondary to trapezial arthritis. J Hand Surg Am 1984;9:738-9.

16. DiMatteo L, Wolf JM. Flexor carpi radialis tendon rupture as a complication of a closed distal radius fracture: A case report. J Hand Surg Am 2007;32:818-20.

17. Hill JR, Alluri RK, Ghiassi A. Acute isolated flexor tendon laceration associated with a distal radius fracture. Hand (N Y) 2017;12:NP39-42.

18. Ertel AN, Millender LH, Nalebuff E, McKay D, Leslie B. Flexor tendon ruptures in patients with rheumatoid arthritis. J Hand Surg Am 1988;13:860-6.

19. Luong DH, Smith J, Bianchi S. Flexor carpi radialis tendon ultrasound pictorial essay. Skeletal Radiol 2014;43:745-60.

20. Parellada AJ, Morrison WB, Reiter SB, Carrino JA, Kloss LA, Glickman PL, et al. Flexor carpi radialis tendinopathy: Spectrum of imaging findings and association with triscaphe arthritis. Skeletal Radiol 2006;35:572-8.

21. Naidu SH, Poole J, Horne A. Entire flexor carpi radialis tendon harvest for thumb carpometacarpal arthroplasty alters wrist kinetics. J Hand Surg Am 2006;31:1171-5.

22. Gabel G, Bishop AT, Wood MB. Flexor carpi radialis tendinitis. Part II: Results of operative treatment. J Bone J Surg Am 1994;76:1015-8.

Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Hammarstedt JE, Hogan WB, Chang J, Slifer D, Regal S. Atraumatic Painful Pseudotendon of Flexor Carpi Radialis: A Literature Review and Case Report. Journal of Orthopaedic Case Reports 2024 December;14(12):192-196.