Tendon pathology in patients with distal radius palmar locked plate: incidence and clinical outcome of treatment

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Abstract

Introduction: The aim of this study is to report the incidence of tendon complications in patients with distal radius fracture treated with palmar locked plate and the medical outcomes of the treatment consisting of the mere removal of the implant.

Materials and Methods: We carried out a retrospective assessment of 992 distal radius fractures. We included the patients we had removed the plate from due to tendon irritation or rupture. We carried out the final assessment of the outcomes, once the implant had been removed, using the DASH score and the visual analogue scale from 0 to 10 for pain at rest and pain with activity, and for functional result.

Results: Thirty-four patients had tendon complications: 20 flexor tendonitis (2%), 13 extensor tendonitis (1.3%), and one rupture of flexor tendon. All the patients were treated with the mere removal of the implant. In the visual analogue scale, patients with flexor tendonitis showed 1 for pain at rest, 1 for pain with activity, and 8 for function; they showed a DASH score of 13. The average final assessment in the patients with extensor tendonitis showed 0 for pain at rest, 3 for pain with activity, 9 for function and a score of 15 in DASH.

Conclusions: The incidence of tendon complications in the treatment of distal radius fracture with palmar locked plates is low. Early treatment consisting of the mere removal of the implant leads to disappearance of symptoms and avoids tendon rupture.

Key words: Radius; complications; fracture; tendons.

Level of evidence: IV

Patología tendinosa en pacientes con placa bloqueada palmar de radio distal: incidencia y resultado clínico del tratamiento

Resumen

Introducción: El objetivo de este estudio es comunicar la incidencia de complicaciones tendinosas en pacientes con fracturas de radio distal tratados con placa bloqueada palmar y el resultado clínico del tratamiento mediante la sola extracción del implante.

Materiales y Métodos: Se realizó una evaluación retrospectiva de 992 pacientes con fracturas de radio distal. Se incluyó a quienes se les extrajo la placa por irritación o rotura tendinosa. La evaluación final de los resultados, una vez extraído el implante, se efectuó con el puntaje DASH y una escala analógica visual de 0 a 10 para dolor en reposo, durante la actividad y para el resultado funcional.

Resultados: Treinta y cuatro pacientes tuvieron complicaciones tendinosas: 20 tendinitis de flexores (2%), 13 tendinitis de extensores (1,3%) y una rotura de tendón flexor. Todos fueron tratados sólo con extracción del implante. En la escala

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analógica visual, los pacientes con tendinitis flexora obtuvieron un puntaje de 1 para dolor en reposo, de 1 para dolor durante la actividad y de 8 para resultado funcional, y un puntaje DASH de 13. La evaluación final promedio de los pacientes con tendinitis extensora fue: dolor en reposo 0, dolor durante la actividad 3, funcional 9 y DASH 15, respectivamente.
Conclusiones: La incidencia de complicaciones tendinosas en el tratamiento de las fracturas de radio distal con placas palmares es baja. El tratamiento precoz mediante la sola extracción del implante lleva a la desaparición de los síntomas y evita la rotura tendinosa.

Palabras clave: Radio; complicaciones; fractura; tendones.
Nivel de Evidencia: IV

Introduction

The risk of rupture and irritation of tendons has been the most important criticism to the treatment of distal radius fracture with dorsal plates. This led surgeons to change fixation methods for dorsally deviated fractures to implants less aggressive towards soft tissues that give stable fixation to bone injuries. Thus, in a position more anatomic and protective of tendons, palmar locked plates that were consequently developed would allow the surgeon appropriate wrist fixation. With the massive use of these implants, however, there are reports on the same tendon complications that had triggered the change of fixation methods—for some reason, extensor and flexor tendons keep suffering complications. Although there are numerous publications about the treatment of distal radius fractures using palmar locked plates, there are none about their complications, or there are reports on little series.[1-3]

The aim of this study is to report the incidence of tendon complications in patients with distal radius fracture, and medical outcomes in the treatment consisting of the mere removal of the implant.

Materials and Methods

We carried out the retrospective assessment of 992 patients with distal radius fracture treated with palmar locked plates, operated on at our center between January 2007 and June 2015.

We recorded the patients' age, sex, and type of fracture as outlined by the AO Classification; we also recorded the time between the initial surgery and the onset of signs or symptoms of tendon irritation and associated injuries. All the patients were operated on by five surgeons experienced in upper limb surgery using a modified Henry approach.

The inclusion criteria were: 1) patients >18 years old with distal radius fracture, initially operated on at our center, 2) signs or symptoms of tendon irritation in both flexor and extensor tendons, and 3) treatment consisting of the mere removal of the implant.

As signs of tendon irritation we set out pain, crepitation or functional impairment on the palmar or dorsal aspects of the distal radius during finger flexion-extension movement (Figure).

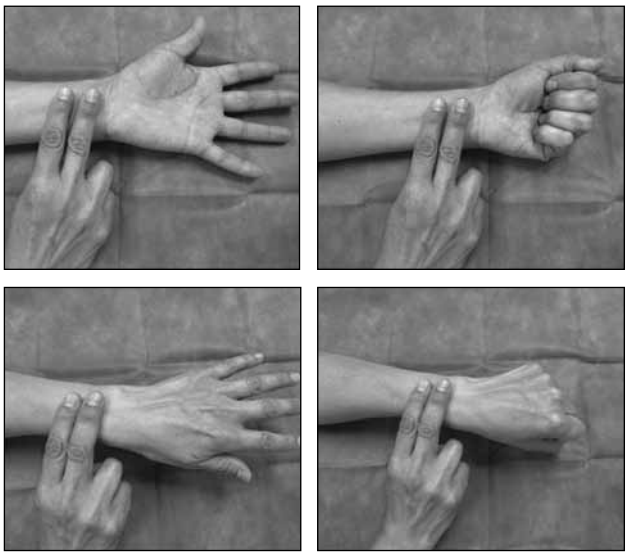

Figure. Assessment of signs of tendon irritation, crepitation and pain.

We excluded the patients operated on at any other center, those with palmar unlocked plates or single distal row plates, and those with no records of results once the implant had been removed and who could not be contacted.

Final outcomes were assessed using the DASH score and the visual analogue scale for pain at rest and with activity, and for function, from 0 to 10. We also evaluated disappearance—or not—of signs and symptoms of tendon irritation previous to the implant removal.

Results

Thirty-four patients met the inclusion criteria. Twenty (2.01%) showed flexor tendon irritation; 13 (1.31%), extensor tendon irritation, and one suffered rupture of the extensor pollicis longus (0.10%). We used five types of different implants, and found no correlation between them.

Except for the patient with rupture of the extensor pollicis longus, surgery consisted of removal of the implant with no associated procedure, such as synovectomy or tendon exploration.

The average time between the implant insertion and the onset of the tendon symptoms was of 13 months for patients with flexor irritation and of 5 months for patients with extensor irritation. Only one patient referred inability to flex the second thumb phalanx 22 months after the surgery; with diagnosis of rupture of the extensor pollicis longus, he was treated by removal of the implant plus a tendon transfer procedure. In this case, we did not carry out subjective evaluation, since this was a rescue procedure and, therefore, it does not have anything to do with the aims of the study. The average follow-up consecutive to the implant removal was of 9 months for the patients with flexor tendonitis, and of 16 months for the patients with extensor tendonitis. The results at last follow-up are shown in Tables 1 and 2, and they are compared between one another in Table 3.

Table 1. Subjective results in the patients with flexor tendonitis

Patient	Age (years)	Sex	AO Classification	Time between surgery and implant removal (months)	Post-removal follow-up (months)	Final DASH	Final VAS at rest	Final VAS with activity	Final functional VAS
1	82	F	C1	13	8	4	2	2	9
2	81	F	B2	26	15	11	0	0	10
3	83	F	B1	3	58	1	0	0	10
4	36	F	C1	58	1	20	0	7	8
5	59	M	C2	14	14	3	0	0	9
6	69	F	A3	11	2	3	2	2	9
7	67	F	C3	13	9	10	0	0	10
8	42	F	C2	11	3	5	0	0	10
9	73	F	C3	7	2	60	3	3	4
10	70	F	B	7	13	12	1	1	8
11	60	F	C3	13	7	5	0	0	10
12	53	F	C2	16	9	43	3	3	10
13	33	F	C3	4	2	0	0	0	8
14	75	F	C1	3	2	15	2	2	0
15	56	F	C3	9	12	15	2	2	10
16	72	M	C3	14	8	15	1	1	8
17	71	F	A2	14	1	19	0	0	6
18	57	F	C2	10	1	16	0	0	7
19	56	M	C3	6	1	0	0	0	8
20	59	F	C3	3	2	10	0	0	9
Average	63			13	9	13	1	1	8

M = male, F = female, VAS = visual analogue scale.

Table 2. Subjective results in the patients with extensor tendonitis

Patient	Age (years)	Sex	AO Classification	Time between surgery and implant removal (months)	Post-removal follow-up (months)	Final DASH	Final VAS at rest	Final VAS with activity	Final functional VAS
1	31	F	A3	10	8	8	0	4	10
2	86	F	A3	5	2	30	1	6	5
3	69	M	B2	4	6	63	0	9	5
4	61	F	C2	7	37	0	0	1	10
5	86	F	C3	8	41	0	0	0	10
6	72	F	C3	5	2	2	0	0	10
7	66	F	A2	5	19	13	4	6	8
8	69	F	C3	6	36	11	0	0	9
9	52	F	C2	4	37	9	0	0	10
10	25	M	A2	5	8	14	0	3	10
11	59	F	A2	3	8	15	0	4	9
12	48	M	C3	3	1	12	0	3	10
13	59	F	C1	4	1	13	0	3	9
Average	60			5	16	15	0	3	9

M = male, F = female, VAS = visual analogue scale.

Table 3. Comparison of results between both groups

	Flexor tendonitis	Extensor tendonitis
Post-removal follow-up (months)	9	16
Final VAS at rest	1	0
Final VAS with activity	1	3
Final functional VAS	8	9
Final DASH	13	15

VAS = visual analogue scale.

In all patients, the symptoms of tendon irritation improved 100%. We did not find complications in anyone of them.

Discussion

The few studies that address specifically tendon disorders in patients with palmar plates are usually focused on tendon rupture with no approach to irritative disorders.[4-8] They do not report at what time irritation or rupture occurred either, nor do they report the final outcomes of the treatment.

In a series of 321 patients, Soong et al.[4] reported 12 cases (3.7%) of flexor tendonitis, one case of extensor tendonitis (0.3%), and one tendon rupture (0.3%) throughout the six years that the study lasted. In a series of 206 fractures, Johnson et al.[12] reported four tendon ruptures (1.9%) and three tendonitis (1.5%) in a study span of two years. Rozental et al.[13] reported two cases of flexor tendon irritation (4%) and one of extensor tendon irritation (2%) in 41 patients, throughout three years. These results are similar to the 2.01% of flexor tendonitis, 1.31% of extensor tendonitis and 0.10% of tendon rupture that we found in our sample, although the study span was greater (9.5 years).

In a prospective multicentric study, Arora et al.[14] published a series of 114 patients with an incidence of 3.5% of tendon rupture, 8% of flexor tendonitis and 3.5% of extensor tendonitis. These results are higher than the ones in our series, Soong et al.'s series[4] and Johnson's series.

Early diagnosis in tendonitis is essential to act timely and avoid progression to potential tendon rupture.

In a systematic bibliographic revision, Asadollah[15] reported 47 tendon ruptures secondary to writs palmar plate, with an average time of nine months between the insertion of the osteosynthesis and the rupture of the tendon. In our series, there was only one tendon rupture among 992 fractures. We attribute this low incidence to the early removal of the implant once the onset of ir-

ritative tendonitis occurred. Although the average time reported for the onset of symptoms is nine months,[15] the only tendon rupture in our series occurred 22 months after the surgery. This highlights the importance of providing patients with information about tendon irritation. Upon presentation, early evaluation even a long time after the initial surgery might avoid tendon rupture, which has been reported occurring up to 10 years after the fracture has been operated on.[16]

The removal of the plate gave improvement in previous symptoms in all cases, what highlights the importance of early implant removal. No patient suffered further complications in the irritated tendons after implant removal. In no case was it necessary to carry out synovectomy or other surgical procedure additional to implant removal.

Among the limitations of this study we point out its retrospective nature and the lack of objective assessment. Among its highlights, however, we can mention the long assessment span and the high number of patients involved, what strengthens the study.

Conclusions

The incidence of complications in the treatment of distal radius fracture with palmar locked plates is low. Early treatment consisting of the mere removal of the osteosynthesis when the patients suffer signs or symptoms of tendon irritation leads to the disappearance of the symptoms and avoids tendon rupture.

Patients with distal radius fracture operated on with palmar locked plates should be warned about the future possibility of osteoshynthesis removal due to tendinous irritation. Every patient's ten-year (furthest report on tendon rupture due to palmar plate[16]) periodical follow-up in those operated on for this type of fractures is difficult. It goes without saying, then, that is utterly important to provide the patients with information about the signs and symptoms which might represent tendon suffering—crepitation or pain on the palmar aspect of distal radius at finger flexion-extension, for them to consult immediately once such symptoms have been identified.

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