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Early detection and treatment of complications in the fingers and hand after arthroscopic rotator cuff repair

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Background: Complications in the fingers and hand after arthroscopic rotator cuff repair (ARCR) have been reported to include carpal tunnel syndrome (CTS), flexor tenosynovitis (TS), and complex regional pain syndrome. These studies were conducted retrospectively; however, the reported complications have not been examined prospectively. The aim of this study was to evaluate the outcomes of early detection and treatment of the complications after ARCR.

Methods: Forty-six patients (48 shoulders) who underwent ARCR were prospectively examined to investigate complications in the fingers and hand after ARCR. We attempted to immediately detect and proactively treat these complications. We evaluated the outcomes of the early detection and treatment of the complications.

Results: Complications were observed in 17 hands (35%) and occurred an average of 1.5 months after ARCR. The symptoms in 3 hands resolved spontaneously, 2 hands were diagnosed with CTS, and 12 hands were diagnosed with TS. Of the 12 hands with TS, 11 exhibited no triggering of the fingers. Among the 14 hands diagnosed with CTS or TS, 13 hands (CTS: 2 hands, TS: 11 hands) were treated with corticosteroid injections; the mean interval between treatment initiation and symptom resolution was 1.0 months (0.5-3.0 months). None exhibited complex regional pain syndrome.

Conclusions: When symptoms occur in the fingers and hand after ARCR, CTS or TS should be primarily suspected. The diagnosis of TS must be made carefully because most patients with TS have no triggering. For patients with CTS or TS after ARCR, rapid corticosteroid injection administration can lead to improvement in these symptoms.

Arthroscopic rotator cuff repair (ARCR) is a safe and effective option for the treatment of rotator cuff tears. The short-term and midterm outcomes after ARCR have been good to excellent.[1,16,19] Nevertheless, ARCR is a complex procedure with associated specific and clinically relevant complications. The complications associated with ARCR have been reported to include rerupture, infection, stiffness, direct nerve injury, brachial plexus stretch neurapraxia, hardware failure, fluid extravasation, deep venous thrombosis, and complications related to anesthesia.[3,21]

Regarding complications of the fingers and hand after ARCR, complex regional pain syndrome (CRPS) type I has been reported.[3,7,17,21,22,24,30] CRPS type I from trauma or surgical intervention is a clinical entity characterized by severe spontaneous pain that is disproportionate to the inciting event and by motor symptoms, such as movement limitations of the fingers and hand. CRPS has been known by many names, but most commonly as reflex sympathetic dystrophy. The prevalence of CRPS ranges from 0% to 14.8% after ARCR.[1,3,16,19,21] It is of great importance to evaluate clinical outcomes in patients with CRPS. In terms of these clinical outcomes in patients with CRPS, Kobayashi et al[14] reported that there is no significant difference in the University of California, Los Angeles score at the 2-year postoperative time point between the patients with or without CRPS, and they concluded that the coexistence of CRPS does not affect shoulder function after surgery. However, the outcomes of hand lesions associated with CRPS remain unclear.

Institutional review board approval was obtained before the start of this study, and informed consent was obtained from the subjects. The name of approval giving authority is ethical committee approval in Izumi Orthopedic Hospital and the study number is IOH IRB-002.

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Regarding complications in the fingers and hand after ARCR with the exception of CRPS, we found that 12 patients (29%) experienced numbness, pain, edema, and movement limitations in the fingers and hand after ARCR and that these symptoms occurred an average of 1.1 months (range, 0.1-2.5 months) after ARCR, and we reported that the diagnoses were cubital tunnel syndrome in 2 hands, carpal tunnel syndrome (CTS) in 3 hands, and flexor tenosynovitis (TS) in 10 hands and that none of the hands exhibited CRPS.[10] However, these reports on complication in the fingers and hand occurring after ARCR were retrospective, and these complications have not been examined prospectively. Therefore, we sought to prospectively detect and proactively treat these complications. We aimed to evaluate the outcomes of the early detection and treatment of complications in the fingers and hand after ARCR.

Materials and methods

From 2012 to 2017, 48 patients underwent the arthroscopic repair of rotator cuff tears. We excluded 2 patients complicated with distal radius fracture and osteochondroma of the finger, and the remaining 46 patients (48 shoulders) were prospectively examined. All of the patients were followed for more than 1 year after surgery. The patients' ages ranged from 41 to 86 years (mean, 59 years), and the group included 34 males and 12 females. In addition, the operated side consisted of the dominant shoulder in 24 patients, the nondominant shoulder in 20, and both shoulders in 2. No patients in the study had diabetes mellitus or rheumatoid arthritis or were undergoing dialysis.

All ARCR surgeries were performed by 2 of the authors (NM and MH), who are orthopedic shoulder surgeons. After general anesthesia was induced, all the patients were placed in the beach chair position (T-MAX Beach Chair; Smith & Nephew, Andover, MA, USA). A Spider Arm Holder (Spider; Smith & Nephew) was used during surgery on 10 shoulders and not used on 38 shoulders.

ARCR using suture anchors was performed on all patients. Among the 48 shoulders included, primary repair was performed on 46, and partial repair was performed on the other 2 shoulders. According to the Cofield classification, the tear size was small (less than 1 cm) in 9 shoulders (19%), medium (between 1 and 3 cm) in 27 (56%), large (from 3 to 5 cm) in 10 (21%), and massive (more than 5 cm) in 2 (4%). After surgery, the arms were immobilized using an UltraSling (UltraSling; DONJOY, Ontario, CA, USA) for a period of 4-6 weeks. On postoperative day 1, all patients in this consecutive series began an organized exercise program including active range of motion (ROM) of the fingers and elbow under the supervision of a physical therapist. The patients began performing passive ROM shoulder exercises at 1-3 weeks (mean, 1.2 weeks) after surgery and active ROM exercises at 8 weeks after surgery. The mean observation period after surgery was 19.1 months (range, 12-48 months).

We examined the history of the fingers and hand for disease before ARCR as well as complications in the fingers and hand, including numbness, pain, edema, and movement limitations, on the operated side that occurred within 1 year after ARCR. We attempted to detect and diagnose the complications as soon as they occurred and to treat them proactively. We evaluated the outcomes of the early detection and treatment of complications in the fingers and hand after ARCR. Until 1 month after surgery, the patients were examined almost daily because they had been hospitalized for 1 month. From 1 to 3 months after surgery, the patients were examined at 1- to 2-week intervals. From 3 months after surgery to the final follow-up, the patients were examined at 1- to 3-month intervals.

One of the authors (MH), who is an orthopedic shoulder surgeon, diagnosed complications in the fingers and hand according to previous diagnosis criteria of CTS, TS, or CRPS. The diagnosis of CTS was based on clinical findings such as finger numbness (thumb, index, middle, or ring finger) or pinch disorder, abnormal findings for Tinel's sign, Phalen's test, and the carpal compression test, atrophy and muscle weakness of the abductor pollicis brevis, abnormal Perfect O sign, and a delay in distal motor latency of the median nerve beyond 4.2 milliseconds. According to the modification reported by Quinnell,[20] a diagnosis of TS was based on clinical findings such as motion pain or movement limitations of the fingers and abnormal findings regarding more than 1 of the following: triggering, tenderness around the metacarpophalangeal (MP) joints, and swelling of the flexor tendon. Swelling of the flexor tendon was considered present when an orthopedic clinician noted thickening of the flexor tendon distal or proximal to the A1 pulley while pulling the volar MP joint as the patient actively flexed the fingers. According to the Budapest clinical diagnostic criteria for CRPS,[12,13] CRPS was diagnosed when the following 4 items were met: (1) continuing pain disproportionate to any inciting event; (2) at least 1 symptom in 3 of the following 4 categories: (a) sensory: reports of hyperesthesia and/or allodynia, (b) vasomotor: reports of temperature asymmetry and/or skin color changes and/or skin color asymmetry, (d) sudomotor/edema: reports of edema and/or sweating changes and/or sweating asymmetry, (d) motor/trophic: reports of decreased ROM and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin); (3) at least 1 sign at the time of evaluation in 2 or more of the following categories: (a) sensory: evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or deep somatic pressure and/or joint movement), (b) vasomotor: evidence of temperature asymmetry and/or skin color changes and/or asymmetry, (c) sudomotor/edema: evidence of edema and/or sweating changes and/or sweating asymmetry, (d) motor/trophic: evidence of decreased ROM and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin); and (4) no other diagnosis better explains the signs and symptoms.

As for treatment, for CTS, according to the modified protocol of a previous report,[6] the injections were placed using a 27-gauge needle at the wrist between the proximal and distal wrist crease to infiltrate the carpal tunnel using 1.0 mL of 1% mepivacaine hydrochloride (Aspen Japan, Inc., Tokyo, Japan) and 0.5 mL of triamcinolone acetonide (40 mg/mL; Bristol-Myers Squibb, New York, NY, USA) with a total injection volume of 1.5 mL. In TS, according to the modified protocol of a previous report,[31] the injections were placed into and around the flexor sheath using a 27-gauge needle at the level of the A1 pulley using 0.5 mL of 1% mepivacaine hydrochloride (Aspen Japan, Inc.) and 0.25 mL of triamcinolone acetonide (40 mg/mL; Bristol-Myers Squibb) with a total injection volume of 0.75 mL.

Results

A past history of disease in the fingers and hand before ARCR was present in 5 patients, including TS in 2 (1: surgical history in the middle finger, 1: injection history in the thumb) and CTS in 3 (2: surgery history, 1: injection history). No patients, including these 5 patients, had symptoms of disease in the fingers or hand before ARCR.

In all, 17 patients (17 hands) (35%) experienced numbness, pain, edema, and movement limitations of the fingers and hand on the operated side after ARCR, and these symptoms occurred an average of 1.5 months (range, 0.1-7 months) after ARCR (Tables I and II). In detail, finger numbness was present in 6 patients (6 hands) (12%), and the numbness occurred an average of 0.3 months (range, 0.1-1 months) after ARCR (Tables I and II). Edema in the fingers and hand was observed in 14 patients (14 hands) (29%) an average of 0.9 months (range, 0.1-6 months) after ARCR (Tables I and II). Movement limitations of the fingers and hand were present in 6 patients

Table I
Summary of complications in the fingers and hand after ARCR

	n (%)	Occurrence time (mo)
Complications*	17 (35)	1.5 (range, 0.1-7)
Numbness	6 (12)	0.3 (range, 0.1-1)
Edema	14 (29)	0.9 (range, 0.1-6)
Movement limitation	6 (12)	2.1 (range, 0.8-3)
Pain	12 (25)	2.8 (range, 0.8-7)

	In detail
Complications*	Thumb and finger numbers
Numbness	Thumb: 4, index finger: 6, middle finger: 6, ring finger: 5, little finger: 3
Edema	
Movement limitation	Thumb: 2, index finger: 1, middle finger: 2, ring finger: 1, little finger: 0†
Pain	Thumb: 4, index finger: 2, middle finger: 6, ring finger: 3, little finger: 0

ARCR, arthroscopic rotator cuff repair.
* Complications in the fingers and hand after ARCR.
† In both hands with thumb movement limitations, the range of motion (ROM) of the interphalangeal joint was as follows: extension: 0°, flexion: 60°. In the remaining 4 hands with movement limitations in the fingers, the mean ROM was as follows: extension of the proximal interphalangeal joint: −0.5° (−5° to 0°), flexion (pulp-palm distance): 0.3 cm (0-1 cm).

(6 hands) (12%), and the movement limitations occurred an average of 2.1 months (range, 0.8-3 months) after ARCR (Tables I and II). Pain was present in the fingers and hand in 12 patients (12 hands) (29%), and the pain occurred an average of 2.8 months (range, 0.8-7 months) after ARCR (Tables I and II).

Among 17 patients (17 hands) (35%) with numbness, pain, edema, and movement limitations in the fingers and hand after ARCR, the symptoms in 3 hands resolved spontaneously an average of 2.6 months (range, 1-6 months) after ARCR (Table III). In the remaining 14 hands, the diagnosis was CTS in 2 hands and TS in 12 hands (Fig. 1, Table III). Of the 12 hands with TS, 11 exhibited no triggering of the fingers (Table III).

Among the 14 hands diagnosed with CTS or TS after ARCR, 1 hand diagnosed with CTS had a past history of CTS (injection history) before surgery (Table III). Although the fingers diagnosed with TS were different from those with a past history of TS, 1 hand diagnosed with TS in the ring finger had a past history of TS in the middle finger (surgical history) before surgery, and 1 hand diagnosed with TS in the middle finger also had a past history of TS in the thumb (injection history) and CTS (surgical history) before surgery (Table III).

Regarding the treatment and outcomes of the 14 hands diagnosed with CTS or TS, 13 hands (CTS: 2 hands, TS: 11 hands) were treated with corticosteroid injections, after which the symptoms in all 13 hands resolved completely (Fig. 1, Table III). The mean interval between treatment initiation and symptom resolution was 1.0 months (0.5-3.0 months) (Table III). The patient with the remaining hand diagnosed with TS refused injection, and both the pain and movement limitations in the middle finger continued. None of the hands exhibited CRPS.

Case 9

The patient was a 52-year-old man. TS in the index finger on the operated side (right side) was diagnosed after ARCR (Fig. 2). The patient experienced motion-induced finger pain, movement limitation, and slight edema in the index finger at 2 months after ARCR. Tenderness around the MP joint of the index finger was also found, and we diagnosed the index finger with TS and administered corticosteroids. At 2 weeks after injection, the motion-induced pain and edema in the fingers and hand had resolved, and the movement limitation in the index finger had improved. Furthermore, at 1 month after injection, the movement limitation in the index finger had almost completely resolved.

Discussion

In this study, we evaluated complications in the fingers and hand after ARCR prospectively; 17 patients (17 hands) (35%) experienced numbness, pain, edema, and movement limitations in the fingers and hand within 1 year after ARCR. Finger numbness occurred an average of 0.3 months after ARCR, edema in the fingers and hand occurred an average of 0.9 months after ARCR,

Table II
Patient details: symptoms and occurrence time of complications in the fingers and hand after ARCR

Patient	Age (yr)	Sex	Complications in the fingers and hand							
			Numbness		Edema		Movement limitations		Pain	
			Presence	Occurrence time (mo)	Presence	Occurrence time (mo)	Presence	Occurrence time (mo)	Presence	Occurrence time (mo)
1	55	F	Yes 1, 2, 3	0.1	Yes	0.1	No	–	No	–
2	59	M	Yes 2, 3, 4	1	Yes	0.2	No	–	No	–
3	63	F	Yes 1, 2, 3, 4, 5	0.1	Yes	0.1	No	–	Yes 3	1.5
4	68	F	Yes 2, 3, 4	0.1	Yes	0.2	Yes 4	0.8	Yes 4	1
5	59	M	No	–	Yes	6	No	–	Yes 1	6
6	59	M	No	–	Yes	1	No	–	Yes 4	1.5
7	60	F	No	–	No	–	No	–	Yes 3	6
8	58	M	No	–	Yes	0.2	No	–	Yes 1,2,3	0.8
9	52	M	No	–	Yes	0.1	Yes 2	2	Yes 2	1.5
10	61	M	Yes 1, 2, 3, 4, 5	0.1	Yes	1	Yes 1	2	Yes 1	1.5
11	56	M	No	–	No	–	Yes 3	2	Yes 3	1.5
12	63	M	No	–	Yes	3	No	–	Yes 3,4	4
13	63	F	No	–	Yes	0.2	Yes 1	3	Yes 1	7
14	75	M	No	–	Yes	1	Yes 3	3	Yes 3	1.5
15	45	M	Yes 1, 2, 3, 4, 5	0.1	No	–	No	–	No	–
16	61	F	No	–	Yes	0.1	No	–	No	–
17	60	F	No	–	Yes	0.1	No	–	No	–

ARCR, arthroscopic rotator cuff repair.
Yes 1, 2, 3, 4, 5: thumb, index finger, middle finger, ring finger, little finger.

Table III
Patient details: diagnoses and treatment outcomes for complications in the fingers and hand after ARCR

Patient	Past history		Diagnosis				Treatment	Symptom resolution	Resolution interval (mo)	Observational period after surgery (mo)
	CTS	TS	CTS	TS	Triggering	Occurrence time (mo)				
1	Yes (inj)	No	Yes	No	–	6	inj	Yes	1	12
2	No	No	Yes	No	–	2	inj	Yes	3	14
3	Yes (op)	Yes 1 (inj)	No	Yes 3	No	2.5	inj	Yes	0.5	12
4	No	Yes 3 (op)	No	Yes 4	No	1	inj	Yes	1	25
5	No	No	No	Yes 1	Yes	7	inj	Yes	1	36
6	No	No	No	Yes 4	No	1.5	inj	Yes	1	48
7	No	No	No	Yes 3	No	6	inj	Yes	0.5	36
8	No	No	No	Yes 1, 2, 3	No	1.6	inj	Yes	1	36
9	No	No	No	Yes 2	No	2	inj	Yes	1	32
10	No	No	No	Yes 1	No	3	inj	Yes	1	29
11	No	No	No	Yes 3	No	3	inj	Yes	1	24
12	No	No	No	Yes 3, 4	No	4	inj	Yes	1	12
13	No	No	No	Yes 1	No	7	inj	Yes	1.5	12
14	No	No	No	Yes 3	No	3	No	No	–	25
15	No	No	No	No	–	0.1	No	Yes	1	20
16	No	No	No	No	–	0.1	No	Yes	1	12
17	No	No	No	No	–	0.1	No	Yes	6	12

ARCR, arthroscopic rotator cuff repair; *CTS*, carpal tunnel syndrome; inj, injection; op, operation; *TS*, tenosynovitis.
Yes 1, 2, 3, 4, 5: thumb, index finger, middle finger, ring finger, little finger.
Resolution interval: resolution interval between treatment initiation and symptom resolution (mo).

movement limitations in the fingers and hand occurred an average of 2.1 months after ARCR, and pain in the fingers and hand occurred an average of 2.8 months after ARCR. Among 17 hands with complications in the fingers and hand after ARCR, the symptoms in 3 hands resolved spontaneously, 2 hands were diagnosed with CTS, and 12 hands were diagnosed with TS. Because the patients were restrained at the shoulder to within 20° of abduction for a period of 4-6 weeks after ARCR, their finger and hand use was extremely limited; consequently, many of them experienced edema of the fingers and hand. We speculate that immobilization of the shoulder to within 20° of abduction after ARCR causes perfusion injury in the upper extremity, resulting in edema in the upper extremity and promoting the development of common conditions in the fingers and hand, such as CTS or TS. However, we could not confirm whether the presence or duration of shoulder immobilization was statistically related to the onset of the complications, so we need to investigate this immobilization phenomenon in future studies.

Previous studied have shown that risk factors of CTS and TS included injuries such as wrist fracture,[2,9] diabetes mellitus,[23,25] rheumatoid arthritis,[5,23] and dialysis.[18,23] However, in our study, no patients had these injuries or diseases. Therefore, we could not investigate the risk factors of CTS and TS. The potential mechanisms of the development of common conditions such as CTS or TS are speculated as follows: (1) symptom exacerbation due to a disease that existed before surgery; (2) symptom occurrence due to subclinical disease that existed before surgery; and (3) acute symptom occurrence due to a new disease that developed after surgery. In our study, among the 14 hands diagnosed with CTS or TS, 1 hand diagnosed with CTS had a past history of CTS (injection history) before surgery, and although the fingers diagnosed with TS were different from those with a past history of TS, 2 hands diagnosed with TS had a past history of TS (1 hand: surgical history, 1 hand: injection history) before surgery. In these 3 hands, the symptoms were suspected to occur due to subclinical disease that existed before surgery. In the remaining 11 hands, the symptoms may have occurred acutely due

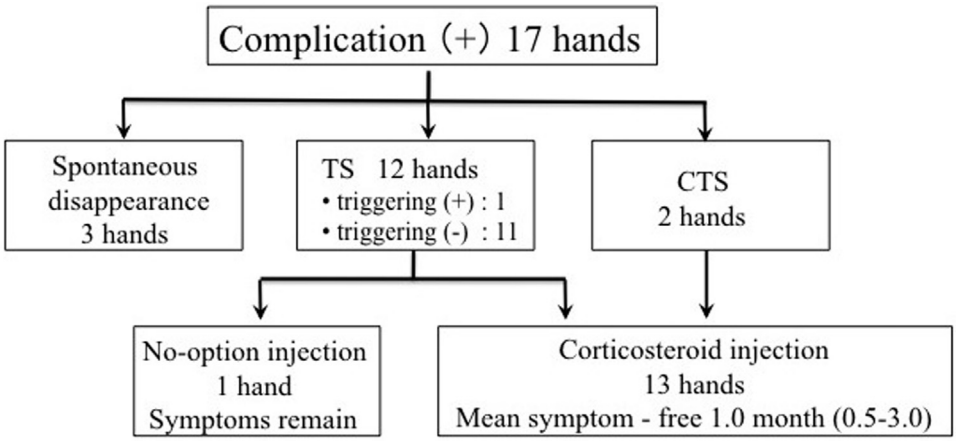

Figure 1 Diagnosis, treatment, and treatment outcomes of complications in the fingers and hand after arthroscopic rotator cuff repair. *CTS*, carpal tunnel syndrome; *TS*, flexor tenosynovitis.

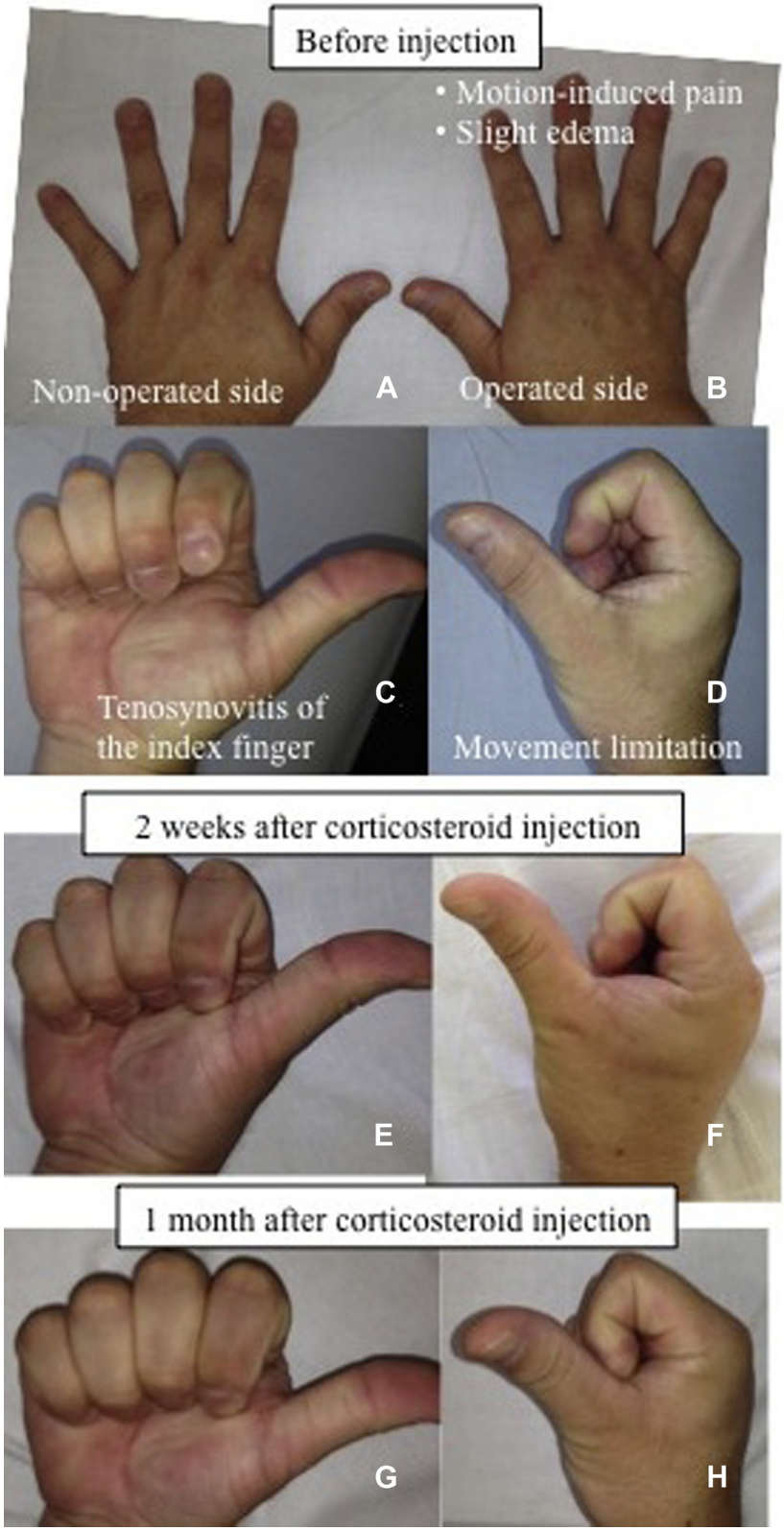

Figure 2 A 52-year-old male patient was treated with corticosteroid injections due to flexor tenosynovitis (TS) in the index finger on the operated side (right side) occurring at 2 months after arthroscopic rotator cuff repair. Before receiving the injection, on the operated side (right side), the patient experienced motion-induced finger pain, slight edema in the dorsal fingers and hand (before injection: **A**, nonoperated side, left side; **B**, operated side, right side), and movement limitation in the index finger (operated right side when fingers flexed before injection: **C**, front view; **D**, side view). We diagnosed these symptoms as TS in the index finger and administered corticosteroid injections. At 2 weeks after injection, the motion-induced pain and edema in the fingers and hand had disappeared, and the movement limitation in the index finger had improved (operated right side when fingers flexed at 2 weeks after injection: **E**, front view; **F**, side view). Furthermore, at 1 month after injection, the movement limitation in the index finger had completely resolved (operated right side when fingers flexed at 1 month after injection: **G**, front view; **H**, side view).

to a new disease that developed after surgery, but the mechanisms involved are still unclear and need to be further investigated.

CTS and TS have been reported to occur after trauma or surgical intervention, resulting in the presentation of CRPS-like symptoms, including numbness, pain, edema, and movement limitations in the fingers and hand.[15,28] Our study also demonstrates the development of CTS and TS with CRPS-like symptoms after ARCR. Among 12 patients with TS, only 1 hand exhibited triggering of the fingers, whereas the remaining 11 exhibited no triggering. These results suggest that when numbness, pain, edema, and movement limitations in the fingers and hand occur after ARCR, common conditions, such as CTS or TS, should be primarily suspected; the diagnosis of TS must be made carefully because most patients with TS have no triggering.

Regarding treatment and outcomes, previous studies have reported that when CTS and TS occurred after trauma or surgical intervention in the finger, hand, or shoulder, these patients should be treated proactively with corticosteroid injections or surgery.[10,15,28] In our study, except for 1 hand that was not injected, 13 hands (CTS: 2 hands, TS: 11 hands) were treated with corticosteroid injections, and the symptoms in all 13 hands resolved completely. The mean interval between treatment initiation and symptom resolution was 1.0 months (0.5-3.0 months). These results suggest the utility of the early diagnosis of complications in the fingers and hand after ARCR and rapid corticosteroid injection administration to treat the complications. We speculate that rapid corticosteroid injection administration can lead to rapid improvement in these symptoms, thereby effectively preventing the development of CRPS. However, we need to investigate whether the cortisone injection actually leads to rapid improvement of the symptoms using a control group in future studies.

The incidence of CRPS is largely influenced by the criteria employed.[29] Three criteria of CRPS diagnosis were mainly used, including the International Association for the Study of Pain (IASP) criteria,[13,26] the Ministry of Health, Labor, and Welfare study team for CRPS in Japan (MHLWJ) criteria,[27] and the Budapest criteria.[4,8,11,12] In 1994, the IASP introduced the term “CRPS” and advocated the criteria for its diagnosis,[26] and the IASP criteria were re-established in 2005.[13] However, the IASP criteria for CRPS have low specificity, potentially leading to overdiagnosis. To improve the low specificity of the IASP criteria, the MHLWJ criteria and Budapest criteria were established. Consequently, the MHLWJ and Budapest clinical diagnostic criteria provide an incremental improvement in diagnostic accuracy compared with the IASP criteria. On the other hand, there is a great difference between the MHLWJ and Budapest criteria, namely, the presence or absence of 1 item: “no other diagnosis better explains the signs and symptoms.” The Budapest criteria include the presence of this 1 item, whereas the MHLWJ criteria do not include it. In our study, we have chosen the Budapest criteria for CRPS, and the results have shown that none of the hands exhibited CRPS among the patients with complications in the fingers and hand after ARCR. We speculate that this is because we could make a diagnosis of CTS or TS before we had diagnosed CRPS, according to the 1 item “no other diagnosis better explains the signs and symptoms,” which was included in the Budapest criteria.

In our study, the reason why the patients were hospitalized for 1 month is that the Japanese medical system recognizes 1-month hospitalization as a medical service that under health insurance does not incur a large amount of expense, and consequently, all patients in our study wanted to be hospitalized for 1 month. Another reason why these patients were hospitalized is that all the patients lived in distant areas from our hospital, and because traveling from this distance would have posed difficulties for frequent hospital visits and thus required the availability of their family or relatives to bring the patients to our hospital, the patients' hospitalization stay accounted for the entirety of these considerations. This study had several limitations. The first limitation is that, despite the prospective design, we did not have a control group because we had injected most of patients who developed complications in the fingers and hand to avoid making the complications worse, resulting in CRPS. Because we focused on improving the complications, we could not have a control group without injections. Therefore, the causal relationships between the complications and injections or between CRPS and injections were not analyzed. Second, our study had a very small sample size. Further investigations with large study populations and comparisons of 2 groups will be needed. Third, we have not yet investigated whether certain factors, including shape and size of tear, immobilization period, 1-month hospitalization, and so on, are related to the complications. Fourth, the diagnosis may be biased because one of the authors who diagnosed these complications is an orthopedic shoulder surgeon (the investigator). However, we do not consider this limitation to be of high bias because the investigator did not diagnose these patients based on observing the results but diagnosed according to previous diagnosis criteria of CTS, TS, or CRPS.

Conclusions

We evaluated the outcomes of early detection and treatment of the complications in the fingers and hand after ARCR. Complications were observed in 17 hands (35%), and the complications occurred an average of 1.5 months (range, 0.1-7 months) after ARCR. When complications in the fingers and hand occur after ARCR, CTS or TS should be primarily suspected. Rapid corticosteroid injection administration can lead to improvement in these symptoms.

Disclaimer

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