

# World Journal of *Clinical Cases*

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# Idiopathic tenosynovitis of the wrist with multiple rice bodies: A case report and review of literature

Yong Tian, Hong-Bin Zhou, Kai Yi, Kai-Jian Wang

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**Yong Tian, Hong-Bin Zhou, Kai Yi, Kai-Jian Wang,** Department of Orthopedics, Yichang Yiling Hospital, Yichang 443100, Hubei Province, China

**Corresponding author:** Yong Tian, MD, Occupational Physician, Department of Orthopedics, Yichang Yiling Hospital, No. 32 Donghu Road, Yiling District, Yichang 443100, Hubei Province, China. [tyong0911@sina.com](mailto:tyong0911@sina.com)

## Abstract

### BACKGROUND

Multiple rice bodies in the wrist is a rare disorder that requires surgery, and there are still many uncertainties regarding its diagnosis and treatment.

### CASE SUMMARY

We described a rare case of chronic idiopathic tenosynovitis with rice bodies of the wrist in a 71-year-old man and reviewed similar topics in the literature. A total of 43 articles and 61 cases were included in the literature review. Our case had a usual presentation: it was similar to those in the literature. The affected population was mainly older adults, with an average age of 59.43 (range, 3 to 90) years. The male-to-female ratio was 1.54:1 (37/24). Most of them showed limited swelling and pain, only 23.0% had carpal tunnel symptoms, and the average disease duration was 18.03 (0.5-60) mo. Wrist flexor tendon sheath involvement was the most common (95.1%, 58/61), and only 3 cases had extensor tendon sheath involvement. The main causes were tuberculosis (34.4%, 21/61), non-tuberculous mycobacteria (24.6%, 15/61), idiopathic tenosynovitis (31.1%, 19/61), and others (9.84%, 6/61). There were 10 patients with recurrences; in 6 of them, were due to non-tuberculous mycobacterial infections.

### CONCLUSION

We reported a case of wrist idiopathic tenosynovitis with rice body formation, and established a clinical management algorithm for wrist tenosynovitis with rice bodies, which can provide some reference for our clinical diagnosis and treatment. The symptoms of rice-body bursitis of the wrist are insidious, non-specific, and difficult to identify. The aetiology is mainly idiopathic tenosynovitis and mycobacterial (tuberculosis or non-tuberculous) infections; the latter are difficult to treat and require long-duration systemic combination antibiotic therapies. Therefore, before a diagnosis of idiopathic tenosynovitis is made, we must exclude other causes, especially mycobacterial infections.

**Key Words:** Idiopathic tenosynovitis; Rice bodies; Wrist; Mycobacterial infection; Case report

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**Core Tip:** We report a rare case of wrist idiopathic tenosynovitis with rice bodies formation. The rice body formation in the wrist is a sporadic disease that requires surgical treatment. Its symptoms are insidious, nonspecific and difficult to identify. And we did the literature review, which can provide a reference for the diagnosis and treatment of the wrist rice-body bursitis.

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## INTRODUCTION

Riese[1] first described rice bodies in tuberculous arthritis in 1895 and named the condition so because it resembled polished white rice. Microscopically, the rice bodies are composed of eosinophilic nuclei and fibrin due to a non-specific reaction to chronic joint inflammation[2]. Rice body formation has no significant correlation with disease progression, severity, or prognosis[3]. It is commonly seen in tuberculous arthritis, rheumatoid arthritis, and seronegative rheumatoid arthritis, and has also been reported in hip replacement surgery[4], fungal infections[5], and systemic lupus erythematosus[6]. It mainly occurs in the joint capsule or the surrounding synovial sac of the shoulder and knee, but rarely in the wrist. Herein, we present a case of wrist tenosynovitis with rice body formation; the patient underwent surgery and had no recurrence during the twelve-month follow-up. In addition, we review the relevant literature to further appreciate the condition's epidemiological characteristics.

## CASE PRESENTATION

### Chief complaints

A 71-year-old man complained of increased swelling of his left wrist and exercise restriction.

### History of present illness

The patient was admitted to our orthopaedic outpatient department because of increased swelling and restricted movements of his left wrist for half a month.

### History of past illness

The patient had no recent history of trauma, except for an injury to the back of the left hand more than ten years earlier that resulted in the flexion of the left hand's fingers in a semi-clenched fist shape. He had had a history of eczema for three years, had been treated with traditional Chinese medicine, and denied a history of tuberculosis.

### Personal and family history

The patient had no special personal and family history.

### Physical examination

Physical examination revealed a cystic mass on the palmar side of the left wrist with unclear borders and mild tenderness. The left hand's fingers were not weak or numb, and Tinel's sign was negative. The range of motion of left wrist flexion was 0°-45°.

### Laboratory examinations

Laboratory tests were normal. The erythrocyte sedimentation rate was 18 mm/L, and the C-reactive protein was 0 mg/L.

### Imaging examinations

Ultrasound examination in other hospitals showed a cystic hypoechoic mass on the palmar side of the left wrist, with clear borders, an uneven internal echo, noticeable enhancement of the posterior sound,



and spot-like blood flow signals around it (Figure 1). We then performed a magnetic resonance imaging (MRI) examination and found a large cystic mass in the volar flexor tendon and carpal tunnel of the left wrist. The mass was filled with rice-sized particles that showed low signals both on the T1 and T2 weighted images (Figure 2). The left carpal tunnel volume had increased, the median nerve structure was unclear, and the left transverse carpal ligament showed an arcuate bulge. Soft tissue swelling of the distal left forearm, around the wrist and the left palm, was observed, with a patch-like long T1 and high T2 weighted-signal shadow.

### Histopathological examination

On histopathological examination of the resected cyst wall, chronic, nonspecific inflammation was observed. The postoperative rheumatoid factor test was normal, at 1.40 IU/mL. The final diagnosis was idiopathic tenosynovitis with multiple rice bodies. Two weeks after the operation, the wound healed, and the stitches were removed. During the twelve-month follow-up period, the symptoms resolved without recurrence.

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## FINAL DIAGNOSIS

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Idiopathic tenosynovitis.

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## TREATMENT

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An excision biopsy was performed, with an "N" incision along the left wrist. Intraoperative incision of the carpal tunnel revealed a cystic mass originating from the tendon sheath of the flexor carpal tendon throughout the palm, carpal tunnel, and distal end of the forearm. After the cyst wall was cut open, many white rice-sized loose bodies were observed (Figure 3). All the rice bodies and the whole bursa were removed. The acid-fast bacilli smear test of the cyst fluid was negative, and the mycobacterial culture was negative too.

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## OUTCOME AND FOLLOW-UP

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Two weeks after the operation, the wound healed, and the stitches were removed. During the twelve-month follow-up period, the symptoms resolved without recurrence.

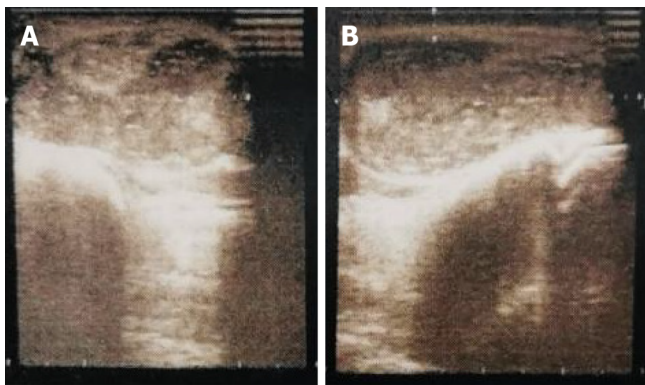
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## DISCUSSION

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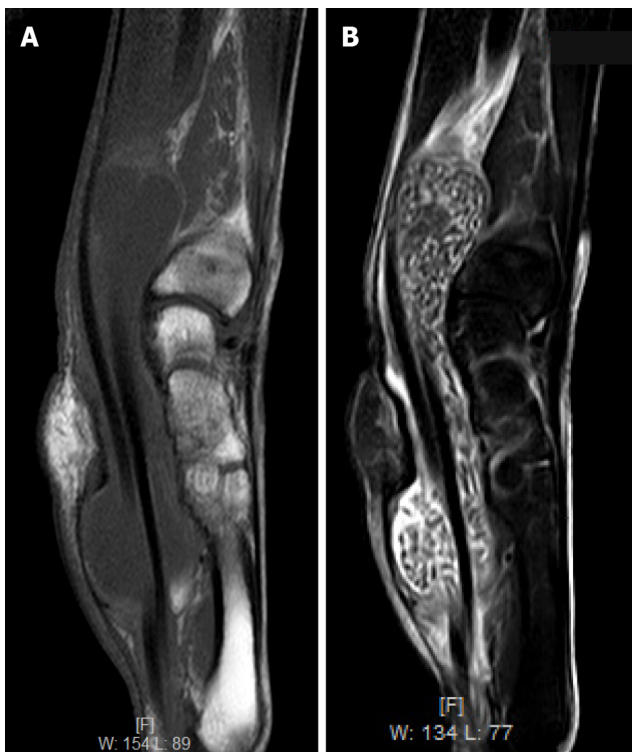
Rice bodies are loose fibrous particles of various sizes and shapes in the synovial bursa around a joint. They can float freely in joint fluid or attach to the synovium and are considered non-specific reactions and final products of chronic inflammation, hyperplasia, and secondary degeneration[2]. Most rice bodies are mainly composed of fibrin and a small amount of collagen; only a tiny part is wholly composed of fibrin. Some also contain neuraminidase and lipids on the surface[2,7]. The mechanism of rice body formation is still controversial. Cheung *et al*[8] found that rice bodies and the synovium contained equal proportions of types I and III collagen and type AB collagen and speculated that the formation of rice grains is related to synovial microinfarction. Berg *et al*[7] also observed that some rice bodies contain vascular tissue, indicating that they were previously connected to the synovium. Non-vascular-type rice bodies are likely to be further degraded from vascular-type ones. However, a study on rice bodies from a patient with JIA (Juvenile rheumatoid arthritis) showed that they contain a large number of synovial B-type cells, which are located in a matrix composed of collagen fibres, fibrin, and amorphous substances, and may be responsible for the secretion of collagen and fibrin[9]. Popert *et al*[3] subsequently proposed that rice bodies are formed independently of the synovium, and synovial B cells may play an essential role in this process. In summary, we consider that synovial microinfarction and synovial B cells work together to lead to the formation of rice bodies. After synovial microinfarction, sloughing of the infarcted tissue into the synovial fluid forms the initial rice bodies-synovial fragments that contain inflammatory cells, synovial B cells, and vascular tissue. The final rice bodies are gradually formed by the secretion of fibrin from synovial B cells and the deposition of fibrin in the synovial fluid.

In diagnostic imageology, the principal differential diagnoses of rice bodies are synovial chondromatosis and pigmented villonodular synovitis. Ultrasonography and MRI are the most effective diagnostic imaging modalities. On ultrasonography, rice granules appear as low-to-anechoic spherical intracapsular nodules but are almost indistinguishable from synovial chondromatosis[10]. On MRI, rice bodies show low signal T1 and T2 weighted sequences. In contrast, the nodules of synovial chondro-



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**Figure 1** Ultrasound-guided shows a cystic mass across palm and wrist, filled with scattered hypoechoic nodules. A: Palm; B: Wrist.



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**Figure 2** The mass was filled with rice-sized particles. A and B: T1 (A) weighted and other signal, T2 (B) weighted low signal, scattered in nodules.

matosis show a high signal on the T2-weighted sequence because of the presence of cartilage components. Meanwhile, the signal cavity of pigmented villous nodular synovitis reflects hemosiderin deposition and the lack of sensitivity artefacts of the gradient echo sequence, which can be distinguished from rice bodies[10].

However, the biggest challenge of wrist rice-body bursitis is to find the relevant cause-rheumatoid, tuberculosis, idiopathic tenosynovitis, or other diseases-which is important for postoperative drug treatment and patient prognostication. To solve this problem, we conducted a literature search in the PubMed, MEDLINE and CNKI (China National Knowledge Infrastructure) databases and used "rice body," "rice bodies," "rice body formation," and "wrist" as search terms. A total of 43 articles and 61 cases were included; their characteristics are summarized in Tables 1 and 2. Our case was similar to those in the literature, with a usual presentation. The affected population was mainly older adults, with an average age of 59.43 (range, 3 to 90) years. The male-to-female ratio was 1.54:1 (37/24). The presentation was insidious, most of them showed limited swelling and pain, only 23.0% had carpal tunnel symptoms, and the average duration was 18.03 (0.5-60) mo. The wrist flexor tendon sheath was mainly involved (95.1%, 58/61), and only three cases had extensor tendon sheath involvement. Our patient mainly showed gradual swelling and limited mobility of the left wrist. Physical examination revealed a cystic mass with unclear borders and slight tenderness. Of the 61 cases reviewed, 60 were managed

**Table 1** Selected literature review of rice bodies for comparison of outcomes reported

	Numbers	Percent
Gender		
Male	37	60.7
Female	24	39.3
Involved site		
Flexor tendon sheath	58	95.1
Extensor tendon sheath	3	4.90
Pathogenesis		
TB	21	34.4
NTM	15	24.6
Idiopathic tenosynovitis	19	31.1
Other reasons	6	9.8
ESR		
Normal	13	21.3
High	14	23.0
ND	34	55.7
CRP		
Normal	21	34.4
High	4	6.60
ND	36	59.0
CTS		
Negative	14	23.0
Positive	15	24.5
ND	32	52.5
Surgical treatment		
Yes	60	98.4
No	1	1.6
Recurrence		
Yes	10	16.4
No	35	57.4
ND	16	26.2

ND: Not described; CTS: Carpal tunnel syndrome; TB: Tuberculosis; NTM: Non-tuberculous mycobacteria; ESR: Erythrocyte sedimentation rate; CRP: C-reaction protein.

surgically, and aspiration alone was only done for 1 case[11]. Although its clinical significance is not clear, the inflammatory stimulating effect of rice bodies has been proven. Moreover, the removal of rice bodies was accompanied by clinical improvement and reduction of synovitis[12,13]. Our patient's symptoms also significantly improved after the operation. In addition, these patients need to receive corresponding chemotherapy postoperatively, including anti-tubercular and anti-rheumatoid treatment. Among these cases, the causes included tuberculosis (34.4%, 21/61), non-tuberculous mycobacteria (24.6%, 15/61), idiopathic tenosynovitis (31.1%, 19/61), and others (9.84%, 6/61). Mycobacteria, including tuberculous and non-tuberculous ones, were the main cause. Currently, it is recommended that isoniazid, pyrazinamide, ethambutol, and rifampicin be used for 2 mo followed by a bitherapy for 3-10 mo[14]. There were ten recurrences during the average follow-up period of 22.6 mo (3-78 mo), six of which were patients with non-tuberculous mycobacterial infections. Non-tuberculous mycobacteria are also called atypical mycobacteria; they are usually spread through direct contact with the

Table 2 Description of 57 rice bodies published cases

Ref.	Gender/ age (yr)	Location	Symptoms/duration	Laboratory testing	Histological findings	Pathogenesis	Surgical treatment	Duration- antibiotics	Outcome
Suso <i>et al</i> [18], 1988	M/41	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS	Elevated ESR of 51 mm/h	Tuberculous granuloma, langerhan's cells	TB	Yes	I + R-9 mo	No recurrence during 3 yr follow-up
Sugano <i>et al</i> [19], 2000	M/81	Flexor tendon sheath	Swelling/24 mo	Normal	giant cell, granuloma	IT	Yes	No	ND
Ohtani <i>et al</i> [6], 2002	F/54	Flexor tendon sheath	Pain, swelling, restricted ROM/12 mo	ND	Chronic nonspecific inflammation	SLE	Yes	No	No recurrence during 1 yr follow-up
Chau <i>et al</i> [20], 2003	M/50	Flexor tendon sheath	Swelling/13 mo	ND	Granuloma, giant cell	NTM	Yes	Anti-tuberculous chemotherapy	Recurrence 5 mo later and re-operation
	M/69	Flexor tendon sheath	Swelling/13 mo	ND	Granuloma, giant cell	NTM	Yes	Anti-tuberculous chemotherapy	No recurrence
	F/71	Flexor tendon sheath	Pain, swelling, CTS/13 mo	ND	Granuloma, giant cell	NTM	Yes	Anti-tuberculous chemotherapy	No recurrence
Lee <i>et al</i> [21], 2004	M/62	Flexor tendon sheath	Swelling, restricted ROM/30 mo	ND	Granuloma	NTM	Yes	Biaxin	Recurrence 2 yr later and re-operation
Huang <i>et al</i> [22], 2005	M/21	Flexor tendon sheath	Swelling/24 mo	ND	Granuloma, langerhan's cells	TB	Yes	I + R + E-9 mo	No recurrence during 9 mo follow-up
Tyllianakis <i>et al</i> [23], 2006	F/61	Flexor tendon sheath	Pain, swelling, restricted ROM/6 mo	Elevated ESR of 40 mm/h	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 1 yr follow-up
Ergun <i>et al</i> [24], 2008	M/32	Flexor tendon sheath	Swelling/4 mo	Elevated ESR of 37 mm/h	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 2 yr follow-up
Teo <i>et al</i> [25], 2008	F/49	Flexor tendon sheath	Pain, swelling, restricted ROM/7 mo	Elevated ESR of 36 mm/h	Caseous necrosis	TB	Yes	No	ND
Nagasawa <i>et al</i> [26], 2009	M/68	Flexor tendon sheath	Pain, swelling, restricted ROM/1 mo	Normal	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 5 yr follow-up
Sanal <i>et al</i> [27], 2009	M/22	Flexor tendon sheath	Pain, swelling/30 mo	ND	ND	NTM	Yes	Tetracycline	ND
Hung <i>et al</i> [28], 2011	F/56	Flexor tendon sheath	Pain, swelling/60 mo	Normal	Granuloma	TB	Yes	Anti-tuberculous chemotherapy for 3 mo	No recurrence during 1 yr follow-up
Iyengar <i>et al</i> [29], 2011	F/72	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/6 mo	Elevated ESR of 50 mm/h	Fibrinoid necrosis	Serum-negative RA	Yes	No	Recurrence 5 mo later and re-operation
Woon <i>et al</i> [30], 2011	M/87	Flexor tendon sheath	Swelling/14 mo	ND	Granuloma	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up
	M/70	Flexor tendon sheath	Swelling/14 months	ND	Granuloma	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up

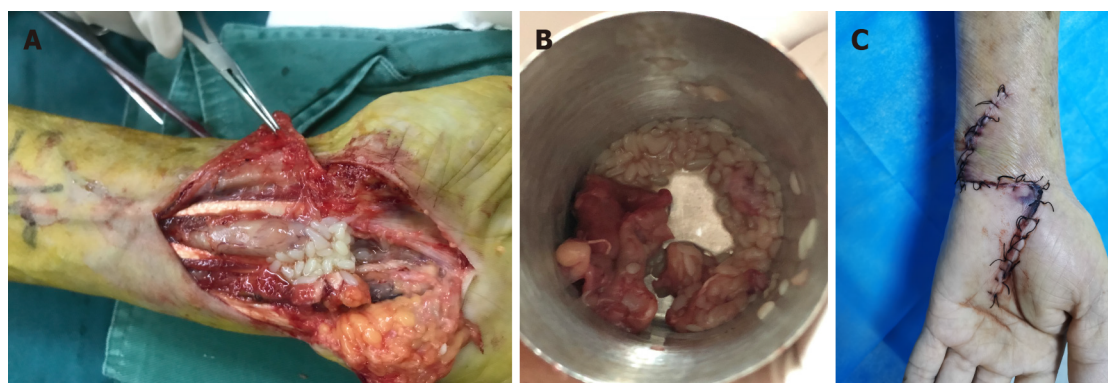
	F/30	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/14 mo	ND	Tuberculous granuloma, multinucleate giant cell	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up
	M/44	Flexor tendon sheath	Swelling/14 mo	ND	Epithelioid granuloma, multinucleate giant cell	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up
	F/24	Flexor tendon sheath	Swelling/14 mo	ND	Epithelioid granuloma, multinucleate giant cell, central caseation	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up
	F/70	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/14 mo	ND	Granuloma, central caseation	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 yr follow-up
Chavan <i>et al</i> [31], 2012	M/57	Flexor tendon sheath	Pain, swelling/36 mo	Elevated ESR of 45 mm/h	Granuloma, caseous necrosis	TB	Yes	Anti-tuberculous chemotherapy	ND
Catherine <i>et al</i> [32], 2012	M/51	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/24 mo	Normal	Granuloma	IT	Yes	No	No recurrence during 1 yr follow-up
Chan <i>et al</i> [33], 2014	M/76	Flexor tendon sheath	Pain, swelling, restricted ROM/12 mo	Elevated ESR of 48 mm/h and CRP of 22.5 mg/L	Chronic nonspecific inflammation	NTM	Yes	CAM + R + E-2 mo	No recurrence during 1.5 yr follow-up
De Groote <i>et al</i> [34], 2014	M/69	Flexor tendon sheath	Pain, swelling, restricted ROM	ND	ND	RA	Yes	No	ND
Hong <i>et al</i> [35], 2015	M/80	Flexor tendon sheath	Swelling/36 mo	Normal	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 1 yr follow-up
Weber <i>et al</i> [36], 2015	M/66	Flexor tendon sheath	Pain, swelling, restricted ROM/6 mo	Elevated CRP of 16 mg/L	Granuloma, giant cell	TB	Yes	I + R-7 mo, P + E-1 mo	No recurrence during 7 mo follow-up
Bayram <i>et al</i> [37], 2016	M/50	Flexor tendon sheath	Pain, swelling, restricted ROM/24 mo	Elevated ESR of 24 mm/h and CRP of 18 mg/L	Granuloma	TB	Yes	Anti-tuberculous chemotherapy for 12 mo	Recurrence 6 mo later and re-operation
Sbai <i>et al</i> [38], 2016	M/45	Extensor tendon sheath	Pain, swelling/6 mo	Elevated ESR of 50 mm/h	Giant cell, granuloma, caseous necrosis	TB	Yes	E + P-2 mo, I + R-8 mo	No recurrence during 2 yr follow-up
Sulaiman <i>et al</i> [39], 2016	F/71	Extensor tendon sheath	Swelling, restricted ROM/36 mo	ND	ND	NTM	Yes	Anti-tuberculous chemotherapy and azithromycin for 9 mo	No recurrence during 9 mo follow-up
Namkoong <i>et al</i> [40], 2016	M/76	Flexor tendon sheath	Tenderness, swelling/2 mo	ND	Granuloma	NTM	Yes	Anti-tuberculous chemotherapy	Recurrence 12 mo later and re-operation
Nabet <i>et al</i> [41], 2017	M/3	Flexor tendon sheath	pain, swelling, restricted ROM/2 mo	Normal	Chronic nonspecific inflammation	JIA	Yes	NSAID-14 mo	No recurrence during 2.5 yr follow-up
Yamamoto <i>et al</i> [42], 2017	M/70	Flexor tendon sheath	ND	ND	ND	IT	Yes	No	ND

	M/70	Flexor tendon sheath	ND	ND	Granuloma	NTM	Yes	Anti-tuberculous chemotherapy	Recurrence and re-operation of 2 times during 37 mo follow-up
	M/53	Flexor tendon sheath	ND	ND	Granuloma	TB	Yes	Anti-tuberculous chemotherapy	Recurrence 14 mo later and re-operation
	M/63	Flexor tendon sheath	ND	ND	Granuloma	TB	Yes	Anti-tuberculous chemotherapy for 12 mo	ND during 1 yr follow-up
	F/83	Flexor tendon sheath	ND	ND	Fibrin deposition	Candida	Yes	Anti-tuberculous chemotherapy and CAM	Recurrence 4 mo later and re-operation
	F/73	Flexor tendon sheath	ND	ND	Granuloma	NTM	Yes	F-8 mo	No recurrence during 8 mo follow-up
	M/90	Flexor tendon sheath	ND	ND	Granuloma	NTM	Yes	F + CAM + E	No recurrence during 6 mo follow-up
	F/77	Flexor tendon sheath	ND	ND	Granuloma	NTM	Yes	F + CAM + E	No recurrence during 1 yr follow-up
	F/80	Flexor tendon sheath	ND	ND	Granuloma	IT	Yes	F + CAM + E	No recurrence during 6 mo follow-up
Baidoo <i>et al</i> [43], 2018	F/65	Flexor tendon sheath	pain, swelling, restricted ROM, CTS/24 mo	Elevated ESR of 94 mm/h	Granuloma, langerhan's cells	TB	Yes	E + P-3 mo, I + R-9 mo	No recurrence during 1 yr follow-up
Celikyay <i>et al</i> [44], 2018	M/34	Flexor tendon sheath	ND	ND	Granuloma, caseous necrosis	TB	Yes	No	ND
Gupta <i>et al</i> [11], 2018	F/50	Flexor tendon sheath	Pain, swelling, restricted ROM/9 mo	Elevated ESR of 50 mm/h	ND	TB	No	Anti-tuberculous chemotherapy for 6 mo	No recurrence during 6 mo follow-up
Hashimoto <i>et al</i> [45], 2018	M/79	Flexor tendon sheath	Swelling/3 mo	ND	Caseous necrosis, langerhan's cells	TB	Yes	Anti-tuberculous chemotherapy for 2 mo	No recurrence during 1 yr follow-up
Mohammed Reda <i>et al</i> [46], 2018	M/69	Flexor tendon sheath	Pain, swelling, CTS/24 mo	Normal	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 1 yr follow-up
Saraya <i>et al</i> [47], 2018	F/74	Flexor tendon sheath	Swelling, restricted ROM/48 mo	Elevated ESR of 35 mm/h	Granuloma	NTM	Yes	R + E + CAM-6 mo	Recurrence 5 yr later and Remedication for 1.5 yr
Kurra <i>et al</i> [48], 2019	F/44	Extensor tendon sheath	Pain, swelling/12 mo	ND	Chronic nonspecific inflammation	Candida	Yes	No	ND
Matcuk <i>et al</i> [49], 2020	F/80	Flexor tendon sheath	Pain, swelling, restricted ROM/6 mo	Elevated ESR of 65 mm/h	Chronic nonspecific inflammation	NTM	Yes	Azithromycin+ E + moxifloxacin + linezolid	Recurrence 3 mo later and re-operation
Perjea <i>et al</i> [50], 2020	F/65	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/2 mo	Normal	Epithelioid granuloma, langerhan's	IT	Yes	No	No recurrence during 30.4



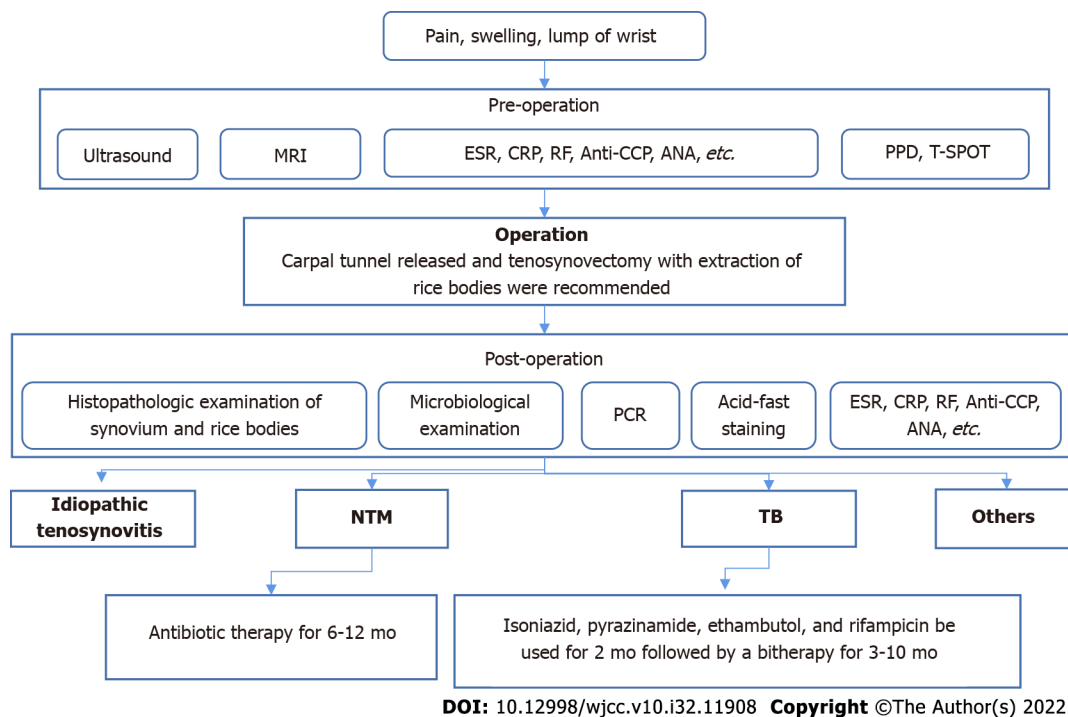
					cells				mo follow-up
	F/70	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/4 mo	Normal	Epithelioid granuloma, langerhan's cells	IT	Yes	No	No recurrence during 30.4 mo follow-up
	M/56	Flexor tendon sheath	Swelling/24 mo	Normal	Epithelioid granuloma, langerhan's cells	IT	Yes	No	No recurrence during 30.4 mo follow-up
	M/47	Flexor tendon sheath	Swelling/48 mo	Normal	Epithelioid granuloma, langerhan's cells	IT	Yes	No	No recurrence during 30.4 mo follow-up
Daoussis <i>et al</i> [51], 2021	F/63	Flexor tendon sheath	ND	ND	ND	NTM	Yes	Anti-tuberculous chemotherapy	ND
Tomala <i>et al</i> [52], 2021	F/86	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/24 mo	ND	Chronic nonspecific inflammation	IT	Yes	No	ND
Zeng <i>et al</i> [53], 2018	M/67	Flexor tendon sheath	Pain, swelling, restricted ROM/24 mo	Elevated CRP of 32.8 mg/L	Chronic nonspecific inflammation	IT	Yes	No	No recurrence
Li and Zhang <i>et al</i> [54], 2019	M/55	Flexor tendon sheath	Pain, swelling, restricted ROM/36 mo	ND	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 3 mo follow-up
Cheng <i>et al</i> [55], 2020	M/41	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/0.5 mo	Elevated ESR of 17 mm/h	ND	IT	Yes	No	ND
Liang <i>et al</i> [56], 2020	F/45	Flexor tendon sheath	Pain, swelling, restricted ROM, CTS/24 mo	Normal	Chronic nonspecific inflammation	IT	Yes	No	No recurrence during 1 yr follow-up
Liu <i>et al</i> [57], 2021	M/56	Flexor tendon sheath	Pain, swelling, CTS/24 mo	ND	Prominent acidophilic, amorphous necrotic areas	IT	Yes	No	ND
Korkmaz <i>et al</i> [58], 2021	M/42	Flexor tendon sheath	Pain, swelling/24 mo	Normal	Granulomatous lesions with central necrosis	TB	Yes	Anti-tuberculous chemotherapy	No recurrence during 4 mo follow-up

M/F: Male/female; ND: Not described; ROM: Range of movement; CTS: Carpal tunnel syndrome; TB: Tuberculosis; NTM: Nontuberculous mycobacteria; IT: Idiopathic tenosynovitis; JIA: Juvenile idiopathic arthritis; RA: Rheumatoid arthritis; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; I: Isoniazide; R: Rifampicin; E: Ethambutol; P: Pyrazinamide; NSAID: Nonsteroidal anti-inflammatory drug; CAM: Clarithromycin; F: Fluconazole.



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**Figure 3** The loose body of rice grain size (rice body) is seen during the operation. A: Rice bodies in the flexor tendon sheath; B: Bursa and rice body of the resected lesion; C: Wound recovery one week after surgery.



**Figure 4 Management algorithm of synovitis with rice bodies in the wrist.** MRI: Magnetic resonance imaging; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; RF: Rheumatoid factors; Anti-CCP: Anti-cyclic citrullinated peptide; ANA: Antinuclear antibody; PPD: Purified protein derivative; T-spot: T cell spot test; PCR: Polymerase chain reaction; NTM: Non-tuberculous mycobacteria; TB: Tuberculous.

environment (such as water and soil)[15]. The current anti-mycobacterial drugs mainly include the first-line drugs (clarithromycin, rifampicin, and levofloxacin) and the second-line drugs (streptomycin and ofloxacin). Atypical mycobacterial infections of the hand and wrist require antibiotic therapy for 6-12 mo[15-17]. Even so, their prognosis is not optimistic: there were 40.0% (6/15) cases of relapse in our review. Idiopathic tenosynovitis with rice bodies is non-association with rheumatic diseases, tuberculosis infection, or trauma; removing the rice granules can achieve symptom relief and a good prognosis. Our patient recovered well after the operation with no signs of recurrence. In addition, rice body formation is frequently seen in rheumatoid arthritis, which is more likely to involve the knee joint, not the wrist joint. Likewise, in our review, only one case was of rheumatoid arthritis.

Finally, we summarized a clinical management algorithm for wrist tenosynovitis with rice bodies (Figure 4). Carpal tunnel release and tenosynovectomy with the extraction of rice bodies were recommended. Before surgery, ultrasonography and MRI examination are necessary; they are the most important standard for diagnosis. In addition, we need to take note of the laboratory tests, especially erythrocyte sedimentation rate, C-reactive protein, and the biomarkers of rheumatoid arthritis-antinuclear antibody, anti-cyclic citrullinated peptide, and rheumatoid factor. Purified protein derivative and T-SPOT tests are important for screening for tuberculosis. If necessary, we also need to perform chest X-ray or lung computed tomography imaging examinations. We should perform further pathological examination of the synovium and the rice bodies, bacterial culture, polymerase chain reaction, and acid-fast staining postoperatively. Patients with mycobacterial infections must strictly be on standardized, long-term, combined drug treatment to avoid recurrence. Because there are few such cases and related studies, this management algorithm can only provide a certain reference and needs to be further improved.

## CONCLUSION

We reported a case of wrist idiopathic tenosynovitis with rice body formation and established a clinical management algorithm for wrist tenosynovitis with rice bodies, which provides a reference for clinical diagnosis and treatment. Rice body formation in the wrist is a sporadic disease that requires surgical management. Its symptoms are insidious, nonspecific, and difficult to identify. Idiopathic tenosynovitis and mycobacterial (tuberculosis or non-tuberculous) infections are the main causes, so, before a diagnosis of idiopathic tenosynovitis is made, we must exclude other causes, especially mycobacterial infections. We should especially take notice of non-tuberculous mycobacterial infections because they are difficult to treat and have poor prognoses and high recurrence rates. Therefore, anti-nontuberculous mycobacterial drug treatment is also a key issue that needs to be resolved.

# FOOTNOTES

**Author contributions:** Tian Y drafted the manuscript; Tian Y, Yi K and Wang KJ managed the case; Zhou HB revised the manuscript critically and the literature; all read and approved the final manuscript; all authors have read and approved the final manuscript.

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**Conflict-of-interest statement:** All the authors report no relevant conflicts of interest for this article.

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**Country/Territory of origin:** China

**ORCID number:** Yong Tian [0000-0001-7037-0873](#).

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