

Chronic Upper-Extremity Tenosynovitis due to Non-tuberculous Mycobacteria: A Systematic Review

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Background

Non-tuberculous mycobacteria (NTM) are ubiquitous environmental organisms and an increasingly recognised cause of extrapulmonary infection.

The distal upper limb is the commonest extrapulmonary soft-tissue site, reflecting exposure to trauma and to environmental reservoirs.

NTM tenosynovitis mimics tuberculous, pyogenic and inflammatory disease. Culture is slow, clinical suspicion is low, and the evidence base is confined to case reports and small series. Existing NTM guidance is either pulmonary-specific or extrapolated from *M. marinum* skin disease; none addresses tenosynovitis specifically.

OBJECTIVE

To characterise the clinical phenotype, diagnostic pathway, treatment and outcomes of culture-confirmed upper-extremity NTM tenosynovitis.

Methods

Design PRISMA-guided systematic review.

Sources PubMed, Embase, Scopus, Web of Science; 1990 to 2024.

Eligibility English-language case reports and series; culture-confirmed NTM tenosynovitis of the upper limb (fingers to shoulder).

Screening Independent duplicate screening in Rayyan.

Extraction Structured REDCap form

Synthesis Descriptive: median (IQR) and n (%). Every percentage uses the number of patients in whom that item was recorded.

PRISMA FLOW

Records identified → After duplicates → Studies included

974 → **390** → **136**

234 individual patients contributed from the 136 included studies.

Results

136 studies

105 case reports · 31 case series

234 patients

22 countries

Regional distribution of reporting

101 43.2%

East & Southeast Asia

79 33.8%

North America

52 22.2%

Europe

2 0.9%

Middle East & South Asia

Included studies by decade of publication

14

1990s

28

2000s

51

2010s

43

2020–24

69.7% of patients come from studies published in 2010 or later.

Host and exposure

n = 184 reported

Traumatic injury (any)

86 (46.7%)

Aquatic/environmental water

76 (41.3%)

Healthcare/procedural*

19 (10.3%)

No risk factor identified

23 (12.5%)

Median age (n = 227)

62 y (IQR 51–69)

Male (137/228)

60.1%

Pre-existing immunosuppression** (47/161)

29.2%

*Includes prior surgery (n=13), prior injection (n=6) and acupuncture (n=1).

**Immunosuppressive therapy or chemotherapy for another condition, solid organ transplant, HIV, or malignancy, each current or prior. Therapy given for the presenting illness is counted separately. Status not reported in 73/234 patients.

Anatomical involvement

n = 234

Fingers / thumb

147 (62.8%)

Hand / palm / dorsum

109 (46.6%)

Wrist

99 (42.3%)

Forearm

25 (10.7%)

Elbow / upper arm

9 (3.8%)

Presenting features (n = 199 reported)

Swelling

164 (82.4%)

Pain

121 (60.8%)

Restricted range of motion

68 (34.2%)

Sites are not mutually exclusive

Causative species

n = 234

M. marinum

66 (28.2%)

M. intracellulare

41 (17.5%)

M. avium complex (MAC)

20 (8.5%)

M. chelonae

16 (6.8%)

M. kansasii

15 (6.4%)

M. abscessus

8 (3.4%)

M. malmoense

8 (3.4%)

M. nonchromogenicum

7 (3.0%)

+ 20 further species, each ≤ 3% of patients · 9 unspciated NTM

A species was named in 223/234 patients (95%); 28 distinct species were reported.

The diagnostic gap

80.0%

of patients with the item recorded were **initially misdiagnosed (128/160)**

not recorded either way in a further 74 patients

Alternative diagnoses that were made first

Pyogenic / bacterial infection

38

Inflammatory arthritis (RA, gout, SLE)

25

Non-infectious tenosynovitis / trigger finger

22

Tuberculous tenosynovitis

12

Carpal tunnel syndrome

11

Tumour / mass / cyst

5

RA, rheumatoid arthritis; SLE, systemic lupus erythematosus.

Delay, imaging and diagnostic yield

Symptom onset → presentation at index centre
IQR 3–12 · reported in 127/234

6 mo

Modality that suspected or confirmed tenosynovitis
denominator 131 patients in whom the modality was reported

MRI

76 (58.0%)

Surgical exploration

54 (41.2%)

Ultrasound

15 (11.5%)

Diagnostic yield of the tests performed
positive results as a share of patients in whom the test was done

Mycobacterial tissue culture

115/140 (82%)

Histopathology / biopsy

100/154 (65%)

AFB smear

64/155 (41%)

AFB smear was negative in six of ten patients in whom it was sent; a negative smear does not exclude the diagnosis.

AFB, acid-fast bacilli; MRI, magnetic resonance imaging.

How long is NTM tenosynovitis actually treated?

Drug-level durations were extracted from 683 antimycobacterial courses across 217 patients; a total regimen length could be derived for 140/234 patients (59.8%).

Distribution of total regimen length

<3

13 (9.3%)

3–<6

22 (15.7%)

6–<9

45 (32.1%)

9–<12

19 (13.6%)

12–<18

33 (23.6%)

≥18

8 (5.7%)

months of antimycobacterial therapy

Regimen length by organism

median (dot) with interquartile range (bar)

M. marinum
n = 38

6

RGM
n = 17

6

M. terrae complex
n = 13

6

MAC
n = 39

9

M. kansasii
n = 11

12

RGM, rapidly growing mycobacteria; MAC, *M. avium* complex

WHAT THIS SHOWS

6 months
median total regimen length

25.0%
treated for less than 6 months

29.3%
treated for 12 months or longer

Reported regimens spanned a wide range and separated only partly by organism, with no consistent stopping point across the literature.

A regimen length could not be derived for 94 of 234 patients, so these figures describe the reported subset only.

Treatment and outcomes

93.6%

Surgery performed

219/234

51.7%

Two or more operations

109/211

94.0%

Antimycobacterial therapy

220/234

57.3%

Three or more agents

130/227

2.6

Mean no. of antimycobacterial agents

n = 227

Commonest agents: Ethambutol, Clarithromycin, Rifampin.

Outcomes denominator 203 patients with an outcome recorded

Favourable outcome

Complete clinical cure

140 (69.0%)

Significant improvement

60 (29.6%)

Any adverse outcome

Functional limitation

81 (39.9%)

Some improvement

24 (11.8%)

Functional limitation

46 (22.7%)

Recurrence

26 (12.8%)

Amputation

10 (4.9%)

Mortality

5 (2.5%)

Favourable = complete clinical cure or significant improvement. Any adverse = functional limitation, recurrence, amputation or death.

Conclusions

- Four in five patients with the item recorded were misdiagnosed before the correct diagnosis was made, and symptoms had been present for a median of 6 months before presentation at the index centre.
- A negative AFB smear is common and uninformative. Mycobacterial tissue culture and histopathology carry the diagnosis and should be sent early in any chronic or atypical tenosynovitis. MRI was the modality that most often suspected or confirmed tenosynovitis.
- Treatment was aggressive but unstandardised: 93.6% underwent surgery, half required more than one operation, and a mean of 2.6 antimycobacterial agents was used. Reported regimen length varied widely with no consistent stopping point.
- Outcomes were favourable in 69.0% of patients with an outcome recorded, but 22.7% had functional limitation, recurrence, amputation or death.
- Optimal treatment duration remains the principal unanswered question. A prospective registry with a defined stop rule, stratified by organism, would address what retrospective reports cannot.

LIMITATIONS

Case-report and case-series evidence only; reporting bias, no comparator group, and item-level missingness. All estimates are descriptive, denominators are stated throughout, and no causal inference is drawn.



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