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EARLY DEBRIDEMENT IMPROVES OUTCOME IN MANAGING ANKLE TUBERCULOSIS: A SYSTEMATIC REVIEW

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Abstract

Background: *Around 16% of the 7.5 million incident cases worldwide in 2019 were extrapulmonary tuberculosis (EPTB) cases. Only 1–4% of all occurrences of osteoarticular TB occur in patients with EPTB, a highly rare condition that causes a kind of ankle or foot arthritis. Chronic synovitis is the predominant symptom of early-stage ankle TB. Although certain circumstances necessitate surgical intervention, conservative therapy is still vital. This study aims to determine whether early surgery for ankle TB impacts the results.*

Methods: *A systematic search strategy was conducted across several electronic reference databases (PubMed, Cochrane Library, ProQuest) and included articles published between 2017–2022. Duplicate publications, review articles, and incomplete articles were excluded.*

Result: *Database search yielded a total of 86 articles, which were systematically eliminated, leaving 5 relevant articles. Analyzed articles showed that combining chemotherapy and surgery effectively manages ankle tuberculosis.*

Conclusion: *Early debridement is advised to enhance ankle TB management results. A combination of chemotherapy, surgery, and non-weight bearing is the effective treatment method.*

INTRODUCTION

A prominent global source of disease and mortality in humans is tuberculosis (TB).[1] PTB, or pulmonary tuberculosis, is the most common kind of TB caused by Mycobacterium tuberculosis complex organisms (MTBC), however extrapulmonary tuberculosis (EPTB) can also occur.[2] Meningitis, lymphadenitis, ophthalmic, oral, pleuritis, pericarditis, peritonitis, musculoskeletal, abdominal, genitourinary, and miliary types of tuberculosis are common clinical presentations of EPTB. Around 16% of the 7.5 million incident cases worldwide in 2019 were

EPTB cases. EPTB can be primary (at the site of initial infection) or secondary (disseminated). Hematogenous or lymphatic spread of bacteria from the primary organ, reactivation of latent TB (LTBI), consumption of infected sputum, or local spread from nearby organs are the usual causes of secondary (disseminated) EPTB. It is difficult to identify and treat EPTB.[3,4]

Only 1–4% of all occurrences of osteoarticular TB occur in patients with EPTB, a highly rare condition that causes a kind of ankle or foot arthritis. Chronic synovitis is the predominant symptom of early-stage ankle TB.[5,6] It is still challenging to establish the diagnosis even though ankle arthrocentesis, bacterial culture, and histological inspection have all been carried out. Due to its unusual clinical appearance, widespread use of antibiotics, and lack of specificity in diagnosis, TB infection in a joint is particularly difficult to diagnose, and misinterpretation is frequent. If left untreated, ankle TB may have a bad prognosis, and a delay in diagnosis might cause greater local damage and functional impairment. Treatment for ankle TB has received relatively few reports, and
arthroscopic therapy for early-stage ankle TB has received even fewer.[7,8]

Although certain circumstances necessitate surgical intervention, conservative therapy is still vital. This systematic review aims to determine whether early surgery for ankle TB impacts the results. Additionally, we assess the value of ankle TB laboratory testing.

Methods and Material

This study was a systematic review, with a systematic literature search on the PubMed, Cochrane Database of Systematic Reviews, Google Scholar, and Directory of Open Access Journals (DOAJ) databases. The search was conducted in English, using keywords related to early debridement outcome in managing ankle tuberculosis, including early debridement, ankle tuberculosis, and the outcome of ankle tuberculosis therapy. The search was performed with a combination of some or all of these keywords, both in the title and abstract of the article. Search is limited to publications in the period December 2017 to December 2022.

Study designs included in this study were before-and-after studies with or without controls, retrospective and prospective cohort studies, interrupted time series analysis, case report, and randomized controlled trials. Studies on interventions in adult and pediatric patients were included if there were complete data on pediatric patients. Literature review articles, letters, notes, and conference abstracts were excluded. Data were extracted using a standardized table that includes the name of the authors, year of publication, study design, study setting, number of subjects, the treatment used, and the key findings of each study. After searching and filtering articles based on search keywords, article analysis was done manually by considering the titles and abstract's relevance. Articles that meet the inclusion criteria and exclusion criteria are not clear will be analyzed further by reading the full text of the article and entering the relevant information in the data extraction table. The results obtained in the included studies will be compared with those of other systematic reviews and literature.

Result

Study Selection

A systematic search was carried out and yielded 78 articles (Fig. 1). A total of 54 articles remained, after rechecking and excluding duplicated articles. A total of 23 articles were eligible for this study. Then, after a comprehensive review of the full-text articles, the remaining 5 articles were included in this study. The database search results are described in Table 1 and Figure 1. The summary of each included study is described in Table 2.

Included Articles

Of the 5 included studies, 4 were case reports and 1 was a retrospective cohort study.

Populations of Included Articles

A total of 301 patients were involved in the 5 included studies. Most of the studies involved pediatric of age, and there was 1 retrospective study that wasn't stated subject's ages. All studies were single-centre studies.

Figure 1. Systematic Search

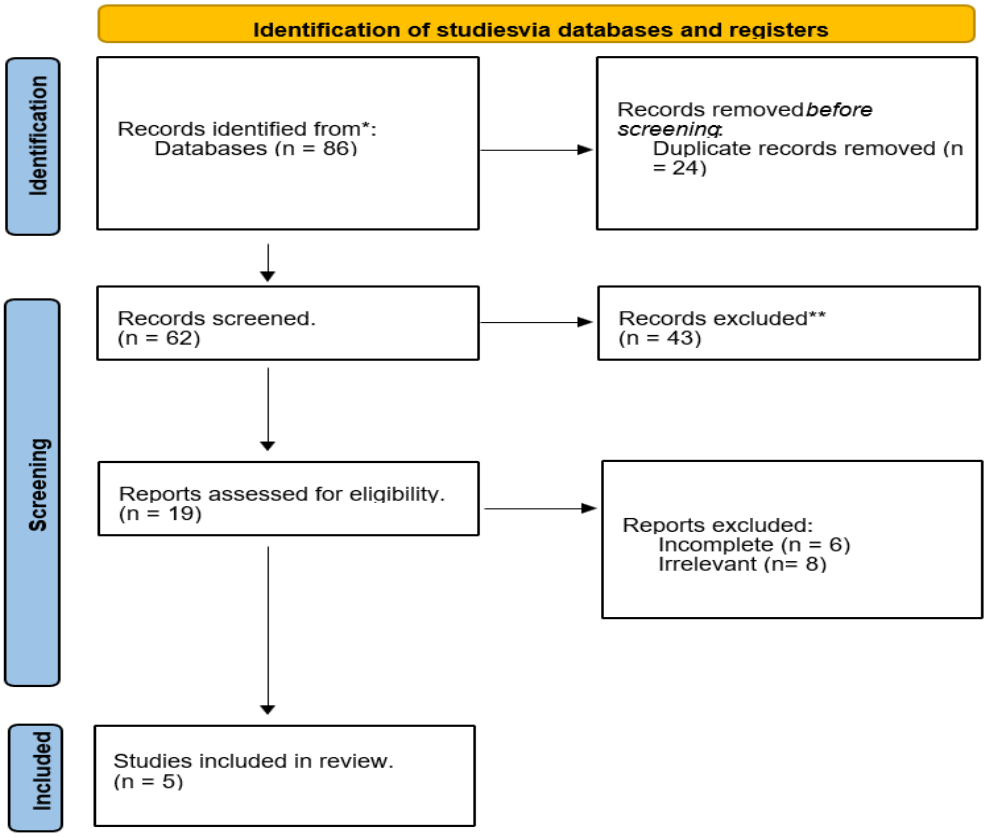

Table 1. Subject Demographic Data in Included studies.

Study/Year	Place	Study design	Level of evidence	Subject (person)	Age (year)	Time from Symptom to Surgery (Months)
Basnayake et al/2021[9]	Sri Lanka	Case Report	Level IV	1	44	15
Duan et al/2019[10]	China	Case Report	Level IV	15	37,5 (870)	16 (3-36)
Pereira et al/2017[11]	India	Case Report	Level IV	1	30	12
Yadav et al/2020[12]	India	Case Report	Level IV	1	21	5
Wenqiang et al/2020[13]	China	Cohort Retrospective	Level IV	10	56,7 (3381)	2-48

Table 2. Laboratory, Radiographic, and Histo]logical Findings

Study/Year	History of Lung TB	Lab Finding	Radiographic Finding	Histology Finding	Culture
Basnayake et al/2021[9]		Positive Rheumatoid factor (RF), anti-cyclic citrullinated peptide antibody (anti-CCP), and antinuclear antibody (ANA) was negative.	X-ray: irregular outline at ankle mortise and loss of joint space with an irregular articular outline at subtalar joint. MRI: a marked loss of articular cartilage with associated bone marrow oedema in the subarticular region of distal tibia extending to distal metaphyseal region	Granulomatous type of inflammation without any Langhans type of giant cells or associated caseating granulomas.	Positive
Duan et al/2019[10]	Positive (n=5) Negative (n=10)	Elevated ESR and CRP	Effusion in the ankle articular cavity, bone edema of distal radius and talus.	Not reported	Positive (n=13)
Pereira et al/2017[11]	Negative	ESR 30 mm/hour	X-ray showed normal features. MRI: lesion over tibiotalar joint, joint effusion and cartilage destruction of ankle joint	Not reported	Positive
Yadav et al/2020[12]	Positive	Positive CRP, raised ESR with lymphocytosis.	X-ray: a lytic lesion in calcaneus. MRI: hypointense and hyper-intense lesion on T1- and T2-weighted.	Granuloma with Caseous necrosis	Not reported
Wenqiang et al/2020[13]	Positive (n=5) Negative (n=5)	Elevated ESR and CRP	Preoperative radiographs showing the destructive talus and distal tibia.	Granulomatous and inflammation pyogenic inflammation,	Positive

Table 3. Treatment and Clinical Outcome of Ankle Tuberculosis

Study/Year	Surgical Approach	Post-Operative Treatment	TB Drug Treatment	Subjective Clinical Outcome	Clinical Outcome Score	Follow Up (Months)
Basnayake et al/2021[9]	Synovectomy	Non-weightbearing for the initial 2 months, followed by gradual mobilisation.	RIPE 2 months followed by 7 months of RI	Pain and swelling improved	-	12
Duan et al/2019[10]	Arthroscopy debridement	High protein diet, Weight-bearing exercise in 2 weeks post-operation	RIPE 3 months, Ibuprofen, Rifampicin and Pyrazinamide for another 3 months, Isoniazid and Rifampicin 12 months	Full ROM	VAS score 1.0 ± 0.5 AOFAS score 85 ± 7	24
Pereira et al/2017[11]	Arthroscopy debridement	Non-weight bearing for 1 month and ankle joint mobilization.	RIPE 9 months	Almost full ROM with terminal restriction of dorsiflexion. Joint pain on weightbearing for long duration	-	24
Yadav et al/2020[12]	Arthroscopy debridement	Nil weight-bearing and foot was protected in a below-knee cast for 4 weeks. Partial weight-bearing was allowed at 4 weeks and progressed to full weight bearing at 12 weeks.	Isoniazid, rifampicin, pyrazinamide, and ethambutol for the first 3 months followed by isoniazid, rifampicin, and ethambutol for 9 months.	X-ray of the right ankle showing healed lesion	-	18
Wenqiang et al/2020[13]	3-stage Masquelet technique (n=5) 1 stage operation (n=5)	Nil weight-bearing and foot	A minimum of 9-12 - months of multidrug antituberculosis treatment		AOFAS score 6-57 81.8 ± 6.3 VAS pain score 1.0 ± 0.7 (range, 0-2)	

Discussion

Although pulmonary TB is the most prevalent type of presentation, extrapulmonary TB (EPTB), which affects the genitourinary tract, intestine, skeletal system, meninges, lymph nodes, and serous membranes, is a major cause of morbidity and mortality.[4] Around 2.2-4.7% of all TB cases and 10-15% of EPTB cases are caused by skeletal system involvement (osteoarticular TB). Only 1–4% of all occurrences of osteoarticular TB occur in patients with EPTB, a highly rare condition that causes a kind of ankle or foot arthritis.[2,3]

Since ankle TB is typically discovered late, diagnosis is challenging. The most typical indications and symptoms of ankle-foot TB are pain, stiffness, edema, and swelling with fullness around the malleoli and the point where the achilles tendon inserts.[14,15] The typical history of lung TB may not be present, and traditional symptoms like fever, night sweats, and weight loss may not be present either. Almost all studies disclosed histories of pulmonary TB in their case reports, except one study.[16,17] Clinicians must be aware of this illness since it can frequently be difficult to diagnose, which delays treatment and raises the risk of subsequent infections.[18] Early biopsies and PCR-GeneXpert were recommended by Pereira et al. in addition to the standard examination.[11]

The prognosis of joint TB is greatly influenced by early diagnosis and therapy.[19] An early diagnosis of ankle TB can be made with the use of an MRI scan. High signal of edema is found in the distal tibia and the talus, and it can reveal distinct vision of effusion in the articular cavity and occasionally with low-signal focal tissue (kissing sign). The signal dispersion range of TB under MRI is often larger than that of osteoarthritis.[20] The soft tissue abscess close to the ankle and even in the subtalar joint can be easily seen on an MRI as well.[11]

For foot and ankle TB, anti-tubercular chemotherapy is the primary therapy.[8,21,22] The course of treatment should begin as soon as feasible and last for at least a year. Surgical procedures are required in situations worsened by joint abscesses, tenosynovitis, and bone and joint architecture loss.[23] Early debridement improves prognosis, penetrates anti-tuberculous therapy, and lowers bacterial burden. Arthroscopy is used more frequently than open surgery because it is linked to lower morbidity, less postoperative discomfort, and quicker recovery.[6,7] When ankle arthrocentesis cannot confirm a case, arthroscopy is a valuable diagnostic tool. In addition, the sample volume obtained by arthroscopy was also bigger, which was extremely helpful for bacterial culture and other associated studies. Early debridement is advised to enhance ankle TB management results. An effective treatment method for ankle TB now available is a combination of chemotherapy, surgery, and non-weight bearing.[10–12]

Wenqiang et al showed that bacteria may quickly adhere to tissue and disseminate because to the intricate structure of the foot and ankle, meaning that even when using the two-stage Masquelet approach, debridement is frequently incomplete. In the initial stage, all necrotic tissue, inflammatory granulation tissue, and soft tissue with sinus tract must be carefully removed until only healthy bone and soft tissue with active blood flow are left.[13] The selection of antibiotic and antituberculosis medications for the antibiotic cement spacer is unquestionably significant in the second stage. Regarding the third stage's option for bone reconstruction surgery, nearby bone tissue and joints are frequently damaged by TB, mixed infections in the foot and ankle, arthrodesis, and concurrent bone defect repair.24,25

Conclusion

Early diagnosis and intervention result in more positive results with no recurrences. Early debridement is advised to enhance ankle TB management results. An effective treatment method for ankle TB now available is a combination of chemotherapy, surgery, and non-weight bearing.

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