



Musculoskeletal Tuberculosis in a Large Healthcare System

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Background

- Musculoskeletal tuberculosis (TB) is the third most common cause of extrapulmonary TB in the United States (US) after pleural and lymphatic disease, accounting for approximately 10% of all extrapulmonary TB cases and 2-3% of all TB cases. Diagnosis is often delayed because of a failure to consider the diagnosis. Bone involvement typically results from hematogenous spread of *M. tuberculosis* after primary infection, making osteomyelitis and arthritis the most common skeletal lesions [1].
- TB myositis may occur secondarily from contiguous bone infections or a draining sinus tract, but muscles are rarely primarily infected [2].
- Vertebral involvement is most common [1], followed by the hip and knee [3].
- HIV infection is associated with increased incidence of extrapulmonary TB. However, musculoskeletal TB is not necessarily increased in HIV positive patients [4].
- The purpose of this study was to examine the incidence and associated co-morbidities of musculoskeletal TB at Atrium Health, a large non-profit health system in the Southeastern US.

Methods

- This was a retrospective review of 241 documented TB infections within Atrium Health between 2008 and 2019 with the goal being to better understand characteristics of musculoskeletal TB infections. Four patients were removed after results were determined to be incorrect or false positives.
- Of the remaining 237 patients, 94 were found to have extrapulmonary tuberculosis infection. Twelve of those had a musculoskeletal infection defined as involvement of bone, joint space, or muscle.
- The primary objective of the study was to compare local incidence of musculoskeletal tuberculosis infection with that reported in the literature.
- We also assessed patient comorbidities including concomitant pulmonary involvement, diabetes, ESRD, rheumatologic conditions, and disease requiring surgery in an effort to better understand musculoskeletal TB manifestations in our health system.

Results

- 237 patients identified with confirmed TB infection from 2008-2019 of which 12 (5%) were found to have musculoskeletal manifestations defined as involvement of bone, joint space, or muscle.
- Table 1 details the patient demographics, showing the median age was 31.5 (20, 43), male predominance (58%), 58% Asian and 100% not Hispanic or Latino. Three (25%) had concomitant pulmonary disease, a smaller proportion than the extrapulmonary population (42/94, 45%).
- Comorbidities were evaluated: of which only 50% were tested for HIV and all were negative, 2 (17%) had diabetes and 1 (8%) was immunosuppressed. Surgical intervention was necessary in 5 (42%) patients for both diagnostic and therapeutic interventions.
- Site involvement is delineated further in Table 2, that shows vertebral involvement (8, 67%) as the most common musculoskeletal site, followed by iliopsoas muscle (3, 25%), sternum/ribs (3, 25%), pelvis (2, 17%), wrist/hand (2, 17%) and total knee arthroplasty (1, 8%).
- Table 3 details the most common vertebral sites, thoracic (7, 88%) being the most common, and cervical (2, 25%) and sacral (2, 25%) being the least common. Five patients (63%) did have multiple site involvement.

Patient Demographics

Table 1

Characteristic	Musculoskeletal TB Cases	
Total (n)	12	
Median Age (n, range)	31.5	20,43
Male (n, %)	7	58%
Race (n, %)		
Caucasian	1	8%
African American	4	33%
Asian	7	58%
Other	0	0%
Ethnicity (n, %)		
Not Hispanic or Latino	12	100%
Hispanic or Latino	0	0%
Birthplace (n, %)		
United States	6	50%
Foreign Born	6	50%
HIV Status (n, %)		
Positive	0	0%
Negative	6	50%
Unknown	6	50%
Concomitant Pulmonary Disease	3	25%
Diabetes (n, %)¹	2	17%
Immunosuppression (n, %)¹	1	8%
ESRD (n, %)¹	0	0%
Rheumatological Disease (n, %)¹	0	0%
Required Surgical Intervention (n, %)¹	5	42%

¹One patient with unknown information regarding diabetes, immunosuppression, ESRD, Rheumatological Disease, and Required Surgical Intervention

Musculoskeletal Sites

Table 2

Musculoskeletal Site	(n, %)	
	n=12	
Vertebral	8	67%
Iliopsoas Muscle	3	25%
Sternum/Ribs	3	25%
Pelvis	2	17%
Wrist/Hand	2	17%
Total Knee Arthroplasty	1	8%

Vertebral Sites

Table 3

Vertebral Site	(n, %)	
	n=8	
Cervical	2	25%
Thoracic	7	88%
Lumbar	4	50%
Sacrum	2	25%
Multiple	5	63%

Conclusions and Future Directions

- The incidence of musculoskeletal tuberculosis at Atrium Health facilities was 5% of all cases, slightly higher than the national average of 2-3% in the United States [1].
- Vertebral manifestations account for 67% of the cases, consistent with the most common manifestation of musculoskeletal TB in the US [1].
- Six of the 12 cases were tested for HIV, and were negative; however, we do not know if the other cases were tested at the health department, further reinforcing the need for more consistent HIV testing within our health system. As our data is incomplete, it is difficult to see any correlation; however it has previously been seen that HIV seropositivity does not necessarily increase risk of musculoskeletal TB [4].
- Very few had other co-morbid conditions including diabetes, use of immunosuppressive medications, ESRD status, or rheumatologic disease.
- Forty-two percent required surgical intervention due to complications of infection or pre-operative suspicion for malignancy rather than TB infection itself, consistent with practice guidelines that have shown no additional benefit has been seen when treated with surgical debridement and chemotherapy compared to chemotherapy alone [5].
- Due to the higher rate of musculoskeletal TB as compared to the national average, further investigation of patient time to presentation and adherence to therapy in the Atrium Health system deserves further investigation and analyses, as earlier recognition may prevent musculoskeletal spread.

Resources

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