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Mini Review

Brief Review of Clinical Morphological and Therapeutic Profiles of the Hand and Wrist Osteoarticular Tuberculosis

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Abstract

Tuberculosis (TB) is an endemic disease known since the Paleolithic in animal species, even before it affected humans. Today it presents serious concerns for global health, being the second most infectious disease after malaria, causing the most deaths worldwide despite the remarkable progress made in recent decades in terms of screening, monitoring and therapeutic strategy. In 2017 there were 1.8 million deaths worldwide from tuberculosis, but we are witnessing a very topical reappearance [1,2]. There are several factors that contribute today to maintaining this status of global tuberculosis health problem with its recurrence in developed countries. These are: immigration from regions where the disease is endemic; increasing number of elderly people with debilitating diseases; increasing the number of immuno-compromised patients; the appearance of mycobacterium-multidrug-resistant strains; increasing drug, alcohol, unemployment, poverty and malnutrition abuse; the HIV epidemic, tuberculosis being often the first manifestation of HIV infection; Extrapulmonary tuberculosis (TBEP) is more common in Asian and African countries, having today a fantastic increase from 7.6% in 1970 to 35 - 40% [3-5].

Osteoarticular tuberculosis (OATB) increased in incidence in 35% of extrapulmonary cases, especially in underdeveloped countries [6-8].

Two basic types of disease patterns could be present: the granular type (most often in adults) and the Cassius exudative type (most often in children), one of which being predominant. The algorithm of diagnosis includes several steps of which detection of *Mycobacterium tuberculosis* (Mt) is the gold standard. The actual treatment is primarily medical, consisting of antituberculosis chemotherapy (ATT), surgical intervention being warranted only for selected cases. It is essential that clinicians know and refresh their knowledge about the manifestation of OATB [9].

Keywords: Osteoarticular Tuberculosis; Bone and Joint Tuberculosis; Extrapulmonary Tuberculosis; Hand and Wrist

Introduction

OATB was identified 9,000 years ago at the spine level in Egyptian mummies, and is today a rare form of TB [5,10-12]. Wrist and hand tuberculosis is becoming a fairly common form of the disease today if we consider the difficulty of reporting and underdiagnosis today. Risk factors or predisposers of OATB are: increasing number of people with suppression of the immune system in chronic immuno-suppressive diseases, immuno-suppressive therapy and patients with HIV and AIDS:

- The development of resistant and multi-resistant *Mycobacterium tuberculosis* strains;
- Increased exposure of health professionals to patients positive for TB;
- Multiparous or lactation women, color population, drug abuse and alcohol;
- Increasing the number of patients with diabetes mellitus, chronic kidney failure, chronic obstructive bronchopneumopathy (BPOC), hepatic cirrhosis, lympho-proliferative diseases;
- The older population is increasing;
- The decline in the public health network's interest for controlling TB [5];
- Immigration from countries with high tuberculosis prevalence (Africa, Asia);
- Socio-economic factors such as poverty, homeless people, protein malnutrition, poor hygiene, housing congestion [5].

The OATB pathogenesis of the hand and wrist is most often hematogenous, but also lymphatic, as well as by direct invasion or by lesion contiguity.

The diagnosis is made epidemiologically (great attention to the origin and passage through different countries of citizens and their contacts with patients), clinical, radiological, CT scan and MRI.

Clinically tuberculosis of the hand and wrist causes local symptoms with pain, limited and difficult movements, joint stiffness, lymphadenopathy, cold abscesses and fistulization.

Paraclinic tuberculin skin test (TST), enzyme linked immunosorbent assay (ELISA), interferon gamma release assay (IGRA).

Plane radiography denotes soft tissue edema, osteopenia, osteoporosis, osteolysis with a characteristic radiological image "in the mirror", subchondral erosion, narrowing of the subchondral space, cysts, appearance of "spina ventosa".

MRI accurately delineates the involvement of soft tissues and lesions associated with adjacent bones and joints [13].

CT scan helps detect the involvement of bone and joint destruction. Tomography has a special role in guiding percutaneous biopsy and drainage of abscesses [5].

Detection of Mt by:

- Ziehl-Neelsen and immunohistochemistry stains on smears and histological slides.
- Culture of Mt from bone/synovial/soft tissue/draining sinuses, synovial fluid although, in some cases, cultures may reveal colonizing bacteria or fungi that are erroneously assumed to be causative pathogen.
- Polymerase chain reaction (PCR) [5,9].

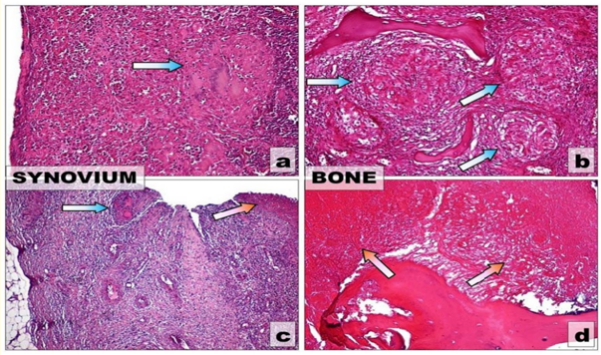

Figure 1: Main histological patterns of OATB. UP: Granular type-Giant Langhans cell granulomas (blue arrows) Placed (a) in the synovium, (b) in the cancellous bone, H-E stain, x10; DOWN: Caseous necrosis (red arrows) (a) in the synovium x4 (b) in the compact bone, x10, H-E stain.

The material used for Mt detection could be:

- Synovial fluid or purulent infected material obtained by aspiration or fine needle aspiration biopsy;
- Bone/synovial/soft tissue obtained by biopsy.

The traditional criteria for diagnosing TB are:

- Chest radiology.

Detection of acid-fast bacilli by Ziehl-Neelsen stain on microscopy and culture. Microscopy is the most rapid diagnostic tool, but it is very insensitive, yielding only 10 - 30% of culture-positive samples [9,14-16].

Biopsy may be required to clear up diagnostic confusion, being the most definitive test for tuberculous arthritis. It must be per-

formed in cases in which microbiology test gives negative results, the demonstration of caseating granulomas on histological examination being of significant value. Culture is the gold standard for the diagnosis of osseous TB in the culture of *Mycobacteria* from bone tissue or synovial fluid, but may take four weeks to obtain conclusive results even with enhanced culture systems.

Newer methods of diagnosis, especially the polymerase chain reaction (PCR) on obtaining joint tissue biopsies, appears promising in the early diagnosis of tuberculous arthritis.

Drug susceptibility testing of isolates is essential. In the respect, the Xpert MTB/RIF assay is an automated nucleic acid amplification test that can simultaneously identify Mt and rifampin resistance; it has been shown to be fast and accurate in diagnosing musculoskeletal TB in children and adults [5,17].

Differential diagnosis

The differential diagnosis of skeletal TB includes:

- Subacute or chronic infection due to pathogens or diseases such as (depending upon epidemiologic factors):
    - *Staphylococcus aureus* osteomyelitis;
    - Brucellosis;
    - Melioidosis;
    - Actinomycosis;
    - Candidiasis;
    - Histoplasmosis;
- Metastatic malignancy (especially multifocal bone involvement).
- Malignancy (metastases, multiple myeloma, lymphoma) [5,9].

Treatment

There is medical, surgical and auxiliary treatment.

Medical treatment

Under strictly survayed treatment (SST) associated with C, D and B vitamin group over a period of twelve months. If during the last three months the results are positive the 3 drugs based therapy can be introduced in SST, also associated with C, D and B vitamin group, remaining on 3 drugs for another minimum three months: Hydrazide - 300 mg/day (5 - 10 mg/day), Rifampicin - 600 mg/day (10 mg/kg/day), Pyrazinamide - 1,5 g/day (25 - 30 mg/kg/day), Ethambutol - 1 g/day (15 mg/kg/day) or Streptomycin - 1 g/day, if the results treatment based on clinical, radiography and CT scan investigations allow it.

Surgical treatment

Involves surgical release by rehabilitation in the carpal tunnel, surgical arthrodesis of the fist with or without metal fixation, associated with local treatment with tuberculostatic drug filling or bone, after lesion cleansing and fixation in a functional position [9,18].

Auxiliary treatment

Plaster immobilization to prevent deformities of infected extremities [19,20]. In our opinion, the interphalangeal joint prosthesis becomes insufficient with all the inactivity of the disease at a distance of at least 10 years due to its lack of effectiveness. Surgical indication is required in the absence of drug treatment results after 4 months of treatment [21,22].

Conclusion

The incidence of the tuberculosis process evolves differently depending on the location of the tuberculosis in the skeleton. The articular forms such as OTB of the hand and the wrist have a temporal evolution with an oscillating tendency with an ascending general trend in the middle age range and of the young adult, especially in the male sex.

The suspicion of the etiological diagnosis at the clinical examination is generally high when TB was not suspected, the suspicion was directed towards arthritic diseases with immunological determinism in the hand, or neoplasms.

The granulomatous reaction is of poorly differentiated or even disorganized type with incipient hyperactive lesions, without necrosis.

We insist on the study of particular morphological profiles depending on the affected tissue, so the morphological picture can provide indications of the aggressiveness of *Mycobacterium tuberculosis*, the quality of the host's immune response or the temporal evolution of lesions, such as their predilection to extension [5,9].

Acknowledgements

Illustration of histological and imaging aspects belong to OATB cases hospitalized in Pediatric Surgery and Orthopaedics and Traumatology departments of the Emergency County Hospital of Craiova, Romania [5,9].

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