

Original article

Tuberculous arthritis in Cambodia

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Background: Cambodia boasts one of the highest incidences of TB in the world. As such, healthcare providers are experienced with types of extrapulmonary TB such as septic *Mycobacterium tuberculosis* arthritic infections, not seen in developed countries.

Objective: Examine the incidence and distribution of TB arthritis cases at a Cambodian surgical center, explore the problems of diagnosis and current methods of treatment for this disease.

Methods: The written charts, operation records, and electronic database of patients with clinically diagnosed extrapulmonary TB, confirmed with a positive biopsy between January 2001 and July 2010 were searched. While medical treatment for the TB was given at other facilities, the operations performed and the result for patients with follow-up was reviewed.

Results: Between January 2001 and July 2010, 38 cases of TB arthritis at the CSC in Cambodia were histologically confirmed. Twenty-eight cases affected the lower extremity with the majority affecting the knee and ankle. All 13 patients receiving arthrodesis reported positive surgical outcomes.

Discussion/Conclusion: TB arthritis persists as an ongoing problem at CSC with a significant level of incidence. Arthrodesis is a viable and cost effective mean of treating TB arthritis in Cambodia.

Keywords: Arthritis, arthrodesis, cambodia, fusion, incidence, tuberculosis

Background

Mycobacterium tuberculosis, *Mycobacterium africanum*, and *Mycobacterium bovis* are strains of pathogenic bacteria that can infect humans and cause tuberculosis (TB). *M. tuberculosis* is the most frequent causative agent of TB infection and commonly manifests itself as some form of pulmonary TB [1].

Extrapulmonary TB infection is rarer than its pulmonary counterparts are, and TB infecting bones and joints can comprise up to 35% of all TB cases [2]. Of these cases, the majority are spinal or vertebral infections. Other arthritic infections are purely osteomyelitic infections that do not affect bony joints [3, 4].

The latest global disease report shows that the South East Asian region has the highest overall incidence of TB in the world. The World Health Organization (WHO) reported 219 cases of TB per

100,000 individuals in Cambodia, compared to the rate of two cases per 100,000 individuals in the United States. Furthermore, the incidence of TB in Cambodia is greater than its geographical neighbors' incidence. In Thailand the incidence is 62 infected per 100,000 individuals while in Vietnam, it is 76 infected per 100,000 individuals. Additionally, Cambodia itself boasts the highest rates of TB infection of any country outside of the African continent [5]. These figures help to illustrate the impact of this disease, and its significance within the Cambodian Health system.

Due to the extremely high incidence of TB within Cambodia, there is a correlated increase in the incidence of cases of arthritic TB. Because of the high frequency of this normally rare manifestation of TB infection, detection and treatment strategies are extremely important. Pulmonary TB is normally diagnosed using a standard Purified Protein Derivative (PPD) skin test, a chest radiograph, and/or a sputum culture. These methods are not as effective when used to diagnose tuberculous arthritis due to the nature of each test. The PPD is very accurate at indicating a previous exposure to TB infection but it cannot indicate

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if the patient is currently infected. A chest radiograph can suggest TB with even higher probability when paired with a PPD, but cannot definitively specify whether the infection is ongoing. A sputum culture may indicate an ongoing infection, but fails to indicate if TB is the causative agent of the patient's arthritis. Furthermore, cultures of *M. tuberculosis* can take from four to twelve weeks to yield observable results and as such may delay needed treatment.

A normal clinical presentation for TB arthritis would include pain of the affected joint, swelling, reduced range of motion (ROM), as well as a “cold

abscess”: i.e. an abscess that is not hot and tender (See **Fig. 1**). Other general signs such as a flat affect, weight loss, lethargy, fever, and other systemic signs of infection may suggest a suspicious arthritic joint with active TB. The presence of a lesion or draining sinus on the affected joint can also suggest a septic joint and should raise suspicion for TB (See **Fig. 2**). Lastly, the confirmed diagnosis of a current or recent pulmonary TB infection in conjunction with arthritic joint pain should increase clinical suspicion for TB in the joint.



Fig. 1 Swollen L knee with TB arthritis and cold abscess



Fig. 2 Supra-patellar sinus in TB arthritis of knee

When differentiating between rheumatological forms of arthritis and tuberculous arthritis, it is important to note the affected joints as well as the number of joints affected. TB arthritis rarely affects multiple joints, polyarthritic infections are less likely to be septic and distal joints are more frequently affected in rheumatological than in TB arthritides. Finally, most rheumatological forms of arthritis produce heat over the affected joints due to inflammation while TB infected joints are characteristically cool to the touch.

The main differences between TB arthritis and other septic arthritic infections are the duration of onset and the presence of a cold abscess. Other septic arthritic infections have a very rapid progression,

become painful, and produce a decreased ROM very rapidly. TB arthritis has a much slower and insidious onset. TB may remain dormant within an individual for an extended period before it spreads and produces symptoms. The cold abscess can be useful in distinguishing TB arthritis from other forms of arthritis as well as from septic infections of the joint, that are normally warm or even hot to the touch.

Clinical suspicions may also arise when viewing radiographs of the affected joint(s) but are usually only evident in later stages of degeneration. In early radiographs, significant necrosis of the articular surfaces may be absent (See **Fig. 3**). In later stages of the arthritic process, more extensive destruction of bone and cartilage is evident (See **Fig 4**).



Fig. 3 Early TB of the knee with no obvious bone destruction



Fig. 4 Late TB with total destruction of the joint

To diagnose tuberculous arthritis definitively, it is necessary to either culture the joint aspirate for TB bacilli, which may take several weeks, or to perform a biopsy of the affected joint tissue for histological analysis demonstrating the presence of granulomas with Langhans giant cells and perhaps visible TB bacilli.

In more developed countries such as the United States, it is possible that patients present early enough in the course of the disease that the physician may intervene in time to preserve joint function by debridement of necrosed tissue and synovial lavage, followed by a regime of anti TB medication. The limb might be immobilized to prevent further inflammation and irritation of the joint and possibly, the patient can recover with little to no pain or loss of function.

In less developed countries, such as Cambodia, the patients rarely present in time to save the joint, and usually an arthrodesis of the joint is performed. At the time of presentation, many patients have already lost articular cartilage and have experienced significant bone necrosis. Once the joint has reached this point of degradation, virtually nothing can be done to save it. Debridement and fusion of the affected joint is often the only option to treat the arthritic condition.

Objectives

The primary is to determine the incidence and distribution of TB arthritis at the Children's Surgical Center in Phnom Penh, Cambodia. The secondary objective is to explore the issues concerning the diagnosis of TB arthritis as well as the efficacy of current arthrodesis procedures at addressing the infection.

Patients/Methods

In order to quantify the incidence and variability of TB arthritic infections at CSC, a retrospective analysis of patient information and outcomes was carried out. Electronic records were searched and verified against hard copy patient charts. Records were searched from January 2001 to July 2010. Only patients who had histologically confirmed TB and who had undergone a surgical procedure at CSC were selected for this study. The general demographic data, the joint affected, the surgical procedure undergone, and the surgical outcome of the patients were recorded. Overall, 38 patients were found to meet the criteria of this study, and were further analyzed.

Due to the nature of record keeping and the relatively new electronic records system at CSC, it is probable that a number of patients that would have qualified for this study were not found. It suffices to say that the incidence of TB arthritis reported here might be a conservative estimate of the incidence of TB arthritis at the CSC.

Results

Thirty-eight patients that met the criteria set forth for the study were found. Of those patients, 34% were found to have a TB infection of the knee, and 26% had an infection of the ankle. Hip and wrist infections were found to have the same incidence at 11% each. Elbow joints made up 8% of infections, shoulders accounted for 5% and hands and feet each made up 3% of TB infections as shown in **Table 1**.

The age distribution ranged from eight to 74 years of age. Twenty-one patients were male and 17 were female. The age range for male patients was from eight years to 70 years of age. The age distribution for females ranged from 18 to 74 years of age.

Of the 38 identified patients at CSC, all had biopsies. Twenty-two cases had some level of debridement and 13 cases had arthrodeses. One patellectomy, one tumor excision, and one internal fixation of the femoral neck were also recorded as shown in **Table 2**.

Of the 38 cases examined, 21 had indications of trauma in their history and three denied any trauma. Fourteen patients had no record confirming or denying any trauma. The average duration of symptoms was 28 months prior to consultation, with a minimum of one month and a maximum of 10 years. The median duration of symptoms was 12 months.

Table 1. Incidence of TB joint infections.

Joint affected	Incidence
Knee	13
Ankle	10
Hip	4
Wrist	4
Elbow	3
Shoulder	2
Hand	1
Foot	1
Total	38

Table 2. Incidence of surgical procedures addressing TB arthritis. Incidence of reported trauma and symptom duration associated with each procedure.

Procedure	Incidence	Trauma indicated	Average symptom duration (month)
Bx Only	22	10	24
Arthrodesis	13	8	40
Patellectomy	1	1	7
Tumor excision	1	1	12
Plating Femoral neck	1	1	5

All 16 patients receiving more definitive surgery than biopsy and debridement alone had positive results. Only one of the 16 patients who received these treatments had recorded a post-operative wound complication of pus at the surgical site. All patients receiving these treatments also reported little to no pain after their surgery. (See **Fig. 5** to **Fig. 8** for a 43-year-old woman with a history of six months of

swelling of her right knee, a cold abscess, and positive histology for TB). Of those 22 patients receiving debridement and biopsy only, outcomes reports were generally missing. This is because most patients were referred to a TB clinic and they did not return to CSC. Of those that did return, four reported a reduction in pain, one complained of fever, three had remaining pus, and two had a recorded reduction in fever.



Fig. 5 Forty-three year old female with six months swelling of right knee (9765)



Fig. 6 Destructive changes in knee joint, biopsy positive for TB



Fig. 7 Knee arthrodesis for TB, with two crossed Steinman pins



Fig. 8 Solid, painless knee fusion, two years later, no signs of TB

Discussion

It is apparent that TB is a major problem in Cambodia and that the incidence of this disease is still at alarming levels. Between January 2001 and July 2010, 38 patients out of about 25,000 had histological confirmation of TB arthritis at CSC. However, the levels of incidence at CSC cannot be used as indicative of the rest of the country. We observed that the vast majority of cases of TB arthritis at CSC involved the lower extremities. There were 13 knees, 10 ankles, four hips, and one affected foot, which accounted for 28 of the 38 examined cases or 74% of all analyzed cases. Trauma was reported in 21 cases and was denied in only three cases. This shows a strong correlation between trauma and TB arthritis incidence in the patients' minds. However,

as all musculoskeletal complaints are generally considered secondary to some fall or other by most Cambodians, it does not signify a scientifically causal relationship. It was unclear from the patient records how many patients had a documented history of TB or a concurrent pulmonary TB infection. More analysis would be necessary to examine the correlation and rate of incidence for patients with pulmonary infections.

Clinical experience has shown that viable treatment options for patients in Cambodia include immobilization and arthrocentesis for minor cases with effective early treatment, and arthrodesis for advanced cases with significant necrosis. Arthrodesis is usually carried out using relatively simple technology such as Charnley clamps and crossed Steinman pins.

Prosthetic replacement of TB joints is not attempted because of difficulties in insuring compliance with treatment and follow-up.

For all cases examined, the average duration of symptoms before surgery was 28 months, with a median duration of 12 months. For those advanced cases requiring arthrodesis, the average duration of symptoms was 40 months before surgery, while those that only received a debridement and biopsy reported an average of 24 months of symptoms prior to surgery. It is evident that the duration of damaging infection and inflammatory response increases the likelihood that the joint will require fusion and a resultant loss of mobility at that joint. Ideally, there would be contact between physicians and patients that are more frequent. This would allow for earlier detection of TB arthritis, but this is difficult in an area such as Cambodia.

Because of the difficulties in obtaining early diagnosis, we looked at the outcomes of specific surgical intervention in addressing the tuberculous arthritis. Our analysis has shown that when early screening fails, arthrodesis is a viable treatment option that is highly successful. All 13 cases examined

showed successful surgical outcomes for arthrodesis procedures with virtually no reported negative side effects aside from the loss of joint function.

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