Functional Outcome on Surgical Treatment For Lower Extrimity Tuberculosis Arthritis At Cipto Mangunkusumo Hospital Jakarta

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Abstract

Introduction: Osteoarticular tuberculosis more frequently occur on weight bearing joints.[1,8] On late stage tuberculosis osteoarthritis choices of surgical treatment involved synovectomy, osteotomy, arthrodesis, and arthroplasy[11] Results on functional outcome after surgery would be useful to decide appropriate treatments and prognosis.

Method: This descriptive analytic study involved all lower extremity tuberculosis osteoarthritis that underwent surgical procedure at Cipto Mangunkusumo hospital in 5 years periods from 2008 to 2012. Follow up performed for minimal 6 months after surgery. Patients were evaluated using Lower Extremity Functional Score (LFES) and functional score according the joints involved, including Harris Hip Score (HHS), Knee Society Score (KSS), and Foot & Ankle Disability Index (FADI). Results: Study only involved late stage cases with average age at surgery was 30.04 (SD 16,67) years old. Average follow-up 33.68 months (SD 18.67). There are significant difference ($p<0.001$) of the LFES between preoperative (27.41), 6 months after surgery (42.19) and on last follow up (63.04). There were also difference ($p<0.001$) on Functional Score (HHS, KSS and FADI) preoperative (27.48), 6 months after surgery (60.11) and on last follow up (82.56). There is positive correlation between time of follow up and LEFS on last follow up. On last follow up, there is also significant difference of LEFS between groups that had arthrodesis and arthroplasty (p 0.045.)

Conclusions: Results of surgical treatment gave significant improvement on functional outcome of the joint involved. The result however is correlated to the type of joints involved, type of surgery performed and the time after surgery.

Introduction

Tuberculosis infection is still one of the major health problems in the world, especially in developing countries. Incidence of tuberculosis has been declining since the era of anti-tuberculosis drugs but in 1985 there's reemergence of the incidence in developing countries.[1]

Osteoartikular tuberculosis or tuberculosis infections in bones and joints are a third, or about 35 % of extra pulmonary tuberculosis infection.[2,3,4] Approximately 3% of all new cases of tuberculosis are osteoartikular tuberculosis.[5,6,7] The spread of tuberculosis in the joints can occur hematogenous through sub-synovial blood vessels as well as directly from osteomyelitis area in epiphysis (in adult) or metaphysis (in children). Tuberculosis arthritis can occur in any joint of the body but are more common in the weight bearing joints such as the hip and sacro-illiac. The incidence followed by the knee, ribs, shoulder, ankle, elbow and wrist. [1.8] Tuberculosis arthritis usually occur monarticular.

Diagnosis in this case is usually late because of the difficulty in diagnosis.[1,7.9] In general management for tuberculosis arthritis based on two basic facts.
First: tuberculosis is an infectious disease that requires pharmacological therapy with

anti-tuberculosis drugs. The next fact is osteoarticular tuberculosis cause consequences in the field of orthopedics and should be treated in accordance to orthopedics principles.

According to orthopedics principles, osteoartikular management for tuberculosis is divided into immobilization, surgery and physical therapy. Surgical goals are to correct the deformity persists after conservative therapy or improve joint function after medical treatment. In addition the use of physical therapy is strongly recommended to be done on each cases.[10] In the early stages of the disease the primary goals of therapy is to maintain normal or near normal range of motion.

In patients with advanced arthritis, the goal of therapy is to keep the joint in a functional position. At joints where ankyolisis can not be allowed, such as hip and elbow joints, excisional arthroplasty procedures can be considered. If joint ankylosis has already occurred in a less than optimal position or there's stiffness in the joints, it can be corrected with release of the soft tissues or also can be done joint reconstruction or arthroplasty. The choice of therapy is usually based on the patient's degree of severity. [1,5,8,10, 11,12]

One classification system that can be used as a guide for arthritis TB therapy was made by Tuli. This classification links clinical and radiological state of patients with treatment options and expected outcomes, and divided into five degrees. In a advanced state of the disease (stage III, IV and V) goals of treatment include management of joint stability and pain and maintain range of motion. Surgery procedure suggested by Tuli includes synovectomy, osteotomy, arthrodesis, and arthroplasty.[11]

Tabel 1. Tuberculosis arthritis according to Tuli classification. [11]

	Clinical	Radiological	Management	Expected outcome
Stage I (synovitis)	1. Soft tissue swelling 2. 75% ROM	1. Soft tissue swelling 2. Osteopenia	1. Drugs 2. Rest 3. ROM 4. Splinting	Normal or minimal symptoms
Stage II (early arthritis)	1. Soft tissue swelling 2. 25-50% loss of ROM	1. Soft tissue swelling 2. marginal erosion of joint 3. joint narrowing	1. Drugs 2. Rest 3. ROM 4. Splinting 5. synovectomy	ROM 50-70%
Stage III (late arthritis)	75% loss of ROM	1. marginal erosion of joint 2. cyst 3.significant joint narrowing	1. Drugs 2.Osteotomy 3.Arthrodesis 4. Arthroplasty	Stable and pain free joints with or without movement
Stage IV (late arthritis)	1. 75% loss of ROM 2. Subluxation or dislocation	Joint destruction	1. Drugs 2.Osteotomy 3.Arthrodesis 4. Arthroplasty	Stable and pain free joints
Stage V (ankylosis)	Ankylosis	Ankylosis	1. Drugs 2.Osteotomy 3.Arthrodesis 4. Arthroplasty	Stable and pain free joints

The results of therapy can be measured based on the patient's perception of the situation known as "soft measures" which is a subjective assessment. Subjective measurement that already validated usually has better reproducibility and more effective to assess the therapy's effectiveness.

Methods

This descriptive analytic study involved all adult lower extremity tuberculosis osteoarthritis that had surgical procedure at Cipto Mangunkusumo hospital in 5 years periods from 2008 to 2012. Follow up performed for minimal 6 months after surgery.

Patients were evaluated using Lower Extremity Functional Score (LFES) and functional score according to the joints involved, including Harris Hip Score (HHS), Knee Society Score (KSS), and Foot & Ankle Disability Index (FADI). Total cases in our center during the intended time were not able to fulfill the required sampling number from calculation therefor we perform total sampling methods. We exclude cases with congenital anomaly that will affect the joint function and cases with secondary infections. All eligible cases from operation-rooms records are compiled, contacted and ask to join the study. If they agree the informed consent, they were asked to fulfilled forms according to the joints involved.

Results

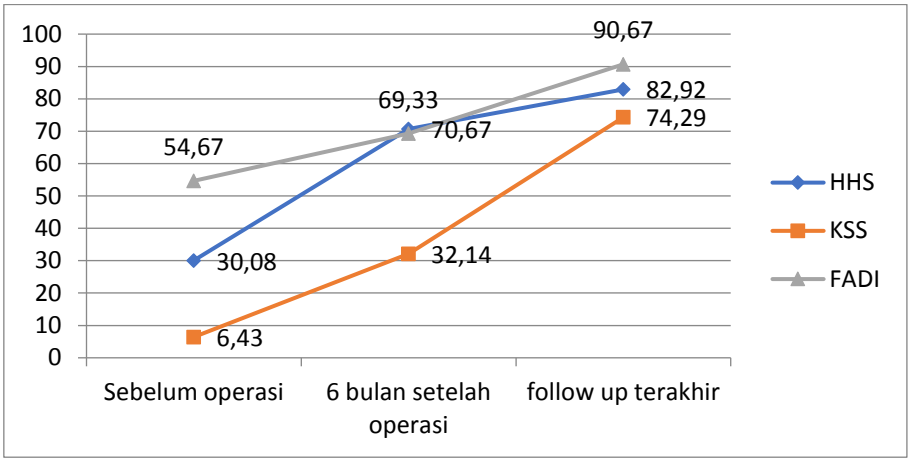
We have 23 cases that matched the inclusion criteria however 7 of them are loss to followup so this study have 22 samples from 16 patients. Average age at surgery was 30.04 (SD 16,67) years old. All cases are followed up for minimal 6 months with average follow-up 33.68 months (SD 18.67).

Table 2. cases characteristic

Characteristic	n (%)
Sex	
Male	15(68.2)
Female	7 (31.8)
Lung tuberculosis	
Positive	12 (54.5)
Negative	10 (45.5)
Tulli classification	
Stage 3	12 (54.5)
Stage 4	10 (45.5)
Joint involved	
Hip	12 (54.5)
Knee	7 (31.8)
Foot and ankle	3 (13.6)
Surgical procedure	
Debridement &	10 (45.5)
sinovektomi	1 (4.5)
Soft tissue procedure	5 (22.7)
Artrodesis	6 (27.3)
Artroplasti	

There Are Significant Difference (P<0.001) Of The Lefs Between Preoperative 27.50 (3-40), 6 Months After Surgery 40.50 (12-76) And On Last Follow Up 68.00 (36-80). There Were Also Difference (P<0.001) On Functional Score (Hhs, Kss And Fadi) Preoperative 30.00 (5-62), 6 Months After Surgery 64.00 (19-98) And On Last Follow Up 83.50 (45-99). Breakdown Of The Functional Score Hhs, Kss And Fadi Didn't Give Significant Difference (P>0.05) But Shows Tendency Of Improvement.

Graphic 1. Specific functional outcome



There are no significant differences between groups of different sexes, involvement of lung tuberculosis and joints type; also no significant difference between different types of joint involved. There are negative correlation between patient's age and LEFS however with p 0.403 this result are not statistically significant. There is also positive correlation between time of follow up and LEFS on last follow up (r 0.385, *p* 0.077) Less severe arthritis tuberculosis would have better functional outcome before (p 0.001) and after surgery (p 0.008). On last follow up, there is also significant difference of LEFS between group that had arthrodesis and arthroplasty (p 0.045)

Discussion

(45.5). This is because the study was conducted in patients with tuberculosis

arthritis who underwent surgical therapy which in turn only includes advanced stage of tuberculosis arthritis (more than stage 3). Histopathology examination was performed after surgery in 11 patients (68.75%), all of which were positive for tuberculosis arthritis. This is one of the functions of the surgery, which is to confirm diagnostik.[10] All subjects received treatment with Anti-Tuberculosis Drug (OAT) for at least 12 months. [10, 44] there is only 1 case of reactivation which is caused by the patient stops taking the OAT.

Type of surgery performed on tuberculosis arthritis include debridement and synovectomy : 10 (45.5), soft tissue procedures : 1 (4.5), arthrodesis : 5 (22.7) and artroplasty : 6 (27.3) . In patients with more advanced stages of this disease, the

In early stages, good results can be achieved with medical therapy without surgery.[13] It explains why more adult patients come to seek treatment. 68.2% of patients were male, there is no literature declares gender predilection on tuberculosis infection in this study. Osteoartikular tuberculosis is a disease that occurs secondary to tuberculosis infection in the lung[10,11] in the study 54.5% of patients had involvement of pulmonary tuberculosis. Involved joints include the hip joint: 12 (54.5), knee: 7 (31.8), ankle and foot: 3 (13.6). This is consistent with the statement of Martini (1988), that the lower extremity joints most commonly affected are the hip joint followed by knee, ankle and foot.[10]

There're only 2 groups based of severity in his study stage 3: 12 (54.5) and stage 4: 10 goal of therapy is to maintain the joint in a functional position . In joints where ankylosis is not well tolerated , such as in the hip joint and knee joint arthroplasty should be considered as choice of treatment.[10,14] Functional outcomes (LEFS) was significantly different before and after surgery ($p < 0.001$) . This confirms the function of surgical therapy in cases of advanced stages of tuberculosis arthritis.

Corresponding with the literatures, there is no significant association between sexes, and involvement of pulmonary tuberculosis with functional outcome. However patient at younger age at diagnosis will have better functional outcomes because arthritis tuberculosis in children can usually recover without sequelae when medical therapy initiated immediately.

Even at advanced stage with appropriate therapy, chance of recovery are quite

great.[13] Longer time after the surgery outcome will increase joint function, especially when supported by pharmacological and rehabilitation programs are good. Although p>0.05 there is an increasing tendency of functional outcomes in correlation with time after follow up.

In this study, no significant difference was found between functional outcome at different joints (hips, knees and ankles and foot) both before and after surgery. This could be due to the number of samples is too little and vast variation between each group of joints. Moreover different joints would have different therapeutic targets .

In this study, from 12 cases of hip tuberculosis, 5 had arthroplasty as second procedure after debridement or arthrodesis, 1 patient had direct arthroplasty, 4 had arthrodesis with a plan for conversion into athroplasy. No reactivation of tuberculosis is found in patients who had Total Hip Arthroplasty either directly or conversion.[10] Traditionally stated that there should be disease-free interval , which is about 10 years, between the completion of medical therapy with orthosis implantation. However, some in vitro studies indicate the absence of biofilm formation on implants in arthrtits tuberculosis and showed good functional outcome studies in the absence of reactivation tuberkulosis.[14] This allows for Total Hip Arthroplasty to be advised in patients with active pelvic tuberculosis . However, at age of 35 years or younger incidence of aseptic loosening and revision ranges between 11-57 % . Therefore , the choice of therapy in adolescents and young adults , among others, is to conduct joint arthrodesis then conversion to a total hip arthroplasty afterward. [14,15]

On tuberculous arthritis of the knee joint at an advanced stage the primary goal is pain free and stable joint, then followed by next priority to achieved near-normal range of motion. Results that considered successful are full extension with a diverse range of motion or stiffness in extension position. [10,16,17]

The tuberculosis in the foot and ankles are the most rare arthritis of the lower extremities . In this study we only found 3 cases (11.1 %). At the ankle, infection will spread rapidly throughout the joints causing deformity. The goal of treatment is to eradicate infection and achieve a pain free foot.

Usually the bone union can occur spontaneously so that goals can be achieved without surgical therapy. In all 3 cases in this study, all underwent debridement and an increase in functional outcomes joints .[15.18]

Mean functional outcome stage 4 significantly lower compared to stage 3 joints either at the time before (p 0.001) or 6 months after surgery (p 0.008) . This is consistent with the statement that a higher degree of severity will make joint function decreases. Therefore it can be suggested that tuberculosis arthritis therapy should be started as soon as possible before the severity of the disease increases .

This study found no significant differences in functional outcome between groups undergoing different procedure at 6 months folow up. This is due to the different joints require different surgical therapies as discussed in the previous section. Furthermore variation in sample size in in each group made statistics calculating difficult to performed. Nevertheless on the long- term follow-up there is a difference in functional outcome between groups who had arthrodesis with arthroplasty (p 0.045), especially for the hip joint . In the hip joint and knee , but especially in the hip joint , ankylosis of joints is not well tolerated , it will be more visible in the long term . Specific statistics calculation for hip arthritis can not be performed because the sample size is too small however group receiving arthroplasty gives better functional outcome.

Limitation of this research is that although this study uses total sampling, sample size was too small and varied between groups, also variations follow-up time. In conclusion this study shows that there is a significant relationship between severity and functional outcomes after surgery. Therefor we suggest surgical treatment to be performed as soon as possible.

There are also significant differences in functional outcome at last follow -up among the group who had arthrodesis and arthroplasty (p 0.045) . This implies that for long-term joint function would be better with arthroplasty especially in hip joint. In this study there also no reactivation cases or other side effects in patients undergoing arthroplasty either direct or convertion which are consistent with recent studies.[15]

Those result made us suggest that arthroplasty in patients with active pelvic tuberculosis arthritis are relatively safe and provide better functional outcomes. However, small sample size in this study, especially when divided by type of joints involved causing the need for further studies with a larger sample size and specific to the joints of the lower extremities in order to provide a therapeutic recommendation.

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