CASE REPORT

Rehabilitation Treatment Of Tuberculosis Of The Knee Joint (Gonitis Tuberculosis) After Synovectomy Surgery: A Case Report

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ABSTRACT

Introduction: The incidence of extrapulmonary tuberculosis (EPT) cases is increasing globally. with bones and joints being the most common sites, accounting for over 10% of occurrences. Tuberculosis of the knee is rare case, presents challenges in prompt diagnosis, leading to severe progressive pain and functional impairment that significantly impacts the patient's quality of life.

Case Persentation: A 42-year-old male patient experienced chronic pain in the right knee joint, stiffness and limitations when moving the knee. Physical examination showed swelling, warmth and redness. The range of movement of the knee was limited. Histopathological examination showed that the patient was diagnosed with tuberculosis of the knee. Synovectomy was performed after a diagnosis of tuberculosis of the knee and followed by a 9-month anti-tuberculosis drugs regimen. Knee range of motion (ROM) exercise and diathermy therapy showed clinical improvement after prompt management since the initiation of progressive rehabilitation therapy.

Conclusion: Tuberculosis of the knee is a rare complication of tuberculosis which has the potential to cause functional impairment and affect the quality of life. Providing physiotherapy interventions in the form of exercises and diathermy therapy in post-synovectomy cases for one year resulted in significant functional progress.

Keywords: Rehabilitation, Tuberculosis Of Knee, Synovectomy, exercise treatment, Diathermy.

ABSTRAK

Latar Belakang: Angka kejadian kasus tuberkulosis ekstraparu (EPT) semakin meningkat secara global, dengan tulang dan sendi menjadi lokasi yang paling umum, terhitung lebih dari 10% angka kejadian. Tuberkulosis lutut merupakan kasus yang jarang terjadi, sehingga menimbulkan tantangan dalam menentukan diagnosis yang cepat. Gejala yang timbul menyebabkan nyeri progresif yang parah dan gangguan fungsional yang secara signifikan berdampak pada kualitas hidup pasien

Ilustrasi Kasus: Seorang pasien laki-laki berusia 42 tahun mengalami nyeri kronis pada sendi lutut kanan, kaku dan keterbatasan saat menggerakkan lutut. Pada pemeriksaan fisik didapatkan pembengkakan, rasa hangat dan kemerahan. Rentang pergerakan lutut terbatas. Pemeriksaan histopatologi menunjukkan pasien didiagnosis menderita tuberkulosis lutut. Sinovektomi dilakukan setelah diagnosis tuberkulosis lutut dan diikuti dengan pemberian rejimen obat anti tuberkulosis selama 9 bulan. Latihan rentang gerak lutut (ROM) dan terapi diatermi menunjukkan perbaikan klinis setelah penatalaksanaan cepat sejak dimulainya terapi rehabilitasi progresif.

Kesimpulan: Tuberkulosis lutut merupakan salah satu komplikasi tuberkulosis langka yang berpotensi menyebabkan gangguan fungsi dan mempengaruhi kualitas hidup. Pemberian intervensi berupa latihan dan terapi diatermi pada kasus pasca operasi sinovektomi pada lutut selama satu tahun menghasilkan kemajuan fungsional yang signifikan.

Kata kunci: Rehabilitasi, Tuberkulosis Lutut, Sinovektomi, terapi latihan, Diatermi.

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INTRODUCTION

Mycobacterium tuberculosa is the causative agent of tuberculosis, an infectious disease that primarily affects the lungs but can also manifest in other organs.[1] Between 10% and 35% of tuberculosis cases outside the lungs occur in the bones, with tuberculosis of the knee joint, known as Gonitis Tuberculosa, ranking second in prevalence after tuberculosis of the spine (TB spondylitis).[1,2] Gonitis Tuberculosa is characterized by monoarthritis, typically affecting a single joint.[3] It is a chronic, progressive disease that, if left untreated, can lead to the formation of abscesses and fistulas. Due to the lack of obvious constitutional symptoms, osteoarticular tuberculosis is often misdiagnosed or diagnosed late, resulting in substantial joint damage that may require additional reconstructive surgical procedures.[3,4] People with tuberculosis-infected joints experience impaired mobility and difficulty performing daily tasks, particularly in the knee joints, which play a crucial role in supporting standing and walking.[3] Postoperative

complications such as edema, discomfort, reduced joint range of motion, and muscle weakness further diminish functional capacity.[3] This review aims to present recent clinical cases of knee tuberculosis and discuss appropriate rehabilitation therapy modalities to restore patients functional abilities.

CASE DESCRIPTION

In 2019, as per the World Health Organization (WHO), Indonesia ranked third globally in terms of tuberculosis prevalence. Tuberculosis can affect extrapulmonary organs, including bones and joints. The knee joint (gonitis TB) ranks as the second most common site of bone and joint tuberculosis, following TB of the spine (spondylitis TB), accounting for over 10% of cases. [3,4]

A 42-year-old male patient experienced chronic pain in the right knee joint, stiffness, and limitations when moving was sent to the hospital's orthopaedic department after experiencing six months of worsening pain in my right knee joint. As the swelling increased and the pain intensified, it became increasingly difficult to move or straighten the legs. There are no signs of a runny nose, cough, or fever. Nobody had any prior contact with tuberculosis patients. Loss of appetite and approximately 20 kg (70 kg to 50 kg) of body weight over three months was another complaint. Upon examining the lower limb, it was noted that the right knee joint was swollen, warm, red, tender, and had limited range of motion (ROM) due to stiffness and difficulty straightening the body. The affected limb could not be bent less than 80◦ or stretched out more than 30◦, and there were no abnormalities discovered during the physical examinations of the left knee, hip, and spine.

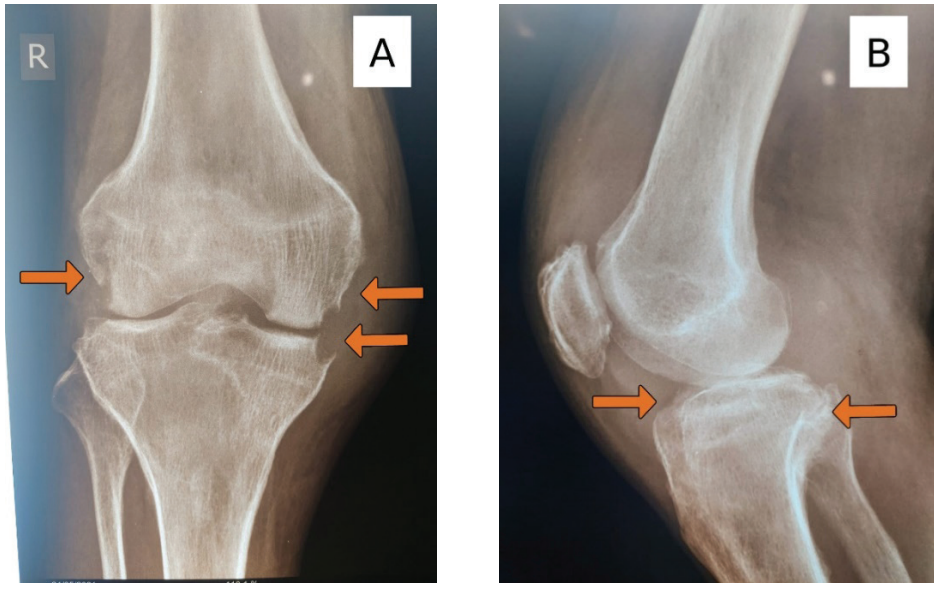

Figure 1:
A. Anterior view knee Radiograph showed bone lesion both in the lateral femoral condyle and on the medial femoral condyle with narrowing of the knee joint
B. Lateral view knee radiograph showed bone lesion and narrowing patellafemoral joint

Laboratory data: leukocytosis (WBC: 21.940 /µl) and granulocytosis (Neutrophil: 92.6%). Sputum examination results showed negative *mycobacterium tuberculosis*.

A radiological chest X-ray showed no abnormalities. Radiological X-ray right genu showed a suspicious abscess on soft tissue and a bone lesion both in the lateral femoral condyle and on the medial femoral condyle with narrowing of the knee joint. (Figure 1).

Lower extremity computerized tomography (CT)-scan genu non-contras showed The subchondral bone layer appears sclerotic, joint space narrowing, and soft tissue swelling with the appearance of joint effusion. Joint space destruction involves the medial and lateral condyle cortex of the bone femur, the medial and lateral condyles of the right tibia, and the eminence intercondylar. (Figure 2).

An orthopedist performed the synovectomy on the patient. The synovial mass, which was found to be unattached to any neighbouring structure, was revealed through the medial incision of the right patella. Tissue samples from the knee were taken for further examination. Later, histopathology revealed groups of epithelioid histiocytes and Datia Langhans cells form granulomas between the synovial tissue. (Figure 3). Then, the patient was subsequently found to have knee tuberculosis or Gonitis tuberculosis.

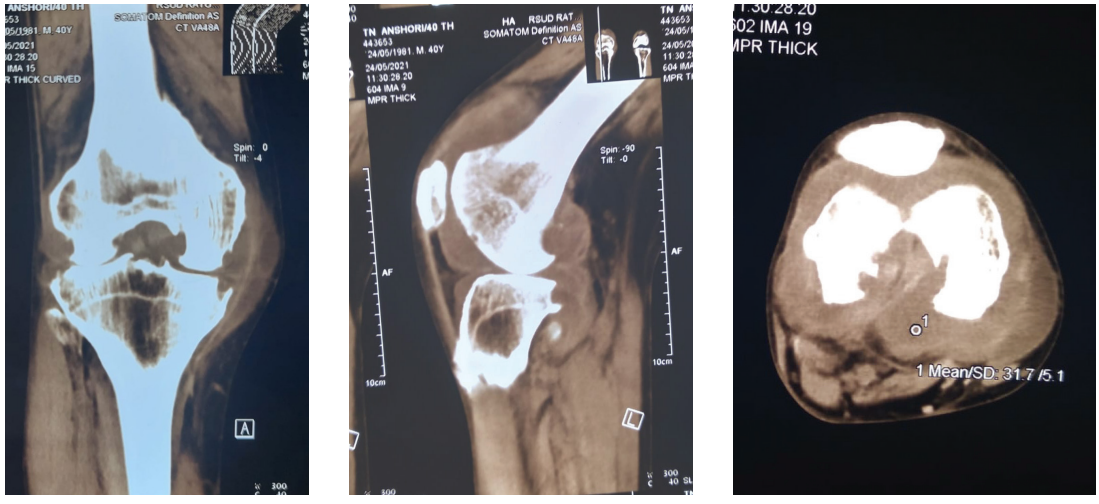

Figure 2: (A) Coronal slice view knee CT-scan (B) Sagittal slice view knee CT-scan (C) Axial slice view knee CT-scan

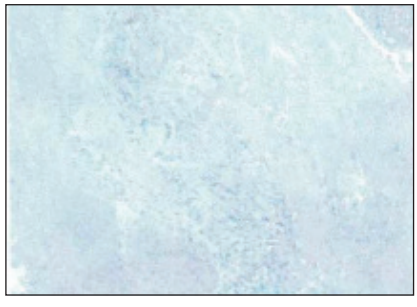

Figure 3. Tissue consisted of histiocyte cells in the form of epitheloid and datia langhans cells forming granulomas between the synovial tissue

The following anti-TB medication regimen was prescribed for a patient with 50 kg body weight for nine months: 300 mg of isoniazid, 450 mg of rifampin, 1000 mg of pyrazinamide, and 750 mg of ethambutol daily while hospitalised: HRZE regimen. Intensive phase 1 anti-tuberculosis therapy with four fixed-dose combinations (FDC) tablets was continued at the public health centre after the patient finished treatment at the hospital. While undergoing tuberculosis (TB) treatment, the patient was undergoing a rehabilitation program. After synovectomy surgery, the patient couldn't walk and flexed his knee. The patient is given an exercise program and diathermy therapy. At first, The muscle strengthening exercise with no weight bearing. Static contractions impact muscle contractions and aim to reduce edema. The range of Motion (ROM) exercise aims to increase joint movement of the patient and avoid joint stiffness. In addition to the exercise program, patients also receive diathermy therapy. The patient was given short-wave diathermy on the quadriceps femoris muscle, which aims to strengthen it. After a year of treatment, the patient was observed while participating in a rehabilitation program twice a week. Evidence from clinical trials showed that flexed and extended abilities to 90◦ and 10◦ were significantly improved.

DISCUSSION

Hematogenous spread of tuberculosis (TB) to the knee joint causes gonitis, which is an extrapulmonary TB infection. Arthritis develops when bone spurs, either epiphyseal (in adults) or metaphyseal (in children), wear away at the joint space. Failure to adequately treat this condition will lead further damage to the joint space.[5] In adolescents and adults, the infection can spread to the joints directly or via the metaphyses and epiphyses, a condition known as osteomyelitis.[4,5] Common tuberculosis (TB) symptoms include a high temperature, loss of appetite, lethargy, night sweats, and anorexia. [3,4]Arthritis, swelling, pain, restricted mobility, and redness without warmth (cold abscess) are the initial symptoms of tuberculosis in the joints. As the condition progresses, it can become more severe, making it difficult to move or lift the joint while experiencing pain. [3,4]

The goal of an X-ray analysis of extrapulmonary tuberculosis (TB) is to detect and validate the existence of pulmonary TB.[3] In contrast, radiology in tuberculosis (TB) is done in the lateral and anterior-posterior (AP) positions with a CT-scan or an MRI to find the source of the bone damage.[5] On the other hand, radiographic signs of tuberculosis in the bones and joints do not serve as a diagnostic tool.[6] A computed tomography (CT) scan can reveal the full extent of bone damage, abscesses in soft tissues, and enlargement in the surrounding soft tissues.[5,6]

Examining the synovial fluid for signs of a tuberculosis infection is another way to diagnose gonitis tuberculosa (TB). When this happens, the synovial membrane gets thick, swollen, and tuberculosed.[2,4] There are more fibrin and more mononuclear cells (MN) in the synovial fluid. A synovial biopsy, which is considered a gold standard for the diagnosis of tuberculosis (TB), yields a positive result in 80% of cases. The hallmarks of tuberculosis, as revealed by biopsies, include lymphocytes, giant cells with caseosa, and caseous granulomas.[2,4]

In order to alleviate the symptoms of the disease and verify the diagnosis through orthopaedic surgery, elective synovectomy and debridement are being considered. In order to preserve the joints, it is important to diagnose Gonitis Tuberculosa (TB) early on and treat the patient effectively, using nonspecific findings from the early stages of the disease.[3] Providing appropriate and effective anti-tuberculosis therapy regimens is the fundamental principle of treatment. Bone and joint tuberculosis (TB) treatment typically lasts 9-12 months, with a 12-month recommendation based on clinical evaluation, as per the guidelines of the Indonesian Ministry of Health.[2,4] The drug's poor penetration into bone and fibrous tissue, along with the difficulty in monitoring the response, necessitates the duration of anti-tuberculosis therapy.[2,4]

Medical rehabilitation management is considered after bone and joint surgery, even though the operation is considered successful, its movement function depends on the postoperative rehabilitation program.[3,7] Postoperative stiffness can occur due to contractures, excessive scar tissue in the wound healing process, and mobility and stability of the knee joint. Stiffness in the knee joint or limited range of motion is one of the complications.[3 7]

The exercise program is given during the rehabilitation period. Static contraction training program is a muscle contraction not accompanied by a change in muscle length.[7] Static contractions aim to train the patient's muscle contractions. Besides that, static contractions aim to reduce edema.[7,8]

Increasing the strength of the quadriceps muscles is very important to maintain stability knee joint so that it can reduce the burden on the knee joint in carrying out resistance to the weight body or during daily activities.[8,9] People can do a variety of exercises to improve their strength, mobility, function, and joint pain with quadriceps exercises, which are a kind of elastic resistance.[7] When you do isometric quadriceps exercises, you're essentially strengthening your muscles by contracting them.[10,11] The dynamic strength of the muscles will be enhanced as a result of strengthening exercises. Thus, the strength of the muscles is enhanced. Strength training improves not only stamina but also balance and endurance.[10,11] The widening of blood vessels causes an increase in blood circulation. Not only that, it will lessen pain by increasing flexibility of fat tissue, which in turn increases strength and size while decreasing inflammation.[7,11]

Range of Motion (ROM) exercise is an exercise that uses basic movement principles in human joints. The movements performed can be in the form of active movements or passive movements in the direction of motion and the range of motion of each joint. Providing exercise therapy pumping ankle with static contractions, and range of motion (ROM) exercises (free active movement and passive movement) can maintain and increase the range of motion (ROM) of the joints.[10] This increase is due to the effect of pumping, where there will be an increase in blood pressure and cardiac output so that it can accelerate metabolism and cause a decrease in edema.[10] Reduced edema will carry away pain-triggering substances and reduce the emphasis on nociceptors to reduce pain. Because there is a decrease in edema and pain, it will cause an increase in the range of motion (ROM) of the joint.[7,10]

In addition to undergoing an exercise program, the patient received short-wave diathermy therapy. Conservative treatment options for knee osteoarthritis include electrotherapy modalities such as short wave diathermy (SWD).[12] The thermal and athermal effects of short wave diathermy (SWD) are distinct from one another.[12] Vasodilation, an elevated pain threshold, diminished muscular spasms, accelerated cellular metabolism, and enhanced extensibility of soft tissues are all effects of the thermal effect. A possible explanation for the athermal effect is that cells absorb energy from an electric field, which in turn increases their activity. Some of these benefits include improved circulation, less inflammation, quicker healing of wounds and edema, and less discomfort and stiffness in the joints.[12] After completing a one-year rehabilitation therapy program, the patient showed clinical improvement after prompt management since the initiation of progressive rehabilitation and successfully resumed activities of daily living.

CONCLUSION

In rare cases, Tuberculosis (TB) can develop in other parts of the body, including the knees. This can lead to a decrease in mobility and overall quality of life. When diagnosing gonitis tuberculosa (TB), a synovial biopsy is considered the gold standard. In order to manage tuberculosis, it is necessary to administer anti-TB medication, conduct clinical monitoring, and finish the medication course for 9 to 12 months. Physiotherapy interventions in static contraction exercises, quadriceps strengthening, and range of motion (ROM) exercises combined with short-wave diathermy therapy in post-synovectomy cases resulted in significant functional progress.

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