



Case report

Impact of physiotherapy rehabilitation on septic arthritis secondary to Hansen's disease

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ABSTRACT

Leprosy, commonly known as Hansen's disease, is a chronic infectious illness caused by the bacteria *Mycobacterium leprae*. The presence of the musculoskeletal system is the third most common symptom. Acute onset of arthritis is documented secondary to Hansen's disease. Septic arthritis is a joint infection that causes excruciating pain, it typically manifests as a single hot, swollen, and extremely painful joint. The main aim of physical therapy is to recover from functional impairment as a result of Hansen's disease and to tailor lifestyle changes to help the patient regain functional independence. In this case study, updated physiotherapy rehabilitation of septic arthritis following borderline Tuberculoid Hansen's disease has been demonstrated to be important in restoring range of motion (ROM), muscular strength, and pain alleviation. A male with 46 year of age presented to the orthopedic department with the symptoms of pain and swelling of the knee of the right side since 1 month without any history of fall or twisting injury. He was advised for the investigations of x-ray and MRI and arthrocentesis of right knee was done during which pus was found and aspirated. He was diagnosed with septic arthritis of right knee joint. Patient was operated with diagnostic arthroscopy of right knee where debridement was done. Patient then was referred to physiotherapy department with the complaints of pain and stiffness over right knee joint, with restricted range of motion. He was known case of Hansen's disease. He was started with physiotherapy rehabilitation protocol for 6 weeks where cryotherapy, TENS, passive ROM, active assisted and active ROM exercises were given. Focus was also made on improving strength. In this case study physiotherapy rehabilitation protocol used had significantly reduce the pain, increased ROM, muscle strength and endurance which considerably help the patient in restoring his functional independence at home and work place.

Keywords: Hansen's disease, septic arthritis, physiotherapy rehabilitation.

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INTRODUCTION

Leprosy, commonly known as Hansen's disease, is a chronic infectious illness caused by the bacteria *Mycobacterium leprae*. The most prominent and classic presentations of leprosy are cutaneous and neurological manifestations. The most prevalent symptom is the existence of the musculoskeletal system. Acute onset inflammatory polyarthritis, acute/chronic oligoarthritic, especially lower limb large joint arthritis, were also documented secondary to Hansen's disease^[1]. Septic arthritis is also known as bacterial arthritis or contagious arthritis. Septic arthritis is a joint infection that causes excruciating pain. Bacteria, viruses, and fungi may enter the joint via a variety of routes, causing synovial membrane inflammation. When inflammation begins, cytokines and proteases are released, potentially causing joint damage. The infection is most often bacterial and occurs in the synovial or periarticular tissues^[2]. Acute septic arthritis typically manifests as

a single hot, swollen, and extremely painful joint. Malaise, erythema, swelling, tenderness, and a reduced ROM in a one joint are common features of septic arthritis^[3]. The swelling and tenderness in the joints can range from mild to extreme. In both children and adults with bacterial and mycobacterial arthritis, the knee is the commonly affected joint, after that the hip, elbow joint, wrist joint, and ankle joint^[4]. The prognosis of infectious arthritis is well known to be linked to the joint infected, age of diagnosis, treatment delay, and the organism responsible^[5]. Septic arthritis, if left untreated, will spread to the underlying growth plate, destroying the physis and causing loss of growth or tethering of the plate, causing deformity^[5]. Osteomyelitis may result from a joint infection spreading to the adjacent bone^[5].

The main aim of physical therapy recovery is to recover from the functional impairment as result of Hansen's disease and to tailor

lifestyle changes to help the patient regain functional independence [6].

In this case study, updated physiotherapy rehabilitation of septic arthritis following borderline tuberculoid Hansen's disease has been demonstrated to be important in restoring ROM, muscular strength, and pain alleviation.

Patient Information

A 46 year male patient working as a farmer by occupation with right hand dominance. He developed pain and swelling over right knee joint 1 month back which was spontaneous in onset and gradually progressive. There was no history of trauma or twisting injury. Patient visited AVBRH hospital Sawangi Meghe with the symptoms of pain on right knee joint and problem in walking since 1 month. He was referred for the investigations of x-ray and MRI. After that arthrocentesis of his right knee was done, during which pus was aspirated which was suggestive of septic arthritis. MRI reveals partial tear of anterior cruciate ligament, grade 1 tear of posterior horn of medial meniscus, joint effusion of right knee joint with extension to supra-infra patellar bursa and associated periarticular soft tissue swelling, bone infarcts in visualized lower end of femur and upper end of tibia. Patient was operated with diagnostic arthroscopy of right knee where debridement was done. Patient then was referred to physiotherapy with complaints of pain and stiffness over right knee joint, with restricted range of motion. He was a known case of Hansen disease and DRESS syndrome. No history of diabetes mellitus, hypertension. Patient had drug history of [rifampicin and dapsone]. He had no significant personal or family history.

Clinical findings

Written consent was taken from patient. He was explained about physical examination and intervention. His general examination was done and he was conscious and oriented to time, place and was cooperative. Patient was hemodynamically stable, afebrile, BP was 110/90mmhg, pulse rate 78 beats per minute, respiratory rate 19 breaths per minute. No findings of cyanosis, icterus, clubbing, edema. Patient was examined in supine position, on observation scar bandages were present over anterior aspect of right knee, and there was no edema and wasting of muscle. Attitude of limb was knee in 30° of flexion and ankle in neutral position. On palpation temperature of the local area was normal and tenderness was present which was grade 2 on scale, swelling was present in suprapatellar region. Knee range of motion was painful. Hip and ankle movements were restricted. Range of motion has been mentioned in table no. 1. Testing of strength of muscle was done on the basis of medical research counseling [MRC] grading has been mentioned in table 2. On neurological examination, all the sensations were intact. Knee reflex was impaired.

Figure 1 represents X-ray of right knee joint (pre-operative) and figure 2 represents patient with restricted knee range of motion.

Figure 1. AP View of X-ray of right knee joint (pre-operative)



Figure 2. Post-operative presentation



Table 1: ROM Pre and Post Treatment of affected [right] knee joint

	Pre-treatment ROM		Post treatment ROM	
	Active ROM	Passive ROM	Active ROM	Passive ROM
Hip Joint				
Flexion	0-80°	0-90°	130°	135°
Extension	0-10°	0-15°	25°	30°
Abduction	0-20°	0-25°	45°	50°
Adduction	0-10°	0-15°	20°	25°
Internal rotation	0-15°	0-20°	35°	40°
External rotation	0-20°	0-25°	40°	45°
Knee Joint				
Flexion	0-30°	0-40°	130°	135°
Extension	25-0°	30-0°	0-135°	0-135°
Ankle Joint				
Plantarflexion	0-25°	0-30°	40°	45°
Dorsiflexion	0-5°	0-10°	15°	20°
Inversion	0-15°	0-20°	30°	35°
Eversion	0-5°	0-10°	15°	20°

Table 2. MRC Grading Scale

Muscles	Right side	Left side
HIP		
Flexors	2	5
Extensors	2	5
Abductors	1	5
Adductors	1	5
Internal rotators	1	5
External rotators	1	5
KNEE		
Flexors	1	5
Extensors	1	5
ANKLE		
Plantarflexors	2	5
Dorsiflexors	2	5

Timeline

Table 3. Timeline of incidents related to health conditions and care

Occurrence	Dates
Date of presentation	15/01/2021
Date of surgery	25/01/2021
Date of physiotherapy rehabilitation	1/02/2021

Therapeutic Intervention

Range of motion, and enhancing strength of lower limbs for activities including training of gait, transferring activities etc. Long term goals were: It focused on improving endurance and help the patient to progressively return to the functional activities.

The main aim of physical therapy was protection of joint, avoid the activities that will damage joint and progressively set back to the day to day activities. So, treatment in this case firstly include range of motion, strength training, electro-therapeutic modalities, activities that will improve balance and training of gait. The affected joint was immobilized at first to prevent further joint damage and to control pain caused by the affected joint's mobilization. During the first 2 weeks of treatment, rest to the part was advised. To reduce pain and swelling, Cryotherapy was given with application of ice pack over the right knee for 6-8 minutes. Low frequencies (2 Hz) Transcutaneous Electrical Nerve Stimulation [TENS] was also applied for 8-10 minutes to reduce pain over the right knee. After that patient was started with range of motion, stretching exercises, and manual therapy exercises to regain movement in his lower limbs. Passive range of motion exercises of right knee were performed. Active assisted ROM exercises to hip and ankle were performed. During 2-4 weeks, patient was progressed to active assisted and active range of motion exercises. Focus was also made on enhancing the muscle strength of his right lower limbs. Due to restrictions in knee range of motion stretching exercises were performed to right hamstrings, quadriceps, and gastrocnemius to enhance knee joint range of motion in a range which is pain free. Lower-limb flexibility activities for the quadriceps muscle, calf muscle, and hamstring muscles were given. Due to pain and decreased muscle strength, isometric strengthening exercises were started to enhance muscle power in the lower limbs in a manner which is pain free. Quadriceps sets, gluteal sets, and hip abduction against a solid surface were done as isometric strength activities. This rehabilitation program was combined with neuromuscular electrical stimulation (NEMS) to the quadriceps and hamstring muscles which resulted in significantly greater improvement in quadriceps and hamstring strength. Treatment time ranged from 10-15 minutes, using biphasic current. During 4-6 weeks, After the patient was able to do isometric strength activities painlessly and with good mechanics, several exercises were progressed from concentrically to eccentrically to build bilateral lower limb muscle strength and endurance. Activities that were performed by the patient were Clamshells, small squats, lunges, one leg step-downs or step-up activities, with 1 set of 10 repetitions of each exercise. Supine progressive resistive exercises were performed

to enhance hamstring muscle length, including the contract-relax method to promote passive joint mobility and the hold-relax approach to promote passive joint mobility and minimize movement-related discomfort. Seating knee extensions, straight leg lifts, side-lying hip abduction, and standing hamstring muscle curls were among the resistive workouts. Each posture was maintained for 10 seconds and then repeated three times. After that, treatment which aimed at enhancing muscle motor control while walking and climbing up and down the stairs started. Balance exercises were also incorporated. The patient acquired confidence in his ability to perform endurance activities without being hindered by knee discomfort after incorporating muscle power, motor control, and balance into his training.

Follow up

Mostly on completion of physiotherapy, the patient reported normal functional activities without pain complaints or limited range of motion. He had a complete range of motion and a muscle strength of 5 degrees on his right lower limb. After that patient had returned to his daily life activities.

DISCUSSION

Leprosy, commonly known as Hansen's disease, is a chronic infectious illness caused by the bacteria *Mycobacterium leprae*. The most prominent and classic presentations of leprosy are cutaneous and neurological manifestations. The most prevalent symptom is the existence of musculoskeletal system [7]. Acute onset inflammatory polyarthritis, acute/chronic oligoarthritic, especially lower limb large joint arthritis, are documented secondary to Hansen's disease [1]. Septic arthritis is also known as bacterial arthritis or contagious arthritis. Septic arthritis is a joint infection that causes excruciating pain. It typically manifests as a single hot, swollen, and extremely painful joint. Malaise, erythema, swelling, tenderness, and a reduced range of motion in a one joint are common features of septic arthritis [2][3]. In this study, updated physical therapy treatment protocol of septic arthritis after Hansen's disease is shown to play a part in recovering range of motion (ROM), strength of muscles, and pain relief. During first two weeks, pain and swelling was treated with application of cryotherapy and TENS and then patient was progressed to passive range of motion exercises. During 2-4 weeks, patient was started with active assisted and active range of motion exercises. Focus was also made on improving strength of right lower extremity and isometric strength exercises were performed. Strength training is essential for improving muscle performance, which aids in the recovery of Musculoskeletal symptoms such as pain, weakness, stiffness, and decreased range of motion [8]. This was combined with neuromuscular electrical stimulation (NMES) to quadriceps and hamstring to increase the strength [9]. During 4-6 weeks patient was progressed to resistive exercises. Interventions which focus on enhancing muscle motor control while walking were started, balance activities were started. The

primary aims of recovery following surgical treatment of a septic joint disease are to restore joint range of motion and strength while also keeping the joint surfaces in good condition. Joint mobilizations, active and passive range of motion exercises, and muscle strengthening activities are considered standard of care when it comes to restoring mobility following a manipulation. According to Yercan et al46, manipulation performed during the first three weeks after surgery is more probably to increase range of motion results than manipulation performed after in the recovery period [10]. In this study, by adopting and progressing patient education, range of motion exercises, isometric exercises, rehabilitative activities, and neuromuscular reeducation, the patient was able to set back to a healthier lifestyle. Due to reduced pain, increased muscle strength, and enhanced motor function, he was able to complete his desired daily activities [11]. Neuromuscular electrical stimulation (NEMS) to the quadriceps and hamstring muscles resulted in much better increase in the muscle strength. It could be more effective to use recovery techniques like NMES right after surgery because Avoiding muscular function loss early after surgery is more likely to be beneficial than attempting to restore it later. In this case study modified physiotherapy rehabilitation aid in pain relief, improving range of motion and increase in strength of muscles.

CONCLUSIONS

Septic arthritis is a joint infection that causes excruciating pain. Bacteria, viruses, and fungi may enter the joint via a variety of routes, causing synovial membrane inflammation. It manifests as a single hot, swollen, and extremely painful joint with reduced range of motion. According to this study, after six weeks of rehabilitation, there was a considerable increase in muscular strength and functional independence using strengthening exercises, muscle reeducation, electrotherapy, and other physical therapy approaches. This case study illustrates the significance of systematic physical rehabilitation after septic arthritis in order to ensure a good recovery for the patient.

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