Case report

**A contemporary physiotherapy approach to a post-sequestrectomy rehabilitation in an adolescent female**

Anushka Mudey, Snehal Samal, Lynn Fernandes, Palak P. Darda, Neha Chitale, Pratik Phansopkar*

Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India.

**ABSTRACT**

Chronic Myelitis results in the pyogenic infection of the bone. In this case, the right tibia was affected and as a result, a Sequestrectomy surgery was carried out, followed by the application of an Ilizarov fixator. Post-operatively, there were various limitations in the ability of the patient to carry out activities of daily living effectively and efficiently. Hence, physiotherapy sessions were initiated in an attempt to bring about improvement in the individual. Patient’s main concerns included pain in her affected leg, inability to flex her knee and difficulty in standing, walking since the occurrence of the operation also difficulty in bed mobility. Pain was 7/10 on numeric pain rating scale during activity and on rest 5/10. The patient was a post-operative case of Sequestrectomy, after being diagnosed with chronic osteomyelitis on the right leg. Her X-rays showed her limb before and after the operation. Physiotherapeutic sessions were begun, that included means of educating the patient and her family, reducing her pain, bringing about normal ROM in the affected joints, strengthening exercises, and finally, gait training. At the end of the physiotherapy sessions, the patient was able to independently walk with a significant improvement in the ROMs of the affected limb. After the hospital sessions, a home program was also recommended to patient with occasional follow-up consultations. The results that compared the before and after physiotherapy sessions showed positive results; which further implies the importance and necessity of physiotherapy in these types of post-operative cases.

**Keywords:** Physiotherapy, Rehabilitation, Osteomyelitis, Sequestrectomy, Strength Training, Ambulation Training.

Received – 10-06-2021, Accepted- 19-01-2022

Correspondence: Pratik Phansopkar* drpratik77@gmail.com

**INTRODUCTION**

Body infections, include the involvement of bones and joints are generally very irritable to the patients affected and the doctors treating them. Avascular necrosis that occurs in the bone is associated with the formation of sequestrum, resulting in a condition referred to as ‘Chronic Osteomyelitis’. These include physiotherapeutic interventions, alongside the involvement of other departments [1]. Proper care from the initial stages avoid the occurrences of secondary complications [2]. To benefit the patient and improve the quality of life, physical therapy is known to be useful, especially after fractures and surgeries [3].

Sequestrectomy, followed by Saucerization, Curettage, and ultimately Excision of the bone that is infected is usually the treatment done for these cases. Amputation after long standing discharging sinus is then looked as a possibility [4]. Osteomyelitis is considered by orthopedic surgeons, to be a very challenging condition [5]. In order to treat cases of infected bones in Chronic Myelitis, sequestrectomy and curettage provide a chance at survival and ultimately also the eradication of the disease. For surgeries involving pyogenic infections of the bone, Ilizarov external fixator application is generally done [6], allows the improvement and management of bone loss and instability.

Physiotherapy sessions are designed based on the individuals: their signs and symptoms, and the time from surgery [7]. The most efficient and hence best rehabilitation results in independence of the patient, his/her social recovery and return to having the ability to conduct daily activities that include walking and ambulation [8].

**Patient Information**

A 13-year-old female had undergone an operation for her case of chronic osteomyelitis on the right tibia. She was in supine lying as was most comfortable in that position, as seen in figure 1. Physiotherapists were called to the ward to start their sessions on the second day. The patient had complaints of pain over the right leg from the site of surgery, difficulty in activities, quick fatigue, a lack of strength and the inability to move from the bed, since the operation.

**Clinical Findings**

When the patient came to the physiotherapy department, she was completely evaluated. The evaluation was done after informed consent was taken from her and her family. Her X-rays were studied, both before and after the operation. Patient’s main concerns included pain in her affected leg, inability to flex her knee and difficulty in standing, walking since the occurrence of the operation also difficulty...
in bed mobility. Pain was 7/10 on numeric pain rating scale during activity and on rest 5/10.

These are shown in Image C and Image D respectively. Her affected limbs’ strengths and ranges of motions were reduced, when compared to the contralateral limb, seen in Tables 3, 4 and 5. When she was asked about her pain, she reported a NPRS grade 7. The surgical scars were clearly visible; they were dry and healing well as seen in Image A and Image B. The Ilizarov ring fixator was appropriately positioned around the right leg. There was no swelling present. Grade 2 tenderness was noticed upon palpation over the surrounding area of the healing scars and Ilizarov fixation areas. The patient was unable to flex her knee; however, isometric quadriceps and hamstrings contractions could be carried out but were significantly weaker than the contralateral limb. Patellar mobility was normal. Lower limb length measurements showed that the right infected limb was 2 inches longer than the left unaffected limb, as seen in Table 1.

Table 1. Lower limb length measurement one day after the sequestrectomy
<table>
<thead>
<tr>
<th>Events</th>
<th>Dates of events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of injury (Fall)</td>
<td>5 May 2019</td>
</tr>
<tr>
<td>Date of procedure in a government hospital (Incision, drainage and antibiotic bead application)</td>
<td>11 May 2019</td>
</tr>
<tr>
<td>Date of procedure of antibiotic bead removal in government hospital</td>
<td>28 May 2019</td>
</tr>
<tr>
<td>Date of admission into AVBRH</td>
<td>22 June 2019</td>
</tr>
<tr>
<td>Date of sequestrectomy and Ilizarov fixator application operation</td>
<td>27 June 2019</td>
</tr>
<tr>
<td>Date of initiation of physiotherapy sessions</td>
<td>28 June 2019</td>
</tr>
<tr>
<td>Date of Discharge from AVBRH and end of physiotherapy sessions</td>
<td>29 July 2019</td>
</tr>
</tbody>
</table>

Lower Extremity Functional Scale (LEFS)
Physiotherapy session Pre score: 12/80 Maximal percentage function: 15.00%. Physiotherapy session Post score: 51/80 Maximal percentage function: 63.75%

NPRS: Numeric pain rating scale
Physiotherapy session Pre score: 7/10 on activity and 5/10 on rest. Physiotherapy session Post score: 2/10

Treatment protocol
In the beginning, the patient was restricted to her bed and was limited to a few exercises.

WEEK 1
Static quadriceps and hamstrings isometric exercises were initiated in the first week post-surgery to provide relaxation, improve circulation, and decrease the pain in the soft tissues; these were repeated 10 times, each with a 10 second hold. Ankle pumps, toe curls and stretches were also carried out daily (20 repetitions each session). There were in total two physiotherapy sessions per day when these activities were conducted. No resistance exercises were permitted to be performed during this week.

WEEK 2 – 3
By the beginning of the second week, active-assisted heel slides, hip flexion, abduction against gravity, dynamic quadriceps exercises, VMO strengthening in high sitting position were carried out. Active and passive stretches were prescribed for all the muscles and joints as well. 20 stretch repetitions with 10 sec hold were done in each 15-minute session. There were 2 physiotherapy sessions per day. By
the middle of the second week, resisted exercises was begun, and was progressively increased as the patient got stronger.

**WEEK 4**

By the fourth week, ambulatory activity was begun, using a walker. Since the right lower limb was 5.08 cm longer than the left, appropriate footwear was prescribed to raise the left lower limb. Dynamic quadriceps and VMO strengthening were more focused and repetitions were 30 times a day. With this patient started walking within the ward 3-4 times daily. Bed side activities were also encouraged and improvement was seen. After this, she was discharged and was instructed to continue her exercises and walking activity at home. Follow up consultations continued once in 2 weeks after her discharge from the hospital.

**Follow up and outcomes**

Table 3 shows the results of the MMT of the lower limb joints before the initiation and after completion of the physiotherapy session.

Table 4 shows the results of active range of motion testing before the initiation and after completion of the physiotherapy session.

Table 5 shows the results of passive range of motion testing before the initiation and after completion of the physiotherapy session.

NPRS showed the reduction of pain, from 7/10 at the beginning at the physiotherapy sessions, to 2/10 at the end of sessions.

LEFS score showed an improvement in the maximal functioning, from 15.00% to 63.75%.

**DISCUSSION**

In our case report, we treated a patient of chronic osteomyelitis in the right tibia. She underwent sequestrectomy and was advised physiotherapy treatment for her pain, decreased strength and ranges of motion in the lower limb movements. The goals of the physiotherapy sessions were to boost the confidence and motivate the patient to ultimately reach a satisfactory level of independence, perform activities of daily living efficiently, improve the strength and increase the joints’ ranges of motion. The patient responded well and positive results were seen by the end of the rehabilitation sessions.

In this study, ‘Early physiotherapy rehabilitation approach enhances recovery in rare acute tibial osteomyelitis post-operative in a 9 year old child’, Cryotherapy and rehabilitation exercises (that included isometric contractions for the hamstrings, quadriceps, and glutei muscles), active assisted movements (for hip flexion-extension and abduction-adduction), and ankle toe movements were performed for ten repetitions, to improve muscle integrity and promotes independence for daily activities [4]. In our study, we also used a similar treatment protocol which proved to be fruitful.

In the article written by James Plummer, ‘Chronic Nonbacterial Osteomyelitis’, published in the Journal of Orthopedic & Sports Physical Therapy; conservative management was adequate enough to bring about a good prognosis. The only surgical procedure required was the biopsy to determine the type of mass. [5] However, in our case, an invasive procedure (Sequestrectomy) was a necessity to bring about the possibility of even the slightest chance at a positive prognosis.

In the study conducted by Julia et al, ‘Physical activity and health-related quality of life in chronic non-bacterial osteomyelitis’ in Pediatric Rheumatology published by Springer Nature; the osteomyelitis showed no relevant differences in objective measurements of physical activity and fitness. [10][11] In our case, the osteomyelitis significantly affected the patient’s physical activity; in fact, she was unable to do even the basic activities of daily living independently.

**Result**

By the end of the physiotherapy sessions, a significant improvement was seen in the patient’s ability to carry out her activities of daily living independently. The patient reported a reduction in the pain felt; a score of 2/10 which is much less when compared to the initial 7/10 before the start of the physiotherapy sessions. There was also an increase in the ranges of motions and the strengths of the muscles involved in the lower limbs of the patients. These showed an improvement, increasing the maximal functional percentage from 15% before starting the physiotherapy sessions to 63.75% by the end of the physiotherapy sessions.

**CONCLUSION**

Eventually, both the patient and her doctors were equally satisfied. It would have benefitted the patient further if she or her
family were aware or educated about the importance of physiotherapy before undergoing any of the operations.

REFERENCES

How to cite this article