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Physiotherapy Rehabilitation for Persistent Symptoms After Osgood-Schlatter Disease Surgery: A Case Report

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Abstract

Background: Persistent symptoms after Osgood-Schlatter Disease (OSD) surgery may lead to chronic knee pain, limited range of motion, and reduced functional capacity. Evidence regarding postoperative physiotherapy rehabilitation in adults remains limited.
Objective: To describe the short-term outcomes of a structured physiotherapy rehabilitation program in a patient with persistent symptoms two years after OSD surgery.
Methods: This CARE-compliant case report involved a 26-year-old woman with persistent right knee pain and functional limitation two years after OSD surgery with internal screw fixation. The patient underwent three physiotherapy sessions consisting of Transcutaneous Electrical Nerve Stimulation (TENS), ultrasound therapy, extracorporeal shock wave therapy (ESWT), scar management, and therapeutic exercises based on the FITT principle. Outcomes were assessed using the Numeric Rating Scale (NRS), knee range of motion (ROM), and Knee Injury and Osteoarthritis Outcome Score (KOOS).
Results: After intervention, knee extension improved from 3° limitation to 0°, while knee flexion improved from 130° to 140°. Pain during movement decreased from 6/10 to 2/10 on the NRS. KOOS improved from 54 to 64, indicating functional improvement. No adverse effects were reported during the intervention period.
Conclusion: A structured multimodal physiotherapy rehabilitation program was associated with short-term improvements in pain, knee ROM, and functional status in this patient with chronic postoperative OSD symptoms. However, findings should be interpreted cautiously because they were derived from a single-case report with short-term follow-up.

Keywords
Osgood-Schlatter Disease; Rehabilitation; Physical Therapy Modalities; Knee Joint; Range of Motion; Pain Measurement

Introduction

Osgood-Schlatter Disease (OSD) is a traction apophysitis of the tibial tuberosity commonly observed in physically active adolescents during periods of rapid skeletal growth. The condition develops due to repetitive traction stress generated by the quadriceps muscle through the patellar tendon at the tibial tubercle, resulting in localized pain, inflammation, and functional limitation around the anterior knee.[1, 2] Clinically, OSD is characterized by pain at the tibial tuberosity, tenderness on palpation, swelling, and symptoms aggravated by activities such as running, jumping, squatting, and stair climbing.[2] Although OSD is generally considered a self-limiting condition, persistent symptoms may continue into adulthood in some individuals, particularly in cases involving unresolved ossicle formation, chronic inflammation, or prolonged mechanical overload.[3, 4]

Most patients with OSD respond favorably to conservative management, including activity modification, therapeutic exercise, and symptom management.[1] However, surgical intervention may be indicated in refractory cases with chronic pain, symptomatic ossicles, persistent tibial tubercle prominence, or prolonged functional limitation that does not improve with conservative treatment.[2] Despite surgical correction, several patients continue to experience postoperative symptoms such as anterior knee pain, scar hypersensitivity, movement restriction, muscle tightness, and reduced functional capacity.[4, 5] Persistent postoperative symptoms may also be associated with residual soft tissue irritation, altered lower-extremity biomechanics, postoperative scar fibrosis, tendon-related dysfunction, and chronic pain sensitization mechanisms, which may negatively affect long-term knee function and activity tolerance.[2]

Physiotherapy rehabilitation has an important role in postoperative recovery by facilitating pain reduction, restoring joint mobility, improving muscle performance, and enhancing neuromuscular control. Current rehabilitation approaches commonly involve progressive strengthening exercise, flexibility training, stabilization exercise, proprioceptive intervention, scar management, and physical modalities.[1, 6] Exercise-based rehabilitation has been reported to improve knee function and reduce pain through gradual load adaptation and improved lower-extremity biomechanics.[6] In addition, modalities such as Transcutaneous Electrical Nerve Stimulation (TENS), ultrasound therapy, and extracorporeal shock wave therapy (ESWT) are frequently used to support pain modulation and soft tissue recovery. Nevertheless, evidence regarding the effectiveness of several electrotherapeutic modalities in chronic postoperative OSD remains heterogeneous and continues to be debated.[1, 2]

Previous studies have primarily focused on conservative management in adolescent populations, whereas reports describing multimodal physiotherapy rehabilitation following OSD surgery in adults remain limited.[1, 3] Furthermore, evidence regarding short-term functional improvement and rehabilitation outcomes in patients with persistent postoperative symptoms several years after surgery is still scarce. Therefore, documenting clinical presentation, rehabilitation strategies, and functional outcomes in chronic postoperative OSD cases may provide additional clinical insight for physiotherapists managing musculoskeletal knee dysfunction.
This case report aimed to describe the clinical presentation and short-term outcomes of a structured multimodal physiotherapy rehabilitation program in a patient with persistent symptoms two years after Osgood-Schlatter Disease surgery.

Methods

This study was designed as a CARE-compliant case report describing the physiotherapy rehabilitation process and short-term clinical outcomes of a patient with persistent symptoms following Osgood-Schlatter Disease (OSD) surgery. The rehabilitation program was conducted at an outpatient musculoskeletal physiotherapy clinic, A3 Physio Center. Written informed consent was obtained from the patient before intervention and publication of clinical information. Patient confidentiality was maintained throughout the study and manuscript preparation process.

The patient was a 26-year-old woman who underwent surgery for Osgood-Schlatter Disease in 2023 due to persistent anterior knee pain and symptomatic tibial tubercle prominence. Postoperative radiographic findings demonstrated internal screw fixation at the tibial tuberosity region. Two years after surgery, the patient continued to report persistent right knee pain, stiffness, hypersensitivity around the incision area, and difficulty performing prolonged walking, stair negotiation, and activities requiring repetitive knee flexion. The patient remained independent during daily activities but avoided high-load activities because they aggravated her symptoms. No acute postoperative complications or signs of severe inflammatory reaction were identified during clinical examination.

Clinical assessment was performed through history taking, physical examination, musculoskeletal evaluation, and radiographic review. Physical examination demonstrated visible prominence at the right tibial tuberosity, knee valgus alignment, and postoperative scar formation. Palpation revealed tenderness around the incision site and medial knee region, hypersensitivity over the scar tissue, and muscle tightness involving the rectus femoris, hamstring, and gastrocnemius muscles. Active knee range of motion assessment demonstrated limited flexion and terminal extension. Muscle strength examination using Manual Muscle Testing (MMT) showed grade 5/5 strength in both knee flexors and extensors despite the presence of functional limitation during weight-bearing activities. This discrepancy was clinically interpreted as being associated with pain provocation, movement avoidance, soft tissue tightness, and persistent postoperative sensitivity rather than isolated muscle weakness.

Knee range of motion was measured using a universal goniometer with the patient positioned supine. Measurements were performed by the same physiotherapist to improve measurement consistency. Baseline assessment showed right knee flexion of 130° and extension limitation of 3°. Pain intensity was assessed using the Numeric Rating Scale (NRS), where 0 represented no pain and 10 represented the worst imaginable pain. The patient reported pain scores of 6/10 during movement and palpation, and 2/10 at rest. Functional status was evaluated using the Knee Injury and Osteoarthritis Outcome Score (KOOS), which assesses pain, symptoms, activities of daily living, sport and recreation function, and knee-related quality of life. The baseline KOOS score was 54, indicating moderate functional impairment.[7, 8]

Radiographic examination was reviewed as part of the diagnostic assessment. Preoperative radiographs demonstrated fragmentation and prominence at the tibial tuberosity around the patellar tendon insertion. Postoperative radiographs demonstrated internal screw fixation without evidence of acute hardware-related complications. Persistent postoperative symptoms were clinically considered to be associated with residual soft tissue irritation, scar hypersensitivity, chronic mechanical overload, and tendon-related dysfunction around the anterior knee. Differential clinical considerations included residual patellar tendon irritation and postoperative scar fibrosis.

The physiotherapy rehabilitation program consisted of multimodal interventions including Transcutaneous Electrical Nerve Stimulation (TENS), ultrasound therapy, extracorporeal shock wave therapy (ESWT), scar management, and therapeutic exercise. Intervention selection was based on the patient's clinical presentation, including pain sensitivity, soft tissue tightness, movement limitation, and reduced functional tolerance during dynamic activities. Therapeutic exercise was prescribed according to the FITT principle (frequency, intensity, time, and type) and adjusted according to symptom tolerance during each session. Exercise-based rehabilitation was selected based on evidence supporting activity modification and progressive strengthening in OSD management.[6]

The physiotherapy management pathway began with an initial assessment and baseline data collection, followed by a comprehensive evaluation of pain and functional status. The intervention consisted of electrotherapy and soft tissue techniques, followed by therapeutic exercise targeting muscle activation and stabilization. Pain and functional status were reassessed after each treatment session to monitor clinical changes. A final comprehensive evaluation was performed after the third session to assess the short term changes in pain and functional outcomes, as illustrated in Figure 1.

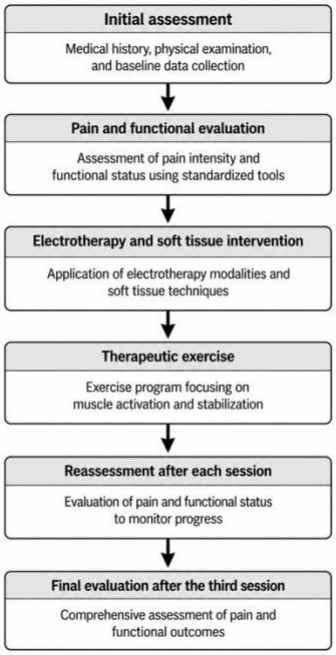

Figure 1. Clinical Workflow of Physiotherapy Intervention and Outcome Assessment

TENS was applied twice weekly at an intensity of 34 mA for 20 minutes to assist pain modulation. Ultrasound therapy was delivered using continuous mode at an intensity of 1.0 W/cm² with a frequency of 1 MHz using standard coupling gel. ESWT was administered using radial shock wave application targeting the hamstring region with 500 pulses per region. Scar management intervention was performed around the incision area to reduce hypersensitivity and improve soft tissue mobility.

Therapeutic exercise focused on quadriceps activation, lower-extremity strengthening, flexibility, and neuromuscular stabilization. The exercise program included quadriceps setting exercise, walking lunges, tibialis activation with ankle dorsiflexion, heel slide exercise, supine spine twist, and single-leg stretch exercise. Pain monitoring was performed throughout the intervention period to avoid excessive symptom provocation, and no adverse effects or symptom exacerbation were reported during treatment sessions.

Outcome evaluation was performed before the first treatment session and after completion of the third session. Primary outcomes included pain intensity measured using NRS, knee range of motion measured using goniometry, and functional status assessed using KOOS. Data were analyzed descriptively by comparing baseline and post-intervention findings to identify short-term clinical changes following physiotherapy rehabilitation.

Results

The patient completed three physiotherapy rehabilitation sessions without interruption or reported adverse effects during the intervention period. Clinical reassessment was performed after completion of the rehabilitation program to evaluate changes in pain intensity, knee range of motion, and functional status. Overall, short-term clinical improvement was observed following the structured multimodal physiotherapy intervention. To improve clarity and reduce redundancy, the primary clinical outcomes before and after intervention are summarized in Table 1.

Table 1. Summary of Clinical Outcomes Before and After Physiotherapy Intervention

Outcome Measure	Baseline Assessment	Post-Intervention Assessment
Knee Extension ROM	3° limitation	0°
Knee Flexion ROM	130°	140°
Pain During Movement (NRS)	6/10	2/10
Tenderness Pain (NRS)	6/10	2/10
Resting Pain (NRS)	2/10	1/10
KOOS Total Score	54	64

Improvements in knee mobility were observed after completion of the rehabilitation program. Baseline examination demonstrated limited terminal knee extension of 3° and knee flexion of 130°, indicating movement restriction in the affected knee. Following three physiotherapy sessions, knee extension improved to full extension (0°), while knee flexion increased to 140**°.** These findings indicate improved joint mobility and reduced movement limitation during functional activities.

Pain intensity also decreased throughout the intervention period. At baseline, the patient reported pain scores of 6/10 during active movement and palpation, while resting pain was recorded at 2/10 using the Numeric Rating Scale (NRS). Following the rehabilitation program, movement-related pain and tenderness decreased to 2/10, whereas resting pain decreased to 1/10. The patient additionally reported improved tolerance during walking and stair-related activities after the intervention period. No symptom exacerbation or adverse responses associated with TENS, ultrasound therapy, ESWT, scar management, or therapeutic exercise were identified during treatment sessions.

Functional status was evaluated using the Knee Injury and Osteoarthritis Outcome Score (KOOS). Baseline assessment demonstrated a total KOOS score of 54, reflecting moderate functional limitation associated with pain, stiffness, and reduced activity tolerance. After completion of physiotherapy intervention, the KOOS score improved to 64. Improvement was observed across several KOOS domains, particularly pain, symptoms, activities of daily living, and knee-related quality of life.

To provide a clearer overview of functional changes across KOOS domains, the detailed score progression is summarized in Table 2.

Table 2. Changes in KOOS Subscale Scores

KOOS Subscale	Baseline Score	Post-Intervention Score
Pain	15	17
Symptoms	8	10
Activities of Daily Living	13	15
Sport and Recreation	7	8
Quality of Life	11	14
Total Score	54	64

Although improvement was observed after the intervention period, functional limitation during high-demand activities remained present, particularly during sport-related movement and prolonged knee loading activities. Because this report involved a short-term intervention period consisting of only three sessions, no long-term follow-up evaluation was available to determine maintenance of clinical improvement over time.

The clinical course began with persistent postoperative symptoms reported between 2023 and 2025, followed by a baseline physiotherapy assessment to establish the patient's initial clinical and functional status. The physiotherapy program was then implemented over three treatment sessions. Session 1 marked the initiation of intervention, followed by continued treatment and interim reassessment during Session 2. Session 3 involved further intervention and final reassessment of the measured outcomes. The overall clinical course and short term changes in clinical and functional outcomes are summarized in Figure 2.

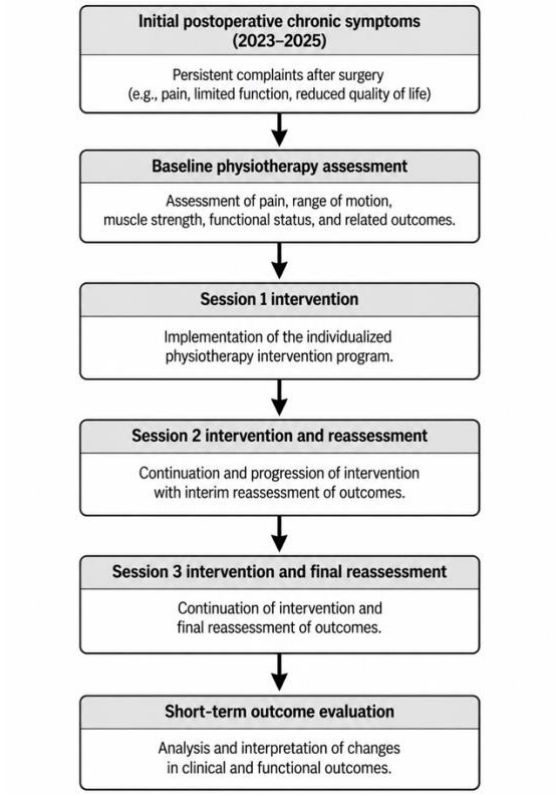

Figure 2. Clinical Timeline of Postoperative Physiotherapy Management and Outcome Assessment

Discussion

This case report described the short-term outcomes of a structured multimodal physiotherapy rehabilitation program in a patient with persistent symptoms two years after Osgood-Schlatter Disease (OSD) surgery. Following three rehabilitation sessions, improvements were observed in pain intensity, knee range of motion, and functional status. Although the magnitude of improvement remained relatively modest, the findings suggest that physiotherapy rehabilitation may contribute to symptom reduction and functional improvement in patients with chronic postoperative OSD symptoms.

Persistent symptoms after OSD surgery are relatively uncommon but may occur in patients with unresolved soft tissue irritation, residual tendon-related dysfunction, postoperative scar sensitivity, altered movement mechanics, or chronic overload around the anterior knee.[3, 4] Previous studies have reported that some individuals continue to experience pain and activity limitation despite surgical intervention, particularly during kneeling, squatting, stair negotiation, and sports-related activities.[3, 4] In the present case, the patient demonstrated ongoing pain, limited terminal knee extension, scar hypersensitivity, and functional limitation two years after surgery, suggesting that structural correction alone may not fully resolve long-term neuromuscular and biomechanical dysfunction. Chronic postoperative pain in musculoskeletal conditions is frequently multifactorial and may involve both peripheral tissue sensitivity and altered pain processing mechanisms. Therefore, rehabilitation strategies focusing on pain modulation, movement restoration, and gradual functional loading remain clinically important even during the chronic postoperative stage.

Improvement in knee range of motion was observed after completion of the rehabilitation program, particularly in terminal knee extension and knee flexion. Restricted knee mobility following surgery may be associated with soft tissue tightness, pain-related movement avoidance, postoperative scar fibrosis, and reduced flexibility of surrounding musculature**.** In this case, tightness involving the rectus femoris, hamstring, and gastrocnemius muscles may have contributed to altered knee biomechanics and reduced movement efficiency during functional activities. Therapeutic exercises emphasizing mobility, muscle activation, and progressive movement exposure may improve soft tissue extensibility and neuromuscular coordination, thereby facilitating restoration of knee mobility.[6] Restoration of terminal knee extension is clinically important because extension deficits may alter gait mechanics, increase quadriceps demand, and contribute to persistent anterior knee symptoms during weight-bearing activities.

Pain reduction was also observed during the intervention period, with movement-related pain decreasing from 6/10 to 2/10 on the Numeric Rating Scale. The reduction in symptoms may be associated with the combined effects of therapeutic exercise, gradual activity exposure, scar management, and electrotherapeutic modalities. TENS is commonly used for pain modulation through stimulation of afferent sensory pathways and temporary reduction of nociceptive input. Ultrasound therapy has also been proposed to improve local circulation and soft tissue extensibility, although evidence supporting its effectiveness in chronic musculoskeletal disorders remains inconsistent.[1] Similarly, ESWT has recently been investigated as an adjunctive treatment for chronic tendon-related disorders because of its potential effects on pain modulation and tissue remodeling. However, current evidence regarding ESWT in OSD remains heterogeneous, and its clinical superiority compared with exercise-based rehabilitation alone has not been conclusively established.[1, 2] Therefore, the present findings should not be interpreted as evidence supporting the isolated effectiveness of any single modality because the rehabilitation program involved multiple simultaneous interventions.

The improvement observed in KOOS scores may indicate better perceived knee function and activity tolerance following rehabilitation. Functional improvement in chronic knee disorders is often associated with reduced pain, improved movement confidence, and enhanced neuromuscular control rather than isolated increases in muscle strength. Although Manual Muscle Testing demonstrated normal muscle strength at baseline, the patient continued to experience substantial activity limitation. This discrepancy may reflect the limited sensitivity of conventional MMT in identifying deficits related to movement quality, dynamic stability, endurance, or pain-provoked functional performance. Persistent symptoms following OSD may also involve kinetic chain dysfunction, altered lower-extremity loading patterns, and compensatory movement strategies that cannot be adequately captured using isolated strength

testing alone. Consequently, exercise interventions focusing on stabilization, movement control, and progressive loading may have contributed to the observed functional improvement despite relatively preserved baseline muscle strength.

The inclusion of stabilization and lower-extremity strengthening exercises in this rehabilitation program was based on the concept that dynamic knee function is influenced by proximal muscle control and lower-limb biomechanics. Previous evidence suggests that progressive strengthening and activity modification are important components of OSD rehabilitation because excessive patellar tendon loading and altered movement mechanics may perpetuate symptoms.[6] Exercises such as quadriceps activation, walking lunges, and stabilization exercises were selected to improve neuromuscular coordination and support functional knee stability during daily activities. Nevertheless, because the intervention duration was limited to three sessions, the observed improvement should be interpreted cautiously, and further progression of strengthening and load-management exercise would likely be required to achieve optimal long-term recovery.

Several limitations should be acknowledged in this report. First, this study involved only a single patient, which limits generalizability of the findings to broader postoperative OSD populations. Second, the rehabilitation program consisted of multiple simultaneous interventions, making it difficult to determine the specific contribution of each modality to the observed outcomes. Third, the intervention duration and follow-up period were relatively short, preventing evaluation of long-term symptom persistence or sustainability of functional improvement. Fourth, no objective performance-based assessment such as gait analysis, stair-climbing evaluation, squat testing, or walking endurance measurement was performed. Additionally, placebo effects, natural symptom fluctuation, and nonspecific therapeutic effects cannot be excluded when interpreting the clinical improvement observed in this case.

Despite these limitations, this report provides additional clinical insight regarding physiotherapy rehabilitation in chronic postoperative OSD, a condition that remains relatively underreported in the literature. The findings suggest that structured multimodal rehabilitation incorporating symptom-guided exercise, mobility intervention, scar management, and gradual functional loading may be clinically beneficial in patients with persistent postoperative symptoms**.** Future studies involving larger samples, longer follow-up periods, and standardized rehabilitation protocols are needed to clarify the effectiveness of postoperative rehabilitation strategies for chronic OSD and to determine appropriate rehabilitation progression criteria for functional recovery.

Conclusion

This case report demonstrated that a structured multimodal physiotherapy rehabilitation program was associated with short-term improvements in pain intensity, knee range of motion, and functional status in a patient with persistent symptoms two years after Osgood-Schlatter Disease surgery. Improvements were observed following interventions consisting of therapeutic exercise, scar management, and electrotherapeutic modalities combined with progressive functional rehabilitation.

The findings highlight the potential clinical value of physiotherapy rehabilitation in managing chronic postoperative OSD symptoms, particularly in addressing pain-related functional limitation and movement restriction. However, because this report was based on a single patient with short-term follow-up, the findings cannot be generalized to broader patient populations.

Future studies involving larger sample sizes, objective functional performance assessment, longer follow-up duration, and standardized rehabilitation protocols are recommended to further evaluate the effectiveness and optimal progression of postoperative rehabilitation strategies for Osgood-Schlatter Disease.

Author Contributions

Marcella Ridha Khairu Nisa: Conceptualization, methodology, data curation, formal analysis, investigation, and writing-original draft preparation.
Wijianto: Conceptualization, supervision, methodology, and writing-review and editing.
Anggi Wahyu Sudianingrum: Supervision, validation, and writing-review and editing.
All authors have read and approved the final version of the manuscript.

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Conflict of Interest

The authors declare no conflicts of interest related to this study.

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Ethics Statement

Written informed consent was obtained from the patient prior to intervention and publication of anonymized clinical information. Patient confidentiality was maintained throughout the study and manuscript preparation process.

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