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Physiotherapy rehabilitation post posterior cruciate ligament avulsion fracture with emphasis on relaxation techniques for anxiety - A case report

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ABSTRACT

Posterior Cruciate Ligament avulsion fracture from its attachment at tibia is a rare occurrence and accounts for only a small percentage of injuries related to the ligaments of the knee. The most common cause of such avulsion fracture is road traffic accidents, often dash board injuries that lead to posterior translation of the tibia. This case report presents a 46 year old female professor sustaining injuries due to vehicular accident a month back, along with frequent episodes of anxiety. Post radiological investigations and operative procedure physiotherapy rehabilitation focused on both patient education to reduce patients' apprehension to move the limb post operatively and on regaining mobility of patellofemoral and tibiofemoral joints. Lyhom scale was used as an outcome measure to assess the progression of the condition.

Keywords: Posterior cruciate ligament, Rehabilitation, Avulsion, Fracture, Case report

1. INTRODUCTION

Posterior cruciate ligament (PCL) is a major ligament that stabilises the posteriorly directed motion of tibia on femur at the tibiofemoral joint. Its distal attachment at the tibial plateau is the major site of avulsion fracture, even though PCL tear with avulsion fracture is a rare injury due to its thickness which is 1.3 to 2 times more than the anterior cruciate ligament. Falls, traumatic events like vehicular accidents or sporting activities like football or skiing that leads to an excessive force in a posterior direction on tibia especially when the knee joint is flexed, is the potential cause of such injuries. A rotational hyperextension injury to the knee joint is a less prevalent cause of harm.

Apprehension to move the joint pre as well as post- surgery is a major cause of concern and should to address immediately. With individual having history of anxiety in day to day life, it can lead to complication later in the process of rehabilitation when patient refuses to mobilise the joint and limb due to pain and fear. Physiotherapy rehabilitation in such cases should begin pre operatively where patients are made completely aware about the precautions that needs to be taken and the course of the condition (Siroya et al., 2021). Familiarising the patients with exercises prior also boosts patient's confidence and reduces the fear (Danielsson et al., 2013).

2. CASE PRESENTATION

A 46 year old female presented with the complaints of pain and odema over left knee since one month. She stated a history of road traffic accident due to fall from a vehicle following which her symptoms appeared. The patient visited a private hospital where she was advised surgery based on the radiological finding but the patient refused to opt for surgical intervention and continued with application of medicated liquid on the affected knee thrice a month. As the relief was inadequate and her daily activities were hampered as she could not stand for a long period of time with the continued perception of pain, patient then visited a hospital for further management. Radiological and MRI investigation showed isolated avulsion fracture of posterior cruciate ligament.

Clinical manifestation

On local knee examination pre operatively fixed flexion deformity of approximately of 5 degrees was present for left knee. Diffuse swelling present over left knee and a posterior lag was seen with limb length discrepancy apparent shortening of left lower limb of 0.5cm, Bony tenderness over medial and lateral joint line. Knee flexion range was assessed to be from 5-100 degrees and painful. Special test performed were anterior drawer test, Lachman's test and posterior drawer test, all were clinically negative. Valgus stress test was found to be positive.

Diagnostic assessment

Radiological investigations showed Avulsion fracture of the posterior cruciate ligament from its tibial attachment (figure 1). Magnetic resonance imaging shows medial collateral ligament partial tear.

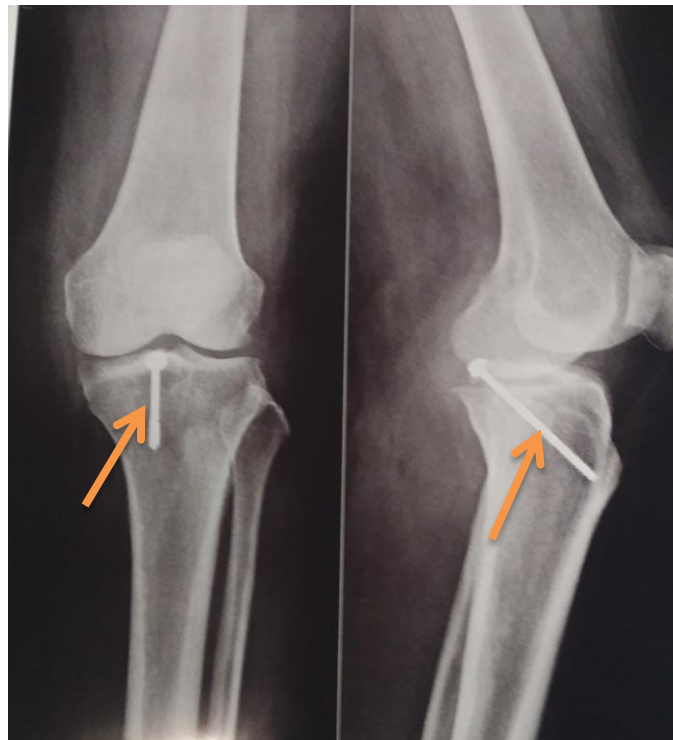


Figure 1 Post-operative X-ray Showing reduction with single 4.5mm cannulated cancellous screw.

Management

Physiotherapy rehabilitation begins post operatively from day one. The initial 3-4 weeks post- surgery are considered as the protection phase where the reduced fracture segment needs to be protected against any stress that may re displace it. During this

phase of rehabilitation, the patient was immobilised in extension to prevent its posterior tibial- subluxation and to reduce unwanted stress on anterolateral fibres of posterior cruciate ligament. mid-end range flexion is avoided in the early days of this first phase.

Isometric exercises for quadriceps, hamstrings and gluteal muscles is initiated with the contract relax technique for first 3 days with ten repetitions, single set. This exercise is performed thrice a day. This is progressed to contract - hold for 5 seconds - relax technique of exercise. As the patient gets comfortable with the exercise, and an increase in isometric strength from weak painful to weak painless/strong occurs further progression by increasing the number of repetitions/sets is done.

The importance of strengthening quadriceps muscle is that, the discontinuation of the crutches depends upon the strength of quadriceps muscles and its ability to control knee motion without assistance during ambulation (Figure 2-3). Active range of motion and strengthening exercises for hip abductors and flexors are also initiated in the first week in supine and then progressed to side lying. Range of motion exercise for knee in done in prone lying, passive knee flexion beyond 45 degrees, isolated hamstring exercise and more than 25% of weight bearing on ambulation is avoided during this phase. Patellar mobilization, training for crutch and stretching for gastrocnemius were also the part of rehabilitation.

As the patient had anxiety due to fear of the trauma and apprehension to move the limb, guided imagery technique was used every day at the end of exercise programme. The patient was asked to keep his eyes closed and through vocal commands of the therapist, patient was asked to imagine scenarios of mountains or lying on grass that would help them relax (Nguyen and Brymer, 2018; Rasi et al., 2020). At the cessation of the first phase of rehabilitation static cycling can be started with zero resistance. Core strengthening exercises to activate transverse abdominals are also initiated. As the patient is weaned off from the crutch training gait training should include single leg balance training with increasing complexity during single leg stance by adding closing of eyes or moving the upper extremity component. Home exercise programme was given to the patient by the end of third week as patient was discharged from in patient department setting.



Figure 2 Represents Active Assisted Knee range of motion on the affected left side



Figure 3 Patient performing quadriceps strengthening Exercises post operatively in bed side sitting for bilateral lower limb.

Follow up and outcome measure

Since Strengthening, ranges of joint and gait training were focused during the rehabilitation the outcome measures taken are resisted isometric contraction grading (Table1), goniometer (Table 2) and lysholm scale (Table 4) respectively to assess the prognosis (Table 3).

Table 1 Post- operative progression in strength of muscle assessed by resisted isometric contraction.

Muscle Tested	Day 1 post surgery	Day 15 post surgery	Day 21 post surgery
Quadriceps	Weak painful	Weak painless	Strong
Gluteal	Weak painless	Strong	Strong
Hamstrings	-	Weak	weak

Table 2 comparison of post- operative ranges from day 1 to day 21

Range Tested	Day 1 post surgery	Day 15 post surgery	Day 21 post surgery
Knee Flexion	Not assessed due to pain	0-35 degrees	0-60 degrees
Knee Extension	complete	35-0 degrees	60-0 degrees

Table 3 progression in ambulation during the hospital stays of the patient

Gait Training	Day 1	Day 15	Day 21
	Cannot be performed.	Crutch walking Non weight bearing.	Crutch walking with less than 25% of weight bearing (toe touch) was taught to the patient.(advise to begin the same only after completion of 4 weeks)

Table 4 Scoring of Lysholm knee injuries scoring scale. The higher the score is the better is the outcome

Pre operatively	Post -operatively Day 21
37/100	74/100

3. DISCUSSION

In this case study early rehabilitation with emphases on free weight exercise rather than weight bearing exercise was the key. Initiating from exercises in gravity eliminated plane to resisted exercises with weights was achieved through regular exercise programme. Since the patient had minimal idea about physical therapy, educating both patient and caregivers was an important aspect of the rehabilitation. Patient presented with a previous history of anxiety and therefore, patient education early in the phase of rehabilitation with emphases to perform relaxation exercises throughout the day till the out- patient care is not started. Surgical approach of treatment depends upon the severity of fracture and includes use of steel wires, suture anchors, absorbable screws, or hollow lag screws of internal fixation (Chen et al., 2016). In this case a single 4.5mm cannulated cancellous screw was used for fracture side fixation. A study on functional outcome post open reduction internal fixation concluded that stable and early fixation with controlled mobilisation provided excellent clinical and function outcomes (Alsaleem et al., 2020; Joshi et al., 2017).

Several outcomes measures can be used for injuries related to knee such as Knee Injury and Osteoarthritis Outcome Scale (KOOS), ACL Quality of Life, Cincinnati knee rating scale, WOMAC (Wright, 2009). Lysholm Knee scale has been used in the study which is widely used for post- operative follow up often in ligament injuries. Rehabilitation process focused on strengthening vastus lateralis, vastus medialis, vastus intermedialis and rectus femoris muscle that is the quadriceps muscle of the affected extremity. In the later phase, balance re-training exercises were of importance to reduced patient reported apprehension to perform even mild jumping /stepping activities.

4. CONCLUSION

Avulsion fracture of PCL with anxiety cannot be rehabilitated in a single day. Physical therapy is integral parts of the recovery and management post -surgery. It requires long term Physiotherapy, rehabilitation and designing of specialized programs in such cases

with a secondary condition like anxiety. Physiotherapy will help in improving functional status, ADLs and to help them make independent with reducing their anxiety and fear. The patient progressed well in this case study because of her familiarization to the physical management prior to the surgery and adding of effective relaxation techniques. After efficiently working together, the patient was able to ambulate with crutches.

Author’s contribution

MZ and MVJ conceptualized and took the case, MVJ and PAP implication of treatment, MVJ assisted in documenting the case. MZ wrote the manuscript. All the authors previewed and approved the case report before submission.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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