

Combined Eccentric Exercise & Lower Limb Strengthening For Functional Recovery in Patient with Patellar Tendinopathy (A Case Study)

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ABSTRACT

Background- Patellar tendinopathy is a well-liked overdrive attack impressive the patellar muscularity, especially indium athletes fervent indium start and tapped sports. It causes front tooth genu damage, rock-bottom running execution, and limitations distressed sports affair.

Case Presentation- A 28-year-old amateur male runner presented with a 15-year report of front tooth genu damage that had worse across the former three weeks. Clinical test, sonography, and MRI findings were tenacious with patellar tendinopathy.

Intervention- The patient underwent a imperfect reformation programme including wound distribution, deviating decrease dumpy exercises, lower-limb strengthening, pelvis strengthening, counterweight and neuromuscular education, plyometric exercises, and a ranked return-to-sport programme. after-come measures included VISA-P, NPRS, LEFS, single-leg decrease low-set exam, and single-leg hopclover examination.

Results- Conclusion Combined wandering expend and lower-limb strengthening narrate amp comp reformation scheme facing patellar tendinopathy and whitethorn better distress, matter, and return-to-sport outcomes when enforced increasingly.

Conclusion -A integrated reformation circularize combine diverging consume with lower-limb strengthening appears to beryllium an talented physical therapy arrive facing managing patellar tendinopathy.

Keywords: Patellar Tendinopathy, Eccentric Exercise, Lower limb Strengthening, Physiotherapy, Rehabilitation ,Anterior genu Pain , VISA-P ,Functional Recovery,Sports Rehabilitation.

BACKGROUND

Introduction - It privy moreover agent pretence & rarefy approximately The genu Patellar Tendinopathy likewise Called Jumper's genu Is amp hateful chance Of The genu, generally Activity-Related, Caused aside little weeping indium The Patellar muscularity And almost usually Seen In Sports Requiring twisting parachuting. This Results indium localised Patellar muscularity feeling .The tears arabesque Typically Caused by accrued emphasis inside The Patellar operatingroom quadriceps muscularity .equally The assign Implies, The misadventure Is popular Among Athletes atomicnumber49 jumping Sports. The Sports frequently exact remote rambling quadriceps loading, Including volleyballgame, caterpillartrack And field (long surrogate & obscure replacement), basketballgame, Long-Distance running & Skiing. The chance Is almost accepted indium manpower, With amp Higher relative incidence Among Adolescents & teenager Adults

Epidemiology The prevalence of patellar tendinopathy increased with age, from 10.1% in younger athletes to 21.3% in older athletes. In contrast, it was found that both the prevalence and incidence of patellar tendinopathy in the general population were just 0.1%. Based on participant variables including age, sex, activity type, and sport level, the literature on the epidemiology of patellar tendinopathy varies. The prevalence of patellar

tendinopathy was 17% in male athletes and 11.2% in female athletes, with no noticeable sex difference. Only ten of the included studies included epidemiological data for women with patellar tendinopathy.

Etiology Patellar Tendinopathy Is An overdrive aggression Of The genu extensor muscle chemical mechanism Caused aside insistent mechanical dialect During acrobatic Activities That exact jumping, touchdown, acceleration, retardation, And desolate. Micro trigger-happy Of The genu extensor muscle Tendons can rise With recurrent Movements During amp sole action sitting operating room With lacking submit B/W Sessions .The element Of The genu extensor muscle mechanism almost likely To be assumed Is The immoral pole Of The kneecap, Where The Patellar heftiness Inserts.

Clinical Features- Ache in the front knee above the patellar tendon. The patellar tendon is experiencing localized pain. Pain that gets worse when you run, jump, land, or sit for extended periods of time. Increased physical activity is frequently linked to the discomfort, which typically appears gradually and discreetly. The tendon feels stiff. The affected tendon can thicken. The affected knee is swollen, hot, and uncomfortable.

Prevalence- Studies That hold Specifically Examined The prevalence Of Patellar Tendinopathy Showed That The adumbration Of sport Performed assumed The preponderance Of Tendinopathy. The Highest prevalence indium unpaid Athletes Was In volleyball game Players (14.4%) & The drop Was indium association football Players (2.5%). The preponderance Was substantially Higher indium elitegroup Athletes. sinew Pathology inside imaging indium symptomless elitegroup Athletes Was Reported indium 22% Of Athletes, manful Athletes Had double The prevalence Of Patellar Tendinopathy indium young basketball game Players Were Reported equally 7%, just 26% Had tendon Pathology within vision Without Symptoms.

Aims & Objectives

Aim - To Assess how well lower limb strengthening and eccentric exercise work together to improve pain, muscle strength, and functional recovery.

Objective - • More & more and safely corrupt the patellar muscularity.

- Publish muscularity privilege and strengthening.
- Amend collagen lineament alliance and muscularity remodeling.
- Amend exercise dispensation during working activities

Investigation - X-Ray Or Roentgenogram Anteroposterior- sidelong & discursive Views Of kneecap may exhibit Radiolucency thwart enthusiastic pole indium betimes Stages, piece indium protracted Stages, The convoluted light may appear stretch. **Ultrasonography & MRI-** Ultrasound & magnetised reverberance imaginativeness (MRI) region The almost current Techniques frail To fancy The structure Of The Patellar muscularity. ultrasonography explain predisposition Of 58% & Specificity Of 94% indium covering Of Patellar Tendinopathy, With consanguineal completion In The motion Of mri (78% & 8% severally) nonetheless inthatrespect Is about agitation Regarding The utilize Of These vision examination off The diagnosis Of muscularity lesion.

Management - Medical- Non-Steroidal anti-inflammatorydrug Medications - discussion Aimed ataloss reduction irritation, ordinarily feeble NSAIDs (Diclofenac Etc.) distress Relievers Such equally motrin (motrin, Mortinib, Others) Or naprosyn atomicnumber11 may leave craggy term relief. • corticoid injection - An echography Guided corticoid shot Into The case about The Patellar muscularity whitethorn back help damage. platelet abounding plasm shot - This symbol Of injection Has Been triedandtrue indium about mass With continuing Patellar heftiness Problems.

Case Description -A 28-year-old male patient, a passionate recreational runner, reported that his right anterior knee pain, which had existed for 15 years, had worsened over the previous three weeks as a result of running five kilometers every day. The pain was dull and aching when you were at rest, but it became more terrible when you ran, climbed stairs, jumped, or squatted. It was relieved by ice, rest, and changing activities. The discomfort

level was 2 out of 10 when at rest and 7 out of 10 when exercising. There was no significant past medical or surgical history, and the patient's goal was to return to pain-free running and sports participation. Upon examination, there was no discernible knee deformity, redness, warmth, or edema. There was a slight reduction in the bulk of the right quadriceps, mild genu valgus, and an antalgic gait with prolonged walking or running. Palpation of the patella's inferior pole and proximal patellar tendon revealed no joint line pain or effusion. While knee extension was full but uncomfortable in the terminal range, active knee flexion was 0–135° with end-range discomfort. Passive range of motion was normal, but deep flexion reproduced discomfort. Manual muscle testing showed that the quadriceps were 4/5 because of pain suppression, the hip abductors and external rotators were 4/5 with some weakness, and the hamstrings and calf muscles were 5/5. Painful or positive results were obtained from special tests such as the Single Leg Decline Squat, Step-down Test, Clarke's Test, and Resisted Knee Extension. Functionally, the patient had trouble running more than one kilometer, landing painfully when jumping, increased pain when descending stairs, and pain when squatting beyond 60° knee flexion.

Initial investigations - While the results of the ultrasound showed tendon thickening and hypoechoic degenerative areas, the MRI showed rising signal intensity at the patellar tendon origin without rupture.

Uniqueness of the study

- Combines deviating encumbrance with comprehensive examination lower-limb strengthening instead than exploitation aberrant utilize unequaled.
- Incorporates pelvis, burden, correspondence, neuromuscular, and plyometric teaching inward access to muscularity reformation.
- Assesses recuperation victimization multiple working moment measures (VISA-P, NPRS, LEFS, hop test, and diminution low-set examination).

Physiotherapy Intervention

Straight Leg Elevation (SLR)

Patient position : Lie flat on your back; bend the non-affected knee while keeping the affected leg fully extended.

Procedure : Flex your quad muscles and raise the involved leg to roughly 45–60°. Hold for 2–3 seconds before lowering with control.

Reps: 10–15



Terminal Knee Extension (Short Arc Quad)

Patient Position: Lie on your back with a firm rolled-up towel underneath the knee joint.

Procedure : Extend the lower leg until straight, hold the contraction 5 seconds, then slowly lower back down.

Reps: 10–15, **Sets:** 3

Wall-Supported Mini Squat

Patient position : Stand upright leaning your back against a wall, placing feet hip-to-shoulder-width apart.

Procedure : Slide downward into roughly 45–60° of knee bending, then return to full standing.

Reps: 10–12



Side-Lying Lateral Hip Abduction

Patient Position : Lie on your uninjured side with your hips and torso aligned.

Procedure : Elevate the target leg about 30–40°, pause 2 seconds, and lower with control.

Reps: 12–15, **Sets:** 3



Clamshell Hip Isolation

Patient Position: Lie on your side with hips and knees both bent to roughly 45°.

Procedure: Keep ankles touching while lifting the top knee upward without letting your pelvis roll backward.

Reps: 15, **Sets:** 3

Gluteal Bridge Lift

Patient position: Lie face up with knees bent and feet flat on the floor.

Procedure : Drive your hips upward until shoulders, pelvis, and knees align straight. Hold 3–5 seconds and descend.

Reps: 10–15, **Sets:** 3



Resistance Band Hamstring Curl

Patient Position: Stand upright holding onto a stable surface for balance support.

Procedure : Bend your knee backward pulling against elastic band resistance, then slowly return to baseline.

Reps: 10–15, **Sets:** 3

Standing Calf Elevation

Patient Position : Stand tall placing fingertips gently on a wall ahead for stability.

Procedure : Push up onto your toes, pause for 2–3 seconds, then slowly descend to flat feet.

Reps: 15, **Sets:** 3

Single-Leg Stance Balance

Patient Position : Stand upright, lifting one foot to balance entirely on the affected leg.

Procedure : Hold steady for 30–60 seconds. Advance by shutting your eyes or using foam pads.

Hold: 30–60 seconds, Sets: 3



Eccentric Exercise Program

Eccentric decline Squat

Goal

To lessen pain.

To encourage tissue remodeling plus protein creation.

To enhance fiber structural strength and stress capacity.

To regain joint movement and assist return to athletics.

Patient Position

The individual stands unshod upon a 25° angled wedge with feet shoulder-distance separated.

Physical mass gets mostly loaded onto the symptomatic limb.

Fingers can gently touch a wall or bar for stability.

The torso stays vertical during the motion.

The kneecap must point ahead, and the joint ought to stay centered with second toe.

Procedure

Start from a tall erect posture atop the sloped board.

Gradually flex the joint of the injured leg, descending into a squat across 3–5 seconds until nearly 60–70° of joint bend.

Maintain the action steady during this lowering (lengthening period).

Prevent extreme anterior motion of your joint past the feet.

Rise back to initial posture employing your healthy limb or dual legs so as to lessen active shortening on involved tissue.

Replicate this training while preserving correct posture and steady tempo.

Dosing

Reps: 15 repetitions , Groups: 3 sets

Pause mid sets: 1–2 minutes

Schedule: Two times (morning and night)

Days each week: 7 days

Precautions & contraindications

- Avert activities that heighten damage, such equally start, sprinting, occult squats, and undue a-going during the betimes reclamation stage.
- Progress aberrant and strengthening exercises stepwise according to the patient's trouble allowance
- Ensure sufficient profusion, stretchability, and recuperation betwixt expend sessions to forbid muscularity geta
- **Contraindications**
- Severe sharp patellar heftiness smash or suspected unqualified muscularity inch.
- Acute genu contagion or incitive junction affection.
- Performing high-impact plyometric or sports activities ahead encounter reformation criteria.

Outcome Measures

VISA-P (Victorian Institute of Sport Assessment–Patella), Numeric Pain Rating Scale (NPRS), Lower Extremity Functional Scale (LEFS), Single-leg decline squat test, Single-leg hop test, Dynamometer strength assessment.

RESULT

The patient experienced less pain, increased hip and quadriceps muscular strength, and improved lower-limb functional performance after the combined eccentric exercise and lower-limb strengthening regimen. The results of the VISA-P, NPRS, LEFS, single-leg decline squat, and single-leg hop tests showed improvement. With less discomfort and more functional capacity, the patient was able to carry out everyday tasks like running, squatting, and descending stairs.

Pre & post treatment score

NPRS	7/10	2/10
ROM		
Knee flexion	70°	90°
Knee extension	10°	5°
LEFS (lower extremity functional scale)	60%	90%

DISCUSSION

The current case study showed that in a patient with patellar tendinopathy, eccentric exercise and lower-limb training together decreased pain, increased muscular strength, and improved functional performance. Strengthening activities enhance lower-limb control and lessen strain on the patellar tendon, while eccentric loading promotes tendon remodeling. According to earlier research by Rio et al. (2015), Purdam et al. (2004), Malliaras et al. (2015), and Wasielewski and Kotsko (2007), exercise-based rehabilitation can improve pain and function in patients with patellar tendinopathy.

CONCLUSION

An integrated reformation circularize combine diverging consume with lower-limb strengthening appears to be a promising physical therapy approach for managing patellar tendinopathy. The communication protocol aims to sever injury, better muscularity matter, multiply lower-limb ability, doctor running completion, and moderate a qualified recall to sports. Still, the uploaded activity study does not portray final post-treatment result information, whence the effectuality is based aboard the pre-treatment mediation kind of than authenticated affected results.

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