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Multi ligament Knee Injury Following Anterior Dislocation in a Young Adult: Surgical and Rehabilitative Management – A Case Study

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Abstract

Severe dislocation of the knees after forceful impact is one of the exceptional situations faced by orthopaedic surgeons. In this article, we describe how a 21-year-old male, after a motorcycle accident, ended up partially displacing his tibia in the anterior direction relative to his femur along with complete tears in his ACL, PCL, and MCL injuries correspond to Schenk KDIIIM classification—and how his treatment consisted of open reduction and internal fixation for his fractured tibia, which continued with removal of fixation rods and ended with repairing his torn ligaments.

At admission, pain (7/10), flexibility limited to only 55 degrees of bending in the knee, and Muscle strength assessed as 2+/5 were present. With focused physical therapy throughout the different phases of surgery, active flexion improved to 120 degrees, pain reduced to only 2/10, and independently walked home for discharge. Radiographic confirmation of injuries was done. Thanks to proper care, normal circulation was maintained. Continuous care prevented wasting of muscles prior to surgery and development of scar tissue post surgery to ease readmission into collegiate life. This particular scenario highlights the vital role of physical therapy in repairing complex injuries to the knee joint, more so in situations of resource constraint, including adhering to home physical therapy despite pain.

Keywords: *Knee dislocation, Schenck KDIIIM, ligament reconstruction, physical therapy, rehabilitation outcomes*

1. Introduction:

Knee displacements are very rare, with a prevalence of around 0.02%, but very serious, especially the anterior variety caused by excessive straightening of the knee beyond 30°, especially among young males due to traffic accidents, causing tears to multiple ligaments, cartilage injury, and vascular emergencies in a quarter of cases. Schenck KDIIIM indicates injuries to both cruciates, as well as a side stabilizer, with a need for immediate relocation and surgical repairs.(1,2).

Common management includes verifying the flow of blood, fixing ligaments, and rehab in order to avoid looseness. However, personal treatment approaches in the aftermath of such injuries are very underdeveloped in less developed regions. This narrative will follow the comprehensive healing process of a college student in Pune following a highway accident, from bone mending in emergencies to functioning in daily life. (3,4).

2. Patient Information:

A healthy 21-year-old engineering student from Pune, India—no smoking habit, standard body weight—met with disaster on November 11, 2023. While riding his bike on the expressway, a truck slammed into him from behind, flinging him onto a divider. This inflicted open left tibial fracture, massive bleeding, and left knee dislocation. No head injury or comorbidities; family history negative for orthopedics.
Rushed by ambulance for first aid, he transferred to Sassoon Hospital next day for ORIF. Discharged November 17 amid escalating knee pain and immobility, he entered Dr. DY Patil Hospital on November 20. Relatives worried over bending restrictions and walking dependence two months in. Psychosocial support strong from parents(5)

3. Clinical Findings:

November 20 assessment showed supine posture with external rotation. Bandages encased left femur-tibia and distal tibia; knee swelling masked. Pain: acute onset, sharp/shooting (NPRS 7/10 activity, 3/10 rest), flared by flexion/hip rotation, eased by rest/meds. The attitude of the patient and application of bandages can be seen in figure 1 and 2.

Active ROM:

Motion	Left	Right
Hip Flexion	0-135°	0-125°
Knee Flexion	0-55°	0-120°
Ankle DF	0-24°	0-30°

Strength: 2+/3 left limb (quads/hamstrings worst). End-feel: empty knee flexion (pain), bony extension. Pulses intact; no neuro deficits.

Figure 1: Showing application of bandages

Figure 2: Showing assessment of Range of motion using Goniometer

4. Timeline

Date	Key Developments
Nov 11, 2023	RTA; X-ray shows anterior dislocation.
Nov 12	Tibial ORIF.
Nov 17	Discharge.
Nov 20	PT referral.
Dec 2	Rod removal (pre-op PT hits 98° flexion).
Dec 27	ACL/PCL/MCL recon.
Mar 2024 Discharge	Full function(6)

5. Diagnostic Assessment:

November 11 X-ray: femur anterior on tibia, fibula bent, patella high—classic KDIIIM. November 20 films verified hardware. ABI normal excluded vascular tear; Schenck criteria confirmed without MRI (instability risk). Differentials: isolated fracture ruled out. Figure 3 and 4

Figure 3: AP and Lateral view of knee joint

Figure 4: Post operative X ray of the knee joint

6. Therapeutic Intervention:

Phase I: Immediate Post-operative Phase (Week 0–2)

Goals

- Pain and edema control
- Protection of grafts and surgical repair

- Prevention of quadriceps inhibition
- Maintenance of cardiovascular and upper-limb conditioning

Precautions

- Knee brace locked in extension during ambulation
- Non-weight bearing or partial weight bearing (as per surgeon's protocol)
- Avoid posterior tibial translation (especially in PCL involvement)
- No active hamstring contraction if PCL reconstructed

Interventions

- Cryotherapy (10–15 min, 3–4×/day)
- Limb elevation and compression bandaging
- Ankle pumps and toe curls
- Isometric exercises:
  - Quadriceps sets
  - Gluteal sets
- Straight leg raises (with brace, if quadriceps control achieved)
- Passive knee ROM:
  - 0–30° initially → progress to 0–60° by end of week 2 (as tolerated)
- Patellar mobilization (superior–inferior, medial–lateral)
- Upper-limb and core strengthening exercises

Phase II: Early Mobilization Phase (Week 3–6)

Goals

- Gradual increase in knee ROM
- Initiation of controlled weight bearing
- Improve quadriceps activation
- Maintain graft protection

Weight Bearing

- Progress from partial to full weight bearing with brace
- Brace unlocked gradually for controlled ROM

Interventions

- Active-assisted → active knee ROM exercises:
  - Target ROM: 0–90° by week 4, 0–110° by week 6
- Closed kinetic chain (CKC) exercises:
  - Mini squats (0–45°)
  - Weight shifts (AP and lateral)
- Quadriceps strengthening:
  - Short arc quadriceps

    - Terminal knee extension (TKE)
- Hip strengthening (abductors, extensors)
- Proprioceptive training:
    - Double-leg stance on stable surface
- Gait training with emphasis on heel-strike and knee control

Phase III: Strengthening Phase (Week 7–12)

Goals

- Achieve near-full ROM
- Improve muscular strength and endurance
- Enhance neuromuscular control
- Prepare for functional activities

Interventions

- Full ROM exercises (target: 0–130° or symmetrical to contralateral side)
- Progressive resistance exercises:
    - Leg press (low resistance, controlled range)
    - Wall squats
    - Step-ups and step-downs
- Hamstring strengthening (initiated cautiously if permitted)
- Core stabilization exercises
- Proprioceptive training:
    - Single-leg stance
    - Balance board / foam surface
- Stationary cycling (low resistance)
- Treadmill walking (gradual speed progression)

Phase IV: Advanced Strengthening and Functional Training (Week 13–20)

Goals

- Restore dynamic knee stability
- Improve agility and functional performance
- Enhance confidence in limb use

Interventions

- Advanced strengthening:
    - Lunges (forward and lateral)
    - Resistance band exercises
- Plyometric drills (low-impact initially):
    - Double-leg hopping → single-leg hopping
- Agility drills:

    - Side stepping
    - Figure-of-eight walking
- Advanced proprioception:
    - Perturbation training
    - Single-leg balance with external challenges
- Cardiovascular conditioning:
    - Elliptical trainer
    - Cycling with resistance

Phase V: Return-to-Activity Phase (Week 21–28+)

Goals

- Achieve pre-injury functional level
- Ensure joint stability during high-level tasks
- Prevent re-injury

Interventions

- Sport- or occupation-specific training
- Running progression (if applicable):
    - Straight-line jogging → directional changes
- Advanced plyometrics:
    - Bounding
    - Jump-landing mechanics training
- Functional testing:
    - Single-leg hop tests
    - Strength symmetry assessment
- Patient education on injury prevention and self-management

Suture care, q2h turns. No complications; logged adherence(7).

7. Follow up and Outcome:

Discharge: knee 120° flexion/0-5° extension, 4+/5 strength, NPRS 2/10, normal gait. 6MWT +200%. 6-month tele-check: sustained, light activities resumed. PT drove gains per serial goniometry.

8. Discussion:

Anterior dislocations, which thrive on hyperextension, tear apart pillars like this KDIIIM. Initiation of exercises before surgery plays an important role in preventing muscle atrophy and aftercare, continuous passive motion device (CPM) is useful in restoring range of motion and avoid stiffness around the joint help in faster recovery and improve knee bending from 55 to 120° (8,9). Due to pain and guarding the treatment started slowly resulted in weakness in both the lower limbs specifically knee joint. The results are same with major knee injuries. Early achievement of independent walking highlights the benefit of

step wise training whereas the study have certain shortcomings such as short follow up period and absence of reference(control) group. Despite the constraints physical therapy proved to be playing significant role in rehabilitation of knee dislocation and ensuring sustained functional recovery and long term outcome (10,11).

9. Conclusion:

Post traumatic multi ligament knee injury from anterior dislocation of the knee joint complex requires an integrated medical surgical and rehabilitation strategy. In this scenario a well planned recovery program played a crucial role in recovery of the patient and improve outcome by training proprioception, neuromuscular control, muscle strengthening, range of motion restoration.
Graded progressive rehabilitation regimen plays an importance role in facilitation recovery prevent atrophy, stiffness and complication caused by immobilization over the course of treatment the assessment showed improvement in mobility, strength and functional independence. We conclude a tailored rehabilitation program showed proved to be beneficial in improving outcome measures in individuals with multi ligament injury caused by anterior dislocation of the knee joint.

10. Patient Perspective:

"Physio changed my leg completely. Couldn't walk or bend without agony before. Now free to study. Step-by-step made it possible.

11. Informed Consent:

Oral consent for care, images, publication obtained. Anonymized; ethics cleared. No conflicts.

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