

## Multiple Knee Ligament Injuries: Algorithm for Treatment

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## Current Trends

- Orthopaedic surgeons are trained to do surgery
- Current trend for knee dislocations is to repair or reconstruct all torn structures
- This approach is overtreatment and leads to complications!

## Introduction

- Knee dislocations worry most orthopedists because:
  - Severity
  - Lack of comfort with treatment
  - Poor outcomes
  - Possible complications

## Introduction

- Unrecognized injuries can have a bad disabling result (most of these are lateral side injuries)
- Acute surgery gives good stability but causes many motion problems and less than normal knees (90% medial)
- Medial and lateral side injuries are different as are ACL/PCL injuries
- Need to separate the individual parts

## Most Important Determination

- Determine if the knee dislocation is medial or lateral disruption
- Different approaches to treatment based on type of injury
  - Medial – acute surgery is not advised because stiffness is frequent
  - Lateral – acute surgery is needed to reattach the distally torn lateral capsule and stiffness is rare

## Initial Evaluation

- History
  - Mechanism of injury?
  - How painful was the injury?
- Observe
  - Active ROM and leg control
  - Observe swelling
    - Is there a large hemarthrosis and is it contained within the capsule?
    - If so, the capsule is still intact and the injury is not as severe

## Initial Evaluation

- Is there diffuse swelling in which the capsule is disrupted, causing swelling and/or discoloration into the calf?
- If so, the injury is more severe, although the knee may look less bad

## Medial Side Knee Dislocation



## MCL injury

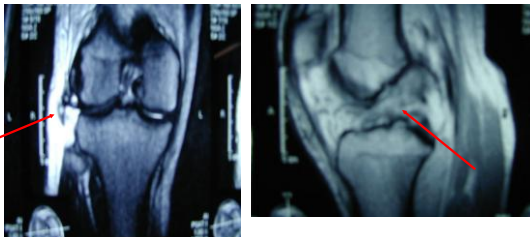
- Proximal injury



## Lateral Side Knee Dislocation



## Lateral Side Injury



## Initial Evaluation

- Observe the knee
  - Is there gross posterior sagging of the tibia?
  - Does the knee go into recurvatum?
  - Evaluate peroneal nerve in lateral side injuries
  - By the time the patient is seen in the office, the vascular status has been confirmed, but make sure to check this if seeing the injury at an athletic event

## Knee Dislocation Approach to Treatment

- Approach to treatment regardless of whether it is a medial or lateral side dislocation is based on the healing potential of the ligaments
- What ligaments can heal?
  - MCL
  - PCL
- What ligaments usually do NOT heal?
  - ACL
  - Lateral side structures

## Knee Dislocation Approach to Treatment

- Major goal is to do the least amount of surgery needed to allow for the best long-term outcome
- Do not want to do a surgery that causes long-term ROM problems
- We want to allow ligaments to heal if possible

## Ligament healing

- Well accepted that the MCL heal
- Some believe that the MCL may not heal well when other structures are torn
- If proper stabilization is provided that prevents stress on the MCL, it can heal regardless of other structures injured

## PCL healing

- PCL can heal either as an isolated injury or with knee dislocation
  - Tewes et al. (CORR 1997)
    - Isolated injuries in 13 patients
    - Performed MRI at acute injury and at follow-up
    - Return of continuity in 10 of 13 complete PCL injuries
    - The 3 patients who had discontinuous PCLs had 2+ posterior drawer on exam

## PCL Healing

- Shelbourne et al. (Am J Knee Surg 1999)
  - MRI at acute injury and at a mean of 3.2 years after injury
    - 23 isolated PCLs
    - 12 PCL/MCL
    - 5 PCL/ACL and lateral or medial side

## PCL Healing

- 21 of 23 isolated injuries healed
- All PCLs with PCL/MCL injuries healed
- PCL/ACL injury – PCL healed, ACL did not
- 2 PCL/MCL/ACL injury – PCL and MCL healed; ACL did not
- PCL/MCL/lateral side – PCL and MCL healed; lateral side did not



## PCL healing

- Degree of PCL laxity doesn't determine outcome
- No difference in subjective scores between patients with 1+ or 2+ PCL laxity (Shelbourne et al. AJSM 1999)

## Medial side/ACL/PCL

- High incidence of knee stiffness and arthrofibrosis is acute ACL surgery
- Worse in ACL/MCL surgery
- It is not surprising that stiffness is even worse with acute surgery for medial side knee dislocations

## ACL/PCL/MCL

- Confirm the ACL tear
- Need to determine location of MCL injury and degree of laxity
- Check for PCL injury
- At initial evaluation, if the knee is too swollen or the patient is not comfortable enough to allow for posterior drawer exam
  - Use TED hose, cold/compression, and elevation for a few days and then re-examine the knee
- MRI may be helpful but even severe grade 3 PCL injuries on MRI have been shown to heal with continuity

## Medial Injury - Proximal

- Determine if the injury is proximal or distal
  - Proximal injuries
    - Usually more painful
    - Large amount of swelling
    - Knee in a bent position
    - These injuries cause the knee to get stiff quickly
  - Distal injuries
    - Less swelling
    - Knee is comfortable in extension

## Cast vs. Immobilizer

- Immobilizer not secure enough to provide good stability
- Cast is more comfortable and allows weight bearing
- Remove the cast at least weekly to evaluate MCL healing
- Can reapply another cast if needed



## Casting

- Proximal injury
  - Gets stiff quickly
  - MCL “healing” usually occurs in 1-2 weeks
- Distal injury
  - Less swelling and the knee does not get as stiff
  - May take longer period of casting to obtain MCL healing

## ACL/PCL/MCL

- Once MCL healing occurs, re-evaluate PCL and ACL stability
- PCL most likely has healed to where you have a 1+ or 2+ posterior drawer with a good endpoint
- ACL reconstruction can be performed electively based on the patient’s lifestyle, demands, and knee ROM

## Medial side knee dislocations

- Key to successful results is to make sure the MCL heals well
- That is why we prefer a cast over a brace
- The MCL heals and the patient is more comfortable during the process
- If some residual laxity persists, the MCL laxity can be addressed during ACL surgery

## Knee Dislocation with Lateral side injury

- Not a common injury – only 10% of knee dislocations and 1% of all knee ligament injuries
- When the injury is unrecognized, patients usually have disabling symptoms
- Lateral side injuries can involve the IT band, lateral capsule, popliteus, LCL, biceps tendon and lateral gastroc
- With marked lateral laxity, multiple structures are involved

## Knee Dislocation with Lateral side injury

- Clinically, the most important structure providing stability is the lateral capsule
- The lateral capsule and biceps tear distally and retract proximally and will not heal as is
- Usually, the IT band and lateral gastroc are not injured
- Body quickly begins healing the tissue “en masse”
- Needs acute repair if > 1+ laxity
- Check for peroneal nerve injury

## Lateral side knee dislocation

**Structures  
tear distally  
and retracted  
proximally;  
will not heal  
as is**

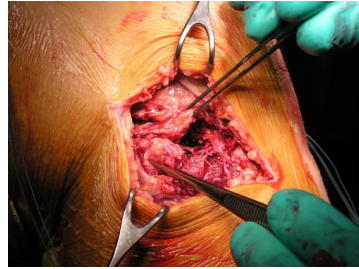


## Lateral side knee dislocation



Biceps torn off the fibular head

## Lateral structures torn off distally



## Treatment

- Lateral side injuries require immediate attention
- Surgical repair within 2 weeks after the injury is desired
  - Lateral stability usually can be established
  - Balance obtaining ROM and decreased swelling with the ability to repair the lateral structures

## Treatment

- Can perform an ACL reconstruction along with lateral repair acutely
- Must be done as an open procedure
- If you want to do the ACL with arthroscopy, you will need to do staged procedures after the open lateral repair
- Repairing lateral side acutely is most important

## Treatment

- Do ACL at the time of lateral side repair for patients who are higher risk – to protect the lateral side repair
- Allow the PCL to heal when lateral side repair is done

## Reattach the joint capsule to tibia



Reattach lateral structures en masse to tibia with a staple



## Follow-up Study

- 17 patients returned for follow-up examination and MRI
- Average time from surgery at follow up- 4.6 years

## Subjective Results

Questionnaire	Mean	Range	SD
Modified Noyes Score	93.5	71-100	7.4
IKDC Subjective Scores	92.3	71-100	9.3
Activity Level-	8.2	6-10	1.3

## Objective Results

- Ligamentous Testing
  - Two with 1+ lateral laxity
  - Two with 1+ posterior laxity
  - One with 1+ anterior laxity
- IKDC Knee Exam Results
  - 11 rated as normal, 6 as nearly normal
- All but 1 patient had full range of motion

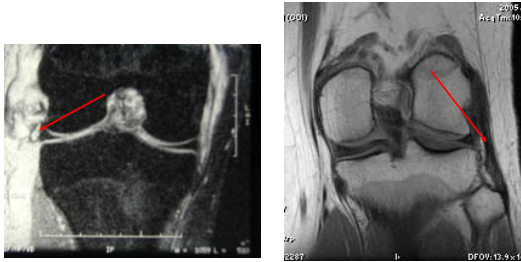
## Radiographic Results

- No knees demonstrated medial or lateral joint compartment narrowing
- One individual had patellofemoral joint space narrowing
- Varus Stress Radiographs
  - Mean difference between surgical and non-surgical legs- 1.1 mm (range, -1.2 mm to 4.7 mm)

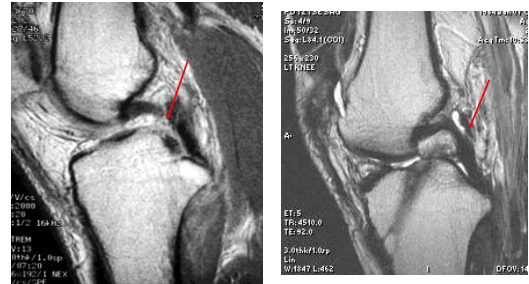
## MRI Results

- Lateral Side Repair
  - All presented intact/healed and appeared thickened
- All PCL injuries healed
  - Usually seen as elongated, buckled, or attenuated
  - All were intact and demonstrated bridging fibers

## MRI of lateral side repair



## MRI of healed PCL injury



## Simple Treatment Approach

- #1 Goal – obtain functional stability without loss of knee motion, as loss of ROM leads to OA
- PCL laxity combined with collateral laxity is a problem
  - Have to get the MCL to heal (can be achieved nonoperatively)
  - Have to do surgery for lateral side injuries

## Simple Treatment Approach

- PCL will heal with conservative treatment even with other structures torn
- Lateral side repair should be performed within two weeks of the injury for best results
- Perform ACL reconstruction IF NEEDED
- Better off waiting to do ACL reconstruction if in doubt
- This approach will NOT lead to ROM problems and will provide good stability and function

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