

## CHAPTER SIX

# **Manual Therapy for Patients with Knee OA**

## Knee Manual Therapy Protocol

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## **Knee Manual Therapy Protocol**

### **General Guidelines**

The goal of manual therapy: tissue altering techniques. The intention is to treat each impairment with manual techniques which will take the joint to end of range at least once in a treatment session, imparting sufficient stress to the connective tissue to result in permanent tissue lengthening via tissue strain. The intention is to treat each impairment with manual techniques which will take the joint to end of range by employing the highest dose of mobilization appropriate. The therapist should achieve at least one set of grade III, IV or V each session. (Caution with EOR techniques for knee flexion as a degenerative meniscus is easily aggravated in this position).

**Joint position:** The therapist may select a joint position for treatment based on their assessment of the irritability of the patient's condition. Joint position can be altered in response to patient reporting or test: re-test findings.

**Patient position:** The therapist may modify the patient's starting position for treatment based on the patient's condition. Patient position can be altered in response to patient inability to achieve the standard position or reporting discomfort.

### **Dose**

**Accessory movements** can be performed in sets of 30 oscillations. At least 3 sets should be performed. The therapist should employ the highest dose of mobilization appropriate, with at least one set of grade III, IV or V each session. A maximum of 6 sets can be performed if the patient is tolerating the technique and responding favourably.

**STM** duration will be of 2-3 minutes duration. Therapist to record actual time. Additional time for massage could be performed if considered high priority by the therapist and there is sufficient time. (ie during secondary treatment time).

**Manual stretches** to quadriceps, hamstrings and gastrocnemius should be performed. Dosage will be 120 secs total (2 x60s, 4x30s, 6x20s)

**Physiological movements** can be performed 10 – 30 times. The number of sets will range from 3 to 6 according to therapist choice and patient response.

**Order.** The therapist can select the order of treatment techniques. They may choose to alternate between techniques (e.g. accessory movements and physiological movements).

**Test-retest:** The therapist can perform test: retest procedures throughout the treatment session as required.

**Addition/dropping of techniques.**

Additional techniques (if indicated) should be added as time allows. The therapist should be clear of the response to new techniques.

Hamstring and gastrocnemius stretches and STM may be dropped at follow up sessions if goals have been reached.

Hamstrings: 90/90 test < 30° from full knee extension

Gastrocnemius: < 10° d/flx (knee ext), <20° d/flx (knee flx)

**Patient Safety.** If the physiotherapist considers application of a mandatory technique threatens patient safety they may opt not to perform that technique. Wherever possible, choose an alternative patient position or a variation from the “acceptable variation” category.

## SECTION I PRIMARY TECHNIQUES

**Knee flexion and extension** – All knee flexion and extension techniques are mandatory at the initial session.

For knee flexion, AP's, patellar glides, STM, manual stretches and physiological movements should all be included.

For knee extension, PA's, external rot, STM, manual stretches and physiological movements should all be included.

Acceptable variations include:

- Patient position (supine/sitting/weight bearing, with or without seat belt)
- Med/lat glides of tib/fem jt, with/without seatbelt
- Varus/valgus stresses, internal/external rots of tibia, for accessory and physiological movements
- Combining physiologic and accessory movements

## SECTION 2

### ADDITIONAL REGIONAL TECHNIQUES

Can be performed in remaining time after the specific knee techniques. A joint may only be included for treatment if indicated by the regional screening. The therapist can prioritise the secondary techniques on the basis of patient presentation, response and tolerance. The therapist should select a technique which addresses the particular impairment for that joint.

Acceptable variations to the techniques as outlined are:

- Addition of lateral or caudad glides with seat belt for the hip
- Addition of caudad/cephalad glide of superior tib/fib joint (By inversion or eversion of ankle)
- Addition of weight-bearing and seat belt for talocrural mobilisation
- Combinations of physiological and accessory movements.

## **The Home Exercise Programme (HEP)**

May consist of ROM exercises and stretches, but no muscle strengthening exercises or coordination exercises. Knee flexion/extension exercises will be designated for all knee patients. Exercises should be added on the basis of restricted physiologic movements and soft-tissue restrictions, including any additional regional joint treatment included in the session. The patient must be taught how to do the exercise correctly and prescribed number of repetitions and sets.



**SECTION I**  
**PRIMARY KNEE MANUAL THERAPY TECHNIQUES**



## KNEE FLEXION

### A-P ACCESSORY

The patient lines in supine. The therapist selects the knee joint position on the basis of pain and irritability.

The least provocative joint position would be in the pain free range.

If patient response allows the knee could be flexed to the onset of pain or resistance.

If patient response allows the joint can be placed at end of range flexion into the restrictive barrier.

The therapist places the 1st web space on the proximal tibia. An oscillatory mobilisation (Grade 3 or 4) is performed in an anterior to posterior direction on the proximal tibia.

Tibial rotation can be added to most effectively reach the restrictive barrier.



## PATELLAR MOBILISATIONS

The patient lies supine with the knee in 5-10° of flexion. The joint position can be progressed into increasing flexion or weight bearing if the symptoms are easing or minor.

Oscillatory movements (glides) are produced via the therapists thumbs or a cupped hand. The glides can be combined with rotation and/or compression to meet the restriction.

Compression should be introduced with caution. Medial/Lateral/Caudal/Cephalad are selected on the basis of restriction. If no restriction is detectable caudad/cephalad glides should be used.



Medial



Lateral



Caudal



Cephalad

## PHYSIOLOGICAL

### KNEE FLEXION

+ valgus

+int tibial rotn

+seat belt

The therapist stabilises the patient's thigh and knee against their body while grasping the patient's ankle. The therapist gently brings the patient's heel towards the buttock to the restrictive barrier. Oscillations can be produced in a pure flex direction. (Grade 3 or 4). A seat belt can be added to produce a lateral glide of tibia through range if this decreases pain. A medial glide of the tibia can be produced by placing the seat belt around the femur and manually gliding the tibia medially.

Valgus stress can be added (heel lateral to buttock) (Grade 3 or 4).

Int rotn can be added simultaneously. Oscillatory mobilisations will be performed through a 5-6 inch arc of motion.



## PHYSIOLOGICAL

### KNEE FLEXION

+ Varus

+ ext rotn tibia

+ seat belt

The therapist stabilises the patient's thigh and knee against their body while grasping the patient's ankle. The therapist gently brings the patient's heel towards the buttock to the restrictive barrier. Oscillations can be produced in a pure flex direction. (Grade 3 or 4). A seat belt can be added to produce a lateral glide of tibia through range if this decreases pain. A medial glide of the tibia can be produced by placing the seat belt around the femur and manually gliding the tibia medially.

Varus stress can be added (heel to midline) (Grade 3 or 4). Ext rotn can be added simultaneously. Oscillatory mobilisations will be performed through a 5-6 inch arc of motion.



## MANUAL STRETCH KNEE FLEXION

### QUAD STRETCH, PROGRESS TO RECTUS FEMORIS STRETCH

The patient is positioned supine. The therapist stabilizes the patient's thigh and knee against their body while grasping the patient's ankle. The therapist gently brings the patient's heel towards the buttock to the restrictive barrier. The stretch is held for 2x60 secs.



A bolster may be used to increase the stretch. If no stretch is felt the patient is positioned prone. The therapist stabilizes the pelvis and produces a passive flexion stretch by bringing the heel towards the buttock. The stretch is held for 2x60 secs.



An alternative position is with the patient lying supine with the involved LE dangling over the edge of the plinth. The therapist sits alongside the involved LE and flexes the knee just before the point of patient reported stretch.

2 reps x 60 sec.



## STM QUADS/ PERIPATELLAR/ITB

The patient is positioned supine with leg over the side of the plinth. The patient's quadriceps is placed on a stretch. The therapist performs an effleurage stroke along the length of the quads. The therapist proceeds from superficial to moderate depth of the effleurage depending on patient tolerance. This is repeated at 1" intervals. 2-3 min.



The strokes can include the peripatellar area or particular tightness is present, circular massage can be concentrated in this area.

**NOTE:** If the patient cannot tolerate this positioning the effleurage is performed with the quadriceps on stretch in a position that is tolerable to the patient.

To address the ITB position the patient in side lying in an Ober's position modified for comfort.

## KNEE EXTENSION

ACCESSORIES MANDATORY  
PA ACCESSORY MOBILISATION  
(may include External Rotn Tibia)

The patient is positioned prone.  
The therapist selects the joint position on the basis of pain and irritability.

The least provocative position is with the knee flexed in a pain free range.

As patient response allows the knee is positioned in more ext at the onset of pain or resistance.

As patient response allows the joint is positioned at EOR ext at the restrictive barrier.

The therapist uses their thumb pads or the heel of their hand to impart oscillatory movements in the PA direction.

The other hand can be used to move the lower end of the tibia parallel with the proximal end

Or: the distal tibia can be lifted slightly to combine PA with knee flx

Or: the distal tibia can be lowered to combine PA with knee ext

Or: External Rotation may be added.

The patient is positioned supine.  
The knee is positioned in flexion and progressed to extension as patient response allows.

The therapist grasps around the proximal and of the tibia. The thenar eminence of the lateral hand produces an AP movement while simultaneously the fingers of the medial hand produce a PA movement, resulting in a lateral rotation of the tibia on the femur.



## PHYSIOLOGICAL KNEE EXTENSION

- + valgus/varus
- + seat belt
- + AP glide

The therapist places the heel of one hand over the proximal tibia while the opposite hand supports the lower leg. An oscillatory movement is performed to the restriction of extension.

Valgus (pictured) or varus stress can be added if it produces a pain response or adds to the restriction.

A seat belt can be used to produce medial or lateral glide of the tibia as previously described.

An AP glide can be added to the oscillatory movement if it reproduces pain or stretch to the posterior aspect of the knee joint.



## MANUAL STRETCHES

### MANUAL STRETCH

Initial Session dropped if goal reached – follow up sessions

### HAMSTRINGS

(drop if 90/90 test  $<30^\circ$  from full knee ext)

The patient is positioned supine with knee extended. The therapist grasps the involved LE and flexes the hip while maintaining knee extension to the point of stretch.

2 reps x 60 sec.



## GASTROC

(drop if  
d/flx < 10° with knee ext  
d/flx < 20° with knee flx)

The patient is positioned supine with the knee as close to full extension as possible. The therapist grasps the middle of the tibia with one hand to maintain EOR knee ext. With the other hand the therapist cradles the heel and uses their forearm to produce dorsiflexion of the ankle. Stretch should be felt in the posterior aspect of the calf.

2 reps x 60 secs.



## STM

Initial Session dropped if goal reached – follow up sessions

## HAMSTRINGS

(drop if 90/90 test <30° from full knee ext)

The patient is positioned prone with leg over plinth placing the hamstring on stretch. The therapist performs an effleurage stroke along the length of the hamstrings. This is repeated at 1" intervals. 2-3 min.

NOTE: If the patient cannot tolerate this positioning the effleurage is performed with the hamstring on stretch in a position that is tolerable to the patient. e.g. as pictured for hamstring stretch

## ADDUCTORS

STM for the adductors is included either in STM for hamstrings or quads.

## GASTROC/ SOLEUS STM



(drop if  
d/flx < 10° with knee ext  
d/flx < 20° with knee flx)

The patient is positioned prone with ankle over the edge of the plinth. The therapist places the ankle in dorsiflexion through contact with his thigh. The therapist performs an effleurage stroke along the length of the gastrocs (making sure to cross the knee joint). The amount of dorsiflexion and depth of STM depends on patient tolerance. This is repeated at 1" intervals. 2-3 min

NOTE: If the patient cannot tolerate this positioning the effleurage is performed with the gastroc on stretch in a position that is tolerable to the patient.



**SECTION 2**  
**ADDITIONAL REGIONAL TECHNIQUES**  
*5 minutes maximum per impairment*

## DECREASED HIP MOTION

### LONG AXIS DISTRACTION / THRUST

The patient is positioned supine. The therapist grasps involved leg, above malleoli. The patient's Hip is placed in 15-30° flexion, 15-30° ABD, slight ER. The therapist performs an oscillatory passive accessory mobilization force inferiorly feeling for the restrictive barrier and imparts a thrust in an inferior direction. Progression of the distraction position into more abduction to gain further ROM. Repeated 5 x's.



**SEATBELT GLIDE OR  
DISTRACTION TECHNIQUES:  
Caudal/Lateral Glide  
Progression**

The therapist uses a mobilization belt placed firmly in the patient's hip "crease". The therapist flexes the patient's hip to the restrictive barrier. The therapist uses their body to apply a caudally/ laterally directed force to the proximal thigh and performs an oscillatory passive accessory mobilization force. The amount of hip flexion, rotation, & add/ abduction can be varied to find the position of optimal mobilization.



## DECREASED HIP FLEXION, ADDUCTION, INTERNAL ROTATION

### ANTERO-POSTERIOR PROGRESSION (Posterior glide)

The therapist places the patient's lower extremity with the hip in a position of flexion, adduction, and internal rotation. The therapist uses his body to impart an oscillatory, passive mobilizing force to the postero-lateral hip capsule through the long axis of the femur. The technique is progressed by adding more flexion, adduction, & / or internal rotation.



## DECREASED EXTENSION, ADDUCTION, INTERNAL ROTATION

### POSTERO-ANTERIOR PROGRESSION (ANTERIOR GLIDE)

With the patient in prone the therapist grasps and supports the patient's lower extremity with his arm. The therapist places either the 1st web space, thenar eminence, or hypothenar eminence of his right hand just inferior and medial to the greater trochanter. The therapist brings the patient's hip into varying degrees of flexion/extension, abduction/ adduction, and internal/ external rotation to find the vector of force that most effectively stretches the hip. The therapist imparts an oscillatory, passive mobilizing force through the proximal femur in a posterior to anterior direction. The stretch should be felt by the patient in the anterior hip region.



**TIP:** To progress the technique the therapist increases the amount of extension, adduction, and internal rotation.

Can also modify by progressing into FABER position.

With the patient in prone the therapist brings the patient's hip into varying degrees of flexion, abduction and external rotation. If the patient is extremely stiff, start with patient's lower extremity on a stool. Progress to lying flat on the table when able.

## DECREASED INTERNAL ROTATION, EXTENSION

### INTERNAL ROTATION IN PRONE

The therapist flexes the patient's knee to 90 degrees and ensures that the hip is in neutral or slight adduction. The hip is internally rotated until the contralateral ilium raises approximately 1-2 inches from the table. The therapist stabilizes the lower leg and imparts an oscillatory, passive mobilizing force through the contralateral pelvis.

NOTE: If the patient experiences knee discomfort, grasp the distal thigh and place your forearm along the medial aspect of the patient's tibia.

Alternatives: Can stabilise knee/leg to oscillate pelvis or stabilise pelvis to oscillate leg.



## SOFT TISSUE MANIPULATION (STM)

### STM TO LATERAL AND POSTERIOR HIP

The patient is positioned sidelying in the recovery position. The therapist performs an effleurage stroke with the posterior/lateral hip musculature on stretch. This is repeated at 1" intervals. 2-3 min.

**NOTE:** If the patient cannot tolerate this positioning the effleurage is performed with the posterior/lateral hip musculature on stretch in a position that is tolerable to the patient.



## STRETCHES – HIP ER

### MANUAL GLUTEUS/ INTERNAL ROTATOR STRETCH

The patient is positioned supine. The therapist flexes the patient's knee to 90, flexes and externally rotates the hip to the point of stretch.

Alternate position is patient prone, with the pelvis stabilised  
2 reps x 60 sec



### HIP EXTERNAL ROTATOR STRETCH

The patient is positioned supine. The therapist flexes the patient's knee to 90 degrees and ensures that the hip is in neutral or slight adduction. The hip is internally rotated until a stretch is felt at the anterior hip.

Alternate position is patient prone. (see description of internal rotn in ext).

Hold stretch for 2x60 secs



## ANKLE JOINT

### LOSS OF ANKLE

#### DORSIFLEXION

d/flx < 10° with knee ext

d/flx < 20° with knee flx)

### REARFOOT DISTRACTION MANIPULATION

The therapist grasps the dorsum of the patient's foot with interlaced fingers and provide firm pressure with both thumbs in the middle of the planar surface of the forefoot engage the restrictive barrier by dorsiflexing and everting the ankle & applying long axis distraction. The therapist pronates, everts, dorsiflexes the foot to fine-tune the barrier.

The therapist then applies a high velocity, low amplitude thrust in a caudal direction.

If the therapist feels that the distraction is occurring at the talocrural joint, attempt again with more pronation/eversion and "scooping" motion at the rearfoot/subtalar joint before the distraction manipulation.



## APTALO-CRURAL ACCESSORY

The therapist uses their left hand to firmly stabilize the lower leg at the malleoli. The therapist then grasps the anterior, medial, and lateral talus with your right hand and applies an anterior to posterior oscillatory mobilization force to the talus. (Grade 3 or 4).

The amount of dorsiflexion can be adjusted to meet restriction allowed by patient response.

The treatment can be progressed into weight bearing in a lunge position on a chair.

This could be reinforced by an anterior glide of the tibia produced by a seat belt.

### Progression:

Increase ankle dorsiflexion before imparting anterior to posterior force to talus.



**PHYSIOLOGICAL  
DORSIFLEXION OF ANKLE**  
As per gastroc stretch but  
oscillatory movement to point  
of resistance.



## LUMBOPELVIC HYPOMOBILITY

### LUMBOPELVIC MANIPULATION

The supine manipulation technique is performed in the following fashion. The side to be treated will be the side with the painful heel. In the figure the side of the painful heel is the left. The physio stands opposite the side to be treated and translates the pelvis towards them and maximally side-bend the patient's lower extremities and trunk away from them and towards the side to be treated.



Without losing the left sidebending the clinician lifts & rotates the trunk so the patient rests on their right shoulder.



The therapist contact the patient's left ASIS with their right hand. Once the left ASIS starts to elevate, perform a smooth thrust in an anterior to posterior direction.



## LUMBAR ROTATIONAL MANIPULATION (described for L4/ L5)

For the sidelying manipulation the clinician will place the side of the painful heel up. In the figure the painful heel is the left. The therapist flexes the top leg until they first begin to palpate motion at L4-L5 interspace and then place the patient's foot in the popliteal fossa as shown. The therapist grasps the patient's right arm and shoulder and induce right sidebending & left rotation until the therapist begins to palpate motion at the L4-L5 interspace. The therapist places the left thumb on the left side of the L4 SP & position the patient's arms around their left arm. While maintaining the setup the therapist log rolls the patient towards them. While monitoring the right side of the L5 SP, the therapist uses the right arm to induce a high velocity, low amplitude (HVLA).



## LUMBOPELVIC MOBILIZATION

If the patient is unable to tolerate either of the above manipulative positions. The patient sits at the end of the plinth. The therapist imparts a joint glide and performs pain free AROM to improve lumbar flexion or extension limitations.

## STM TO PARAVERTEBRAL MUSCLES

Patient is positioned prone. Alternate effleurage strokes are performed to the paravertebral muscles on either side of spine.



## PROXIMAL TIBULA FIBULA JOINT (lateral knee pain, including superior Tib/fib joint)

**PROXIMAL TIBIO-FIBULAR JOINT POSTERIOR TO ANTERIOR MANIPULATION**  
The therapist places their 2nd MCP in the popliteal fossa, then pulls the soft tissue laterally until your metacarpophalangeal joint (MCP) is firmly stabilized behind the fibular head. The therapist uses their right hand to grasp the foot and ankle as demonstrated to externally rotate the leg and flex the knee to the restrictive barrier (the therapist should feel firm pressure from the fibular head over the palmar aspect of your MCP). Once at the restrictive barrier, the therapist applies a high velocity, low amplitude thrust through the tibia (direct the patient's heel towards his ipsilateral buttock).



### AP PA ACCESSORIES

The patient is positioned in side-lying. They may require padding between the knees for comfort. The therapist is positioned at the side of the bed level with the knee joint. The therapist places the thenar eminence of the treating hand over the anterior or posterior aspect of the fibula head and then imparts a horizontal force to produce the joint glide.

## STM TO ITB AND POPLITEAL FOSSA

The patient may be positioned in sidelying or prone. The knee is extended as fully as possible.

