

Clinically Effective Manual Therapy | **FOR THE KNEE**

Manual therapy (MT) is a commonly used therapeutic technique, which may be applied to both joints and soft tissue. As we saw in the article 'Clinically Effective Manual Therapy for the Hip', MT has quantifiable effects on pain and movement, but its effects are likely to sit within a biopsychosocial rather than purely mechanistic model of healthcare. In this article we will use examples of MT on the knee to show how this technique may be used as a central part of a rehabilitation process.

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EMPOWERING OR DISEMPOWERING THE PATIENT?

One of the criticisms often waged against manual therapy (MT) is that it disempowers the patient, encouraging them to be dependent on their therapist and less reliant on themselves – effectively eroding self-efficacy. However, the technique itself is unlikely to instigate this but the way in which it is presented may do so (1). Giving the message that a patient's pain results from a stiff joint which is 'blocking a movement' is likely to result in the patient coming back to see a therapist time and time again. Seeing pain and lack of movement as a temporary barrier to recovery and using MT to instigate rehabilitation enables the patient to manage their own treatment outcome. Using MT as part of a progressive rehabilitation programme can lead to increased patient self-efficacy enabling the patient to move further along the recovery timescale when previously their recovery has plateaued.

SPECIFIC OR NON-SPECIFIC?

Although traditionally it was often claimed that in MT techniques spinal joints may be moved individually (for example L4 motion on L5), or gliding motions may be directionally specific (for example detecting rotation of a

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Set of six videos demonstrating knee mobilisation technique.

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spinous process) this has largely been disproved. The skin–fascia interface over the thoracic spine is essentially frictionless, meaning that any movement of a vertebra which creates a reactive force would not be felt in the overlying skin (2). Further, many MT techniques, while resulting in a change of movement, are unlikely to generate sufficient force to enable significant accessory joint movement or tissue changes directly. Neuromuscular factors occurring at the time of MT application are a more likely explanation for any motion change. In addition, as we saw in the article 'Clinically Effective Manual Therapy for the Hip', motion changes resulting from MT are usually only temporary resulting from a short-term reduction in muscle tone. For this to occur the MT technique only has to be applied close to the region of pathology for a patient's symptoms to be modified. For example, treating the thoracic spine with MT has been shown to reduce symptoms in the cervical spine (3).

“ USING MANUAL THERAPY TO INSTIGATE REHABILITATION ENABLES THE PATIENT TO MANAGE THEIR OWN TREATMENT OUTCOME ”

TECHNIQUE ONE: CAPSULAR STRETCH

Following knee injury, tightness and limitation to flexion can suggest intracapsular swelling. The increased fluid volume, synovial irritation and pain

can limit active movement resulting in a reduction of flexion range which is noticeably greater than the reduction of extension range – the capsular pattern of the joint. Increasing flexion range can be brought about by using exercise therapy, which is either general (for example walking, stair climbing) or specific (active or passive knee bending). However, the volume of fluid and degree of tissue tightness can make moving into end range flexion both painful and stiff. To ease these symptoms, placing a support such as a rolled towel behind the knee within the popliteal region is often helpful.

A common and effective MT procedure for limited flexion with subacute pain is the 'capsular stretch' technique, which mimics flexion with popliteal support. Although symptoms of stiffness and pain are eased with this technique, the force required to stretch the capsule is unlikely to be created. The mechanism of action is likely to be neuromuscular, causing a reduction in pain and alteration in proprioception.

With the patient in supine lying, and where the right leg is to be treated the therapist stands to the right, taking up a walk standing stance (Video 1). Passive flexion range is first assessed determining the distance of the heel to the buttock. The right forearm is then placed behind the patient's knee and the left hand grips the shin to press the knee into flexion. The forearm is positioned so the thickest part of the muscle mass contacts the patient, reducing contact pressure. Where the therapist has a very slim forearm, a towel may be wrapped around it to create extra padding. The force is applied with a slow build-up and release, using a 5 progressing to 10 second hold. Patient tolerance limits force and holding time, and the technique is repeated 3–5 times before retest of motion range (heel to buttock distance).

A simple home exercise may be used to mimic the MT technique. The patient places a towel, rolled lengthways, behind their knee high up into the crook of the joint (popliteal fossa). They then grip their shin with one or both hands and apply overpressure to press the joint into


further flexion. Patient education points include tolerance of mild discomfort (stretching), avoidance of sudden movement (jolting), and avoidance of intense pain, generally beyond 6 out of 10 on a numerical rating scale. Where the patient is unable to position the towel correctly a partner may be required, and where the patient is unable to grasp their shin a belt or second towel may be used, looped around the shin towards the ankle.

TECHNIQUE TWO: GROSS ANTERO-POSTERIOR GLIDE

An antero-posterior (AP) glide may be performed with the tibia moving on the fixed femur (Video 2). Have the patient in supine lying with a firm block (compressed folded towel or dense foam block) placed beneath their femur above the popliteal region of the knee. Pressure is placed over the tibial tuberosity with the hands surrounding the knee. Traditionally the grip is with the thumbs together, thumb pads pressing on the tuberosity and fingers folded around the knee avoiding fingertip pressure into the popliteal region. An alternative is to V contact between the thumb and first finger, supporting one hand over the other. Pressure is produced by the therapist leaning their body weight forwards and directing it downwards through the hands. Importantly the hands direct, but do not create the AP force. The patient's symptoms are monitored and the aim is to reduce pain, and increase pain-free movement at retest.

The AP glide moves the tibia backwards relative to the fixed femur, a movement equivalent to moving the femur forwards on the fixed tibia. This second action occurs when the foot is on the ground and the bodyweight moves forwards, as in running or jumping forwards to a sudden stop (Videos 3 & 4, first part). These actions can be used as part of a progressive rehabilitation programme to build knee resilience. Begin with the foot on the ground, knee slightly flexed or 'soft' (10–15° flexion). Swing the arms and trunk forwards transferring the body weight from the heel to the toe region of the foot. Build this to a slow and then fast walk, stopping suddenly on the spot. Initially make this predictable



 **Video 1: Capsular stretch for the knee joint**
<https://spxj.nl/2Pal8QI>



 **Video 2: Antero-posterior glide for the knee joint**
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 **Video 3: Home mobilisation exercises for the knee**
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 **Video 4: Close-up of home exercises for knee mobilisation**
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(‘3 steps and then stop’) and then unpredictable (‘walk and stop when I say’). Build to a slow and then fast jog, and then progress to jumping. Jumping actions build from bilateral (jump with both feet together) to unilateral (land on one foot), and from flat surface to jumping from a step to perform plyometric actions.

**TECHNIQUE THREE:
VALGUS OR VARUS GLIDE**

Knee collateral ligament injuries are a common occurrence in both competitive sport and general exercise (4), and medial joint pain is often seen in conditions such as knee osteoarthritis. Using a MT technique aimed at the medial aspect of the knee joint is often clinically effective at modifying symptoms in the short-term. When symptom modification is demonstrated in this way to a patient, compliance is likely to be greater with exercise therapy designed to place a valgus stress on the knee.

The patient is lying in supine with the therapist in walk standing, half facing the patient (Video 5). When treating the left leg, the therapist grasps the leg with their left arm, placing the shin beneath their arm for stability, pressure is applied with the left hand below the knee joint. The knee is unlocked by placing it into 10–15° of flexion. The valgus stress (knee joint opening medially) is imposed with the right hand, using the heel of the hand (fingers cup the knee) placed over the lateral joint line. Force is transmitted through the forearm which lies perpendicular to the joint and applied but not created by the hand. Where varus glide (knee joint opening laterally) is required, the therapist’s body position is reversed. The therapist stands against the treatment couch placing the patients leg on the therapist’s right side. The right hand grasps the patients shin and the heel of the left hand is placed over the medial joint line to create the varus gliding force (Video 5).

In each case, low grade rhythmic oscillations are used; for example, grades 1 or 2 (low amplitude movement at the beginning of range) for 20–30 seconds. Where pain is reduced, the mobilisation is repeated for two or three sets (see Table 1: Manual therapy



Figure 1: Valgus stress exercise: (a) stage 1 and (b) stage 2

application framework, in the article ‘Clinically Effective Manual Therapy for the Hip’.

Exercise therapy is used to impose valgus and varus stress on the knee to build resilience and patient confidence (Fig. 1). Standing on the affected leg, the action is to step to the side with the contralateral leg, and then to cross the leg in front of the ipsilateral leg. Again, step to the side, and then behind the affected leg. This static action can progress to slow and then faster side step actions. Initially this is performed on flat even ground (Fig. 1a), and then on a slope or from a step bench (Fig. 1b) to vary the imposed force and challenge muscle control and proprioception (Videos 3 & 4, second part).

**TECHNIQUE FOUR:
MOBILISATION WITH
MOVEMENT (SQUEEZE
TECHNIQUE)**

The squeeze technique, used for treating knee meniscus injury, is a classic example of the potential clinical benefit of changing sensory inflow to the body and altering associative learning. The principle behind this effect would appear to be that pain is a warning of potential harm or threat to the body. When this threat occurs, several factors interact in the brain (neuromatrix) and become associated together. Over time, specific movements and pain become linked, often as a result of the movement being similar to that which originally created the pathology. The squeeze technique (5) uses a focused pressure

over the knee joint line during a leg movement which is limited or painful (for example squatting or lunging). When originally described, the technique was claimed to squeeze the

“ INCREASED PATIENT SELF-EFFICACY ENABLES THE PATIENT TO MOVE FURTHER ALONG THE RECOVERY TIMESCALE ”



Video 5: Valgus and varus stresses to the knee
<https://spxj.nl/2Pal8Ql>



Video 6: Squeeze technique for the knee
<https://spxj.nl/2Pal8Ql>

medial meniscus back into shape. It seems unlikely that manual pressure over the joint line would affect the meniscus (which is attached to the bone via the coronary ligament), and any effect that is created would only be temporary.

The patient begins in a full weight-bearing starting position with the foot of the affected leg on a low step or taking up a squatting position (hand holding a support for balance) (Video 6). Initially a squat or lunge is performed to recreate the patient's symptoms. The mobilisation is then performed by placing the edge of one thumb over the painful region of the

knee joint line and creating force by pressing on the finger with the other hand. A firm pressure is used, directed in towards the joint as the patient performs the painful squat or lunge action. The aim is to increase pain-free motion range, and the direction of the MT technique is varied to produce the best outcome. The action is repeated 2 or 3 times and then the patient (or their partner) is taught to produce the mobilisation on themselves. They perform the mobilisation with movement over a period long enough to remove symptoms (typically 3 or 4 sessions), and then re-strengthen the knee incorporating a variety of

lunge and squat actions into a general rehabilitation programme (4–6 weeks).

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KEY POINTS

- Manual therapists need to be careful that the way the diagnosis and treatment is presented will result in empowering the patient to manage their own treatment outcome and eventual decreased reliance on the therapist.
- Manual therapy usually produces temporary changes in motion that result from short-term reduction in muscle tone, probably through associated neuromuscular factors.
- The aim of manual therapy is to remove the immediate 'block' to movement to allow the patient to continue with a progressive regimen of rehabilitation exercises at home.
- Knee injury can cause limited flexion as a result of intracapsular swelling, which can be addressed by the use of the capsular stretch technique when inflammation has resolved.
- Educating the patient about tolerance of mild discomfort is useful for encouraging adherence to home exercise regimens.
- Antero-posterior glides to mobilise the tibiofemoral joint mimic the action that occurs when walking, running or jumping to a sudden stop. These actions can be used to build resilience in the knee.
- Valgus and varus glides at the knee are used to treat knee collateral ligament injuries.
- The pain from some knee meniscus injuries can be treated using the squeeze technique, which seems to alter the sensory inflow in the body and undo the learned association of movement and pain.
- All of the manual therapy techniques demonstrated here are accompanied by descriptions of associated exercises for the patient to do at home to build strength in the knee.

DISCUSSIONS

- Discuss the effects of manual therapy on motion and how they are likely to be caused.
- Think about how you present your manual therapy to your patients. Do you educate them adequately about the role it plays and the role that they need to play in their rehabilitation?
- What conversations can you have with your patients to encourage increased adherence to home exercise regimens and self-efficacy?

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