

OSTEOARTHRITIS OF THE KNEE: A PRACTICAL TREATMENT APPROACH

This article discusses the issue of osteoarthritis of the knee, the role of exercise, its relationship (or not) with arthritis and progresses to physical therapy interventions including exercises which should be included as part of a strengthening and stretching plan. The article is supported by videos which show manual therapy techniques that can be used as part of a treatment programme and additional videos that can be used as part of a patient education programme. There is also a downloadable/printable patient information leaflet. Read this online <http://spxj.nl/2ljbsKI>

Knee pain is a common complaint, especially in the over 50s. Studies

have shown that almost half of the over 50s complain of pain in the knee, and in about 25% this lasts for a prolonged period, being termed chronic (1). Chronic knee pain can lead to a significant reduction in quality of life (QOL) and difficulty carrying out common activities of daily living. Although the condition

can progress, many risk factors of progression are modifiable. Exercise therapy can improve muscle strength and control of movement, and increase

BY DR CHRISTOPHER NORRIS PHD, MCSP

range of motion. Strength exercise may increase muscle mass and muscle recruitment, providing that the overload on the muscle tissue is great enough. Strength increases to the knee musculature may lessen internal knee forces, modify biomechanics, decrease rate of joint loading and reduce articular cartilage stress (2). Overload during strength exercise may be reduced where pain is a barrier to exercise performance leading to exercise under dosage, often making pain management early on in the condition especially important. Exercise in general may improve QOL, increasing the number and variety of daily living tasks and improving physical function; these factors in turn having positive psychological benefits.

WHAT IS ARTHRITIS?

The term arthritis tends to be used to describe any chronic inflammatory reaction affecting a joint. However, the term simply means 'joint inflammation', and as such must be qualified by a description of the cause of inflammation. Acute joint injury which causes swelling within the joint may be termed 'traumatic arthritis' for example. True osteoarthritis (OA) involves cartilage degeneration, initially with little inflammation, so the term osteoarthrosis is often used nowadays.

This condition must be differentiated from inflammatory states affecting multiple joints, such as rheumatoid arthritis (RA).

Joint cartilage is composed of cells (chondrocytes), water, and a matrix consisting of collagen (mainly type II) with proteoglycans (especially aggrecan). Under normal circumstances the matrix undergoes a continuous process of dynamic remodelling, which balances low level degradation with synthesis through enzyme action, and so homeostasis is maintained. When a joint shows osteoarthritic changes, the cartilage overexpresses degrading enzymes upsetting the subtle balance between cellular breakdown and repair. The result is the loss of collagen and proteoglycans from the matrix, causing chondrocytes to proliferate in an attempt to compensate.


The initial changes in OA are usually painless and show no gross joint swelling. The tissue affected first appears to be the joint cartilage, which now begins to show an increased water content resulting from degradation (proteolysis) of the cartilage proteins. Mild fraying or flaking of superficial collagen fibres within the hyaline cartilage occurs. This happens first at the periphery of the joint in the non-weight-bearing region. Later,

KNEE | LOWER-LIMB | 17-04-COKINETIC

FORMATS ►WEB ►MOBILE ►PRINT

MEDIA CONTENTS

 Video showing manual therapy techniques for treatment of OA – <http://spxj.nl/2ljbsKI>

 Videos showing stretching and strengthening exercises that the patient can perform at home – <http://spxj.nl/2ljbsKI>

 Patient Information Leaflet: Osteoarthritis of the Knee – <http://spxj.nl/2ljbsKI>

damage (fibrillation) is to the deeper cartilage layers in the weight-bearing areas of the joint, extending down to one-third of the cartilage thickness. Small cavities form (blistering) between the cartilage fibres, which gradually extend to become vertical clefts. If cartilage fragments break off, they may float free in the joint fluid as loose bodies, giving sudden twinges of pain and sometimes the joint feels as if it has locked. The presence of a loose body and the by-products of cartilage destruction causes the synovium (deep joint membrane) to inflame, and it is only now that many patients become aware that a problem exists. At this stage medication and modalities to reduce pain and inflammation can give some short-term relief.

Turnover of proteoglycan and collagen within the cartilage ground substance is increased, and the proteoglycan molecules near the fibrillated cartilage are smaller than normal. Mechanically, this altered cartilage is weaker to both compression and tension stresses, but it is still resistant to gliding. As the cartilage thins, the joint space is reduced – a change that is visible on X-ray.

The bone beneath the fibrillated cartilage (subchondral bone) becomes shiny and smooth, an appearance called 'eburnation'. Below the eburnated region the area becomes osteoporotic and local avascular necrosis can cause cyst formation where there is complete bone loss. Osteophytes (bone spurs) covered with fibrocartilage form at the periphery of the joint, and may protrude into the joint space or more frequently into surrounding soft tissue, again a change visible on X-ray.

The synovial membrane becomes thickened and its vascularity increases in line with an inflammatory response. The joint capsule demonstrates small tears filled with fibrous tissue, causing thickening and stiffening, often most noticeable first thing in the morning or on rising from prolonged sitting. Contracture usually alters both physiological and accessory movements, the first representing normal joint movement, the second

joint play. Synovial proliferation alters the consistency of the synovial fluid, giving it a lower viscosity. Injections of hyaluronic acid (HA) are designed to slow this process. Increased growth of blood vessels (angiogenesis or neovascularisation) occurs in OA in bone, synovial membrane and joint capsule. In addition new vessels may also grow across the subchondral barrier dragging nerve fibres with them (3).

It is important to realise that the knee joint is adapting. Just as muscles get stronger with increased loading (resistance training), they can get weaker if a joint is painful and a patient loads the knee less. Joints become stiff if they are not moved regularly; 'motion is lotion' is an old adage, but very apt here. OA is a condition that is driven by mechanical factors. Alteration to joint loading as a result of training or injury will cause the joint to react and repair, and an equilibrium must exist between stimulus (joint loading) and response (bone change).

STAGES OF OSTEOARTHRITIS

Osteoarthritis is normally categorised in stages or grades 1–4 in terms of severity, with 0 being a normal joint (Table 1). Stage 1 is often asymptomatic, but on X-ray mild cartilage changes may be detected, often as a result of an X-ray being taken for another condition such as a ligament injury. Osteophytes may be seen but do not affect joint function. Stage 2 pathology shows further changes on X-ray with greater osteophyte formation and change in subchondral bone density. Bone will often appear whiter on X-ray (sclerosis) and bone cysts may sometimes be seen, and occasional cartilage thinning may be noted. Symptoms may occur on severe joint loading and muscle wasting may be noted where mild pain has encouraged reduced activity. Stage 3 injury will show more severe osteophyte formation and joint-space narrowing. Overall bone shape may change and cartilage erosion is noted, in patches down to subchondral bone. Muscle wasting and joint stiffness are

“IN OA, MUSCLE WASTING AND JOINT STIFFNESS IS COMMON”

common, and should be addressed by rehabilitation. Joint stiffness is seen following prolonged rest (on rising from a chair or waking for example). Stage 4 OA is severe, and can often show complete loss of joint space with severe bone-end deformity. Pain is common following rest and joint loading. Movement range is severely limited and muscle wasting is marked.

WHERE DOES THE PAIN COME FROM?

The pain of OA of the knee comes from a number of sources, other than the bone changes seen on X-ray. Irritation and swelling to the bone beneath the joint cartilage, swelling within the joint, and overuse and irritation of the soft tissues (capsule, ligaments, muscles) supporting the joint may all be local causes. However, these will only generate electrical signals in the nerves

TABLE 1. STAGES OF OSTEOARTHRITIS
(C. Norris, 2017)

| Stage | Joint changes |
|-------|--|
| 1 | <ul style="list-style-type: none"> ■ Minor loss of articular cartilage and minor bone spur growth ■ Mild occasional discomfort when joint is heavily stressed. |
| 2 | <ul style="list-style-type: none"> ■ Some bone hardening (sclerosis) and occasional bone cyst formation ■ Greater osteophyte formation with change in bone density (whitening of bone on X-ray) ■ Mild to moderate pain following intense activity ■ Occasional joint stiffness. |
| 3 | <ul style="list-style-type: none"> ■ Joint stiffness after prolonged resting ■ Cartilage thinning and some joint narrowing ■ Marked osteophyte formation. |
| 4 | <ul style="list-style-type: none"> ■ Dramatically reduced joint space ■ Bone-end deformity with severe cartilage loss ■ Frequent mild to moderate pain, occasional severe pain ■ Joint stiffening and movement loss. |



Figure 1: Longitudinal distraction mobilisation (C. Norris, 2017)



Figure 2: Therapist-applied capsular stretch (C. Norris, 2017)



Figure 3: Self-applied capsular stretch (C. Norris, 2017)

which supply them. The same signals could be generated by movement or simply touching your knee. As the intensity of these signals increases – a little like turning up the volume on a radio – there comes a point where the body chooses to interpret the signals not as normal, but as threatening damage. When this happens, we would term the sensation we feel as painful, and the point at which this occurs is hugely variable between individuals.

The severity of pain that a person with OA feels will be influenced by a number of psychological factors such as fear of the condition getting worse, and the effect it might have on their lifestyle (home, work, sport) for example. Changes in pain processing are also important. This is the way in which the electrical

signals are viewed as painful or not. If a patient is a builder, used to heavy work on their knees, they are less likely to view a mild change in feeling of the knee as pain. If the patient is a professional ballerina the day before an important performance, any change in the way the knee feels may be interpreted as pain. In both cases, the electrical signals from the nerves to the brain are the same, but the brain's interpretation (what the feeling means to the patient) is very different.

When the electrical stimuli from the knee due to irritation (noxious stimuli) have been present for some time, the structures involved in feeling them

become hypersensitive. This process is called central sensitisation and may explain why 20% of individuals with severe knee OA who have their knee joints replaced, still complain of long-term pain afterwards (4).

DO X-RAYS AND SCANS SHOW KNEE PAIN?

X-rays and scans will often look for two essential signs in the presence of OA in the knee: osteophytes and joint space narrowing. Some individuals who show marked changes on X-ray report very little pain, whereas others with obvious pain show few radiographic changes (5). The changes on an X-ray which together indicate the presence of OA sometimes explain less than 20% of the pain (4). A positive X-ray does not indicate that the condition cannot be treated, and usually patients can expect significant improvement in their symptoms with treatment such as muscle strengthening, active general exercise and weight loss.

A number of features on X-ray may be used to guide treatment. Firstly we can look at bone alignment. Sometimes, an excessive angulation can occur called valgus or knock knee. Although this is not necessarily a problem, if altering the angle by using a shoe insert reduces pain, this may be used as a temporary or more longer-lasting measure.

Secondly the gap between the bones is assessed. This gap is filled with cartilage which does not show up on X-ray, and where the joint space is reduced, either between the bones of the knee themselves, or between the femur and the patella, this is an indication that the cartilage has thinned. When looking for OA in the knee, a number of X-ray views are normally taken, including one to show the

condition of the patella under-surface (patellofemoral joint). The front-to-back (anteroposterior or AP) view looks straight on to the knee, whereas the lateral view looks from the side; both of these may be taken weight-bearing or with weight off the knee. A skyline view (infero-superior) looks between the femur and the patella. Cartilage has a number of functions, one of which is to absorb and redistribute shock. If the cartilage is worn, shock absorbing heel pads or springy shoes may be used to compensate.

The X-ray will also show if another injury coexists (co-morbidity), such as a hairline fracture if the patient has had a fall, and if there is swelling (effusion) within the knee which will take time to settle. If a patient has slipped and fallen heavily, this fluid may also contain a small amount of blood (haemarthrosis) which acts as an irritant causing sensory signals to go to the brain. The health of the knee joint bones is also important and the bone density can be assessed from an X-ray. If it is poor, osteoporosis may be present which can require further tests, such as dual X-ray absorptiometry (DXA bone scan), to assess. Looking more closely at the X-ray we may see bone spurs or osteophytes at the edge of the joint, and sometimes bone cysts which appear almost as pockets within the bone. Where the cartilage has worn, the bone beneath becomes stronger and shows up as white indicating bone sclerosis. It is important for a patient to remember that the X-ray appearance does not mean the condition will stay as it is, because the X-ray does not accurately assess pain, muscle strength or confidence in the knee – all of which can improve significantly with rehabilitation.



Figure 4: Knee bracing
(C. Norris, 2017)



Figure 5: Knee bracing with muscle palpation (tactile cue) (C. Norris, 2017)



Figure 6: Leg extension
(C. Norris, 2017)

ARTHRITIS AND EXERCISE

Joint cartilage is continually subjected to impact stress in sport. For example when running a marathon an athlete is said to take 38,000 steps and each time to subject the knee joint to between 4 and 8 times their bodyweight, which equates to almost 5000 tonnes' force. After a 20km run cartilage volume is seen to reduce by 8% in the patella, 10% in the meniscus and 6% on the tibial plateau, with all cartilage volumes returning to normal within 1 hour of cessation of exercise (6). Joint cartilage is open to continuous microdamage. However, providing the cartilage repair mechanisms outweigh the damage process, the joint will remain healthy.

Animal studies have failed to show a direct link between exercise and arthritis. Radin et al. (7) found no evidence of cartilage deterioration in sheep forced to walk for 4 hours daily on concrete for 12 and 30 months. Videman (8) found that running did not affect the development of OA in rabbits. Experimentally induced OA was not increased when the animals were forced to run over 2000m per week for 14 consecutive weeks. Studies on runners have also failed to show any significant difference from non-runners. Puranen et al. (9) found less hip OA

in Finnish distance runners than in non-runners of a similar age. Panush et al. (10) found no greater clinical or radiological evidence of OA in male runners of average age 55 years, and Lane et al. (11) concluded that runners and non-runners showed similar evidence of hip and knee OA.

Although chronic mechanical loading may be detrimental to the knee, evidence suggests that recreational running is not a cause of knee OA (12) and may even be used therapeutically in OA patients (13). Chronic knee stress which may be imposed by elite level running is less clear cut. A systematic review of 19 studies looked at MRI scans of knees of distance runners and found no irreversible effects other than temporary proteoglycan depletion which took more than 3 months to recover to baseline. The authors were unable to conclude if this represented permanent structural damage (14).

Maintaining the normal mobility and strength of a joint throughout life, and maintaining a healthy BMI (body mass index) could help maintain the health of the joint structures and perhaps delay the onset of OA, and many forms of exercise including running are helpful in doing this. Certainly obese individuals have been shown to be more likely to develop OA, the

increased risk being 4.8-fold in men and 4.0-fold in women (15).

PHYSIOTHERAPY TREATMENT OF THE OSTEOARTHRITIC KNEE

Exercise therapy plays the primary pivotal role in the management of OA in the knee, with hands-on techniques and pain-relieving modalities such as acupuncture and electrotherapy often having secondary supporting roles.

In the acute (reactive) stage of the condition the knee may be too painful to exercise. The aim in the short term is to allow the joint to settle and relieve pain so that exercise can be used as soon as possible as this gives the longer-term benefit. Small joint movements (joint mobilisation) and gentle sustained lengthening (joint distraction) can often be very relieving; two accessory movements are especially useful, and may also be used as partner exercise following suitable instruction (Fig. 1; Video 1).

Capsular stretching is a technique that uses a pivot at the back of the knee. This can be done using the therapist's forearm (Fig. 2, Video 1) or the patient can apply the stretch themselves using a rolled towel (Fig. 3, Video 2). The knee is gently bent (flexed) against the pivot in a 'nutcracker' type action and a



Video 1: Distraction technique and capsular release for OA of the knee
(C. Norris, 2017)



Video 2: Strengthening exercises for the knee Part 1 (C. Norris, 2017)



Video 3: Strengthening exercises for the knee Part 2 (C. Norris, 2017)



“ THE SEVERITY OF PAIN THAT A PERSON WITH OA FEELS WILL BE INFLUENCED BY A NUMBER OF PSYCHOLOGICAL FACTORS ”



Figure 7: Leg-press with a band
(C. Norris, 2017)

comfortable stretch is held for 5 to 15 seconds and repeated 3–5 times. The aim is to feel pain reducing and stiffness easing. Joint distraction aims to gently draw the knee bones apart. Although little movement is likely as the knee is a very strong joint, patients who find their pain is worse with prolonged standing (joint compression) may often get relief from distraction. Pain modulation may occur and this type of action introduces a longitudinal

glide mobilisation. Oscillation may be continued over a 30–60 second period. If patients are trying this with their partner at home, the force must be quite small as well as put on and taken off slowly to avoid jarring the knee.

Exercise therapy may also be used early on for pain reduction. Sitting on the end of a table or bench, patients

may gently bend and straighten their knee to move the fluids within the joint and increase circulation to the tissues. This action, called pendular swinging can help to ease pain and stiffness



Figure 8: Leg-press with a gym ball
(C. Norris, 2017)

and is a useful method of targeting non-acute (cold) swelling, where the knee has been stiff and puffy for some time. Perform the action for about 3 to 5 minutes morning and evening until pain has eased sufficiently to begin walking and using more challenging exercise. Even early on, walking itself is an excellent form of pain management with an osteoarthritic knee. People often say that walking makes their pain worse. However, when we look closely at this it is normally prolonged walking, often carrying heavy shopping bags for instance. A short walk in springy shock absorbing shoes will often help to ease stiffness. The knee may ache to begin but this should ease with time. Pacing may be used initially, only walking up to the point of pain onset. If a patient finds their knee aches if they walk for 15 minutes, they should try 10 minutes the next day. Use this approach for 3 to 5 days and then try to increase the time. This approach is called graded exposure and it is a little like building repetitions and sets up in the gym. The aim is to progress as the knee gets stronger.

This type of approach, which sets the end of an exercise by pain onset (symptom contingent), is useful in the reactive phase of an injury, but it does have a disadvantage later on. When you move into the recovery phase,



Figure 9: Supported lunge
(C. Norris, 2017)

your body may interpret relatively normal sensations as pain. This effect (hypersensitivity and allodynia) can be corrected by exercising for a set time (time contingent) which may involve the patient going through a little pain. In this way the perception of pain can be 'reset' so normal sensations are no longer interpreted as pain.

Acupuncture is often used by physiotherapists in the early treatment of the osteoarthritic knee, and the results are generally quite good. In a systematic review of seven trials (393 patients) Ezzo et al. (16) concluded that acupuncture was effective for both pain relief and restoration of function, and that real acupuncture was better than sham acupuncture. In a later systematic review of 13 randomised controlled trials (1334 patients) White et al. (17) concluded that acupuncture was superior to sham acupuncture for improving pain and function with chronic knee pain. Some patients find acupuncture enables them to reduce the number of pain killers they take and lets them begin exercise early. Once they can exercise, this takes over from the acupuncture. In this way acupuncture can be used as a precursor to exercise within a multimodal approach. The current NICE (National Institute for Health and Care Excellence) guidelines do not



Video 4: Strengthening exercises for the knee
Part 3 (C. Norris, 2017)



Video 5: Strengthening exercises for the knee
Part 4 (C. Norris, 2017)



Video 6: Proprioceptive and functional strengthening exercises for the knee
(C. Norris, 2017)





Figure 10: Deadlift
(C. Norris, 2017)



Figure 11: Barbell squat
(C. Norris, 2017)



Figure 12: Goblet squat
(C. Norris, 2017)

recommend acupuncture for knee arthritis (18,19) but a network meta-analysis from the NIHR (National Institute for Health Research) stated that acupuncture could be considered as one of the more effective physical treatments for alleviating OA knee pain in the short term (20).

SIMPLE KNEE STRENGTHENING

A personalised exercise therapy programme should be prescribed after a knee assessment. To facilitate tissue adaptation (for example increased strength, movement range, balance) a training response should be expected (aching, tiredness) and patients should be warned of this. It is common for individuals to interpret pain as negative (hurt and harm) rather than a training response and patient education is essential to manage this. To be effective, exercise must be progressive, and frequency, intensity, time and type (F.I.T.T.) of exercises must change as tissue adaptation occurs. Full strength may take 6 to 12 months to develop and again education should prepare the patient for this.

Knee bracing

Have the patient sit on a bed or the floor, with his leg out straight in front of him. Tell him to tighten his thigh muscles and try to brace his leg out straight. If his knee has been swollen, it might not lock out completely straight (compare it to his other leg). He should tighten his thigh muscles (quadriceps)

and hold them tight for 3 to 5 seconds before relaxing. Rest and repeat for 5 reps. Remind him to breathe as he tightens and not to hold his breath (Fig. 4, Video 2). If his muscles are very weak, and you only get a flicker of contraction, grip them with your hand. This will help send messages to the muscle to remind it to 'wake up' (muscle facilitation) (Fig. 5). Where his knee does not lock out easily, use your flat hand to gently press down on the thigh to encourage straightening. Once it has straightened with help from your hand, instruct him to keep his thigh muscles tight as you remove your hand from his thigh.

Leg extension

When your patient is able to brace her thigh muscles, she can use them as she bends and straightens her knee (Video 2). She should begin with a small movement, placing a block or rolled towel behind her knee. Instruct her to press the back of her leg down against the towel as she tightens her thigh muscles to straighten her leg and lift her heel from the floor. The straight position should be held for 3 to 5 seconds and then released. Perform 5–10 reps and then rest. The amount of movement can be increased by performing the same leg extension action sitting at the edge of a bed or table. Tell your patient to slowly straighten her knee (concentric action), hold it straight (isometric action) and then bend under control (eccentric action). Use a count of 2 to

straighten, 4 to hold and 2–4 to lower. The lowering phase is important, so the patient should not let the leg simply fall back down. Increase strengthening by adding a small weight on her shin (a weight bag or heavy towel) and have her perform 10 reps (Fig. 6, Video 3). After rest, repeat this (2 sets of 10) and then build to 3 sets of 10, as the patient is able. As the exercise becomes easier the patient needs to remember to increase the weight to keep pace with her strengthening muscles.

Leg-press with band

The first two exercises were 'open chain' exercises, performed with the foot free. The knee joint is free to move, and it is not compressed. However, eventually the patient will need to load his knee and we then move to 'closed chain' actions. The leg-press with a band (Fig. 7, Video 4) or a gym ball (Fig. 8, Video 5) is a good action to bridge the gap, as the patient is pressing against something with his foot, but the resistance is light. Have the patient sit on the floor with his back against a wall. Have him bend his knee and hook an exercise band over his foot and hold it with both hands (tell him to turn his head away from the band for safety – in case it flicks off his foot!). Then he should straighten his leg by pressing against the band. The straight position should be held for 2 to 5 seconds and then the knee bent again under control. Have the patient perform 5–10 reps and then rest and repeat. With this type of closed chain action, the muscles on the front and back of the thigh (quadriceps and hamstrings) work together to control the knee movement, whereas with an open chain action the muscles on one side of the thigh (quadriceps

“PAIN, MUSCLE STRENGTH AND CONFIDENCE IN THE KNEE CAN ALL BE IMPROVED SIGNIFICANTLY WITH REHABILITATION”



Figure 13: Step-up (C. Norris, 2017)

with the leg extension action) work in isolation. The closed chain action more accurately mimics the type of action we would perform in our day-to-day tasks such as pushing, pulling, standing from a chair for example and so are termed 'functional'. Using a thicker resistance band increases the work on the muscles, and eventually the patient will be able to use a gym-based leg-press machine.

Supported lunge

Have the patient begin this movement by standing to the side of a chair, with the chair back towards her (Fig. 9). The chair is held with one hand and with feet hip-width apart tell the patient to step forwards by about 1m with one leg – the step distance varies depending on leg length. As she steps forwards with one leg, the knee of the other leg should be lowered towards the ground. The eventual aim is for her to place her knee on the ground almost level with the heel of her leading leg so that the shin of her leading leg is about vertical. Have the patient begin by lowering a small distance and gradually build up as she feels capable. As she gets stronger, gradually release the chair – change from holding it to just touching it lightly and eventually she can just place her hand over it so it is there if she needs it. The patient then reverses the movement by putting the other leg forwards. The aim is for the lunge to be performed unsupported (hands behind head) and ultimately holding a weight.

Mini-squat

Patients often find standing from a chair harder when they have had any type of knee pain. When getting up if the leg muscles are weak they tend to lunge the body forwards, and when sitting down they tend to sit heavily and fall into the seat. This can be

quite dangerous as chairs may slip and people can fall or twist their knee or hip. Strengthening the leg muscles and improving control and balance is the key, and it can be achieved at any age. Once the leg extension has been mastered and the lunge exercise has been started, the patient is ready for the mini-squat. A firm dining chair is used with its back against a wall so it does not slip. Have the patient place his feet hip-width apart and reach both hands forwards as he bends his knees. He should lower himself towards the chair seat until he just touches it (not sit down completely) and then stand up again. If this is too hard, hold his hands for balance, so that he can 'sit' towards the seat but not quite touch it. You can even put some solid blocks or books on the seat to raise it up. As he improves he can go further towards the chair. Eventually this action becomes a squat exercise in the gym (Figs 10–12, Video 6), which even elderly patients can achieve with practice.

Step-up

When someone has had knee pain, stairs can also be a problem. Going up is normally a bit of a struggle, but coming down can be even worse. This is because when we go upstairs we naturally lean forwards to take our weight into the stair, but coming down we lean back slightly taking our weight onto our heels. The step-up is simply using a staircase as an exercise (Fig. 13). The patient begins by facing the bottom step of a staircase or use a step bench in a gym. Have your patient place one foot on the step (whole of the foot not just your toes) and press with her leg to straighten it and step up. She should keep the same foot on the step, pause in the top position and then step down under control. With this first exercise patients are deliberately stepping up with the right and down with the right – using the same leg. The downwards action must also be a controlled movement. Have the patient practice 3–5 reps keeping one foot on the step and then rest and reverse the action keeping the other foot on (up with the left, down with the left). Once she is able to perform this unaided,

alternate the stepping (up with the right, down with the left). This action uses a concentric action going up and an eccentric action going down. To progress the action the patient turns around and stands on the step. Now, she steps down first, tap your foot onto the floor and then go back up (eccentric and then concentric action). Performing this action facing down the staircase is slightly harder as one's weight is back, but more important is the fear of falling downstairs, which is worse following a knee injury. This exercise is as much about confidence as it is about muscle strength. Again, we use graded exposure. Have the patient begin with a smaller step, holding onto the banister and looking down at her foot. The aim is to use a deeper step, and perform it while looking up and with folded arms.

References

1. Urquhart DM, Phymaung PP, Dubowitz J et al. Are cognitive and behavioural factors associated with knee pain? A systematic review. **Seminars in Arthritis and Rheumatism** 2015;44(4):445–55
2. Fransen M, McConnell S, Harmer AR et al. Exercise for osteoarthritis of the knee: a Cochrane systematic review. **British Journal of Sports Medicine** 2015;49:1554–1557
3. Jones A. The osteoarthritic knee. **In Touch** 2007;119:16–21
4. Wylde A, Sayers A, Odutola R et al. Central sensitization as a determinant of patients' benefit from total hip and knee replacement. **European Journal of Pain** 2016;1:1–8
5. Bedson J, Croft PR. The discordance between clinical and radiographic knee osteoarthritis: a systematic search and summary of the literature. **BMC Musculoskeletal Disorders** 2008;2:9:116
6. Hohmann E. Long distance running and arthritis. **sportEX medicine** 2006;30:10–13
7. Radin EL, Eyre D, Schiller AL. Effect of prolonged walking on concrete on the joints of sheep. **Arthritis and Rheumatism** 1979;22:649 (abstract)
8. Videman T. The effect of running on the osteoarthritic joint: an experimental matched pair study with rabbits. **Rheumatology and Rehabilitation** 1982;21(1):1–8
9. Puranen J, Ala-Ketola L, Peltokalleo P et al. Running and primary osteoarthritis of the hip. **British Medical Journal** 1975;1:424–425
10. Panush RS, Brown DG. Exercise and arthritis. **Sports Medicine** 1987;4(1):54–64
11. Lane NE, Oehlert JW, Bloch DA et al. The

relationship of running to osteoarthritis of the knee and hip and bone mineral density of the lumbar spine: a 9 year longitudinal study. **Journal of Rheumatology** 1998;25:334–341

12. Leech RD, Edwards KL, Batt ME. Does running protect against knee osteoarthritis? Or promote it? **Assessing the current evidence British Journal of Sports Medicine** 2015;49(21):1355–1356

13. Lo G, Driban J, Kriska A et al. Habitual running any time in life is not detrimental and may be protective of symptomatic knee osteoarthritis: data from the osteoarthritis initiative. **Arthritis and Rheumatology** 2014;66:1265–1266 (abstract)

14. Hoessly LH, Wildi LM. Magnetic resonance imaging findings in the knee before and after long-distance running – documentation of irreversible structural damage? **The American Journal of Sports Medicine** 2016;doi: <http://spxj.nl/2nCiC2>

15. Felson DT. Understanding the relationship between bodyweight and osteoarthritis. **Clinical Rheumatology** 1997;11:671–681

16. Ezzo J, Hadhazy V, Birch S et al. Acupuncture for osteoarthritis of the knee: a systematic review. **Arthritis and Rheumatology** 2001;44(4):819–825

17. White A, Foster N, Cummings M et al. Acupuncture treatment for chronic knee pain: a systematic review. **Rheumatology** 2007;46(3):384–390

18. National Institute for health and Care Excellence (NICE). Osteoarthritis: the care and management of osteoarthritis in adults. **NICE Clinical Guideline (CG)59, 2008**

19. National Institute for health and Care Excellence (NICE). Osteoarthritis: care and management. **NICE Clinical Guideline (CG)177, 2014** (<http://spxj.nl/2mUsjzL>)

20. Corbett MS, Rice SJ, Madurasinghe V et al. Acupuncture and other physical treatments for the relief of pain due to osteoarthritis of the knee: network meta-analysis. **Osteoarthritis and Cartilage** 2013;21:1290–1298.



THE AUTHOR

Dr Chris Norris PhD, MCSP is a physiotherapist with over 35 years' experience. He has an MSc in Exercise

Science and a PhD in Backpain Rehabilitation, together with clinical qualifications in manual therapy, orthopaedic medicine, acupuncture, and medical education. Chris is the author of 12 books on physiotherapy, exercise, and acupuncture and lectures widely in the UK and abroad. He is a visiting lecturer and external examiner to several universities at postgraduate level. He runs private clinics in Cheshire and Manchester and his postgraduate courses for therapists are on his website:

<http://www.norrishealth.co.uk/>.

Email: cmn@norrishealth.co.uk

Twitter: @NorrisHealth

LinkedIn: <https://uk.linkedin.com/in/dr-christopher-norris-aa366115>

Facebook: <https://www.facebook.com/NorrisAssociates/>

RELATED CONTENT

- ▶ Gait Retraining in Medial Osteoarthritis of the Knee [Article] - <http://spxj.nl/1Gt3JBF>
- ▶ Untreated ACL rupture and Future Osteoarthritis [Video] - <http://spxj.nl/1kOYFTT>
- ▶ The Biology of Bone Repair and Regenerative Cell-based Approaches [Video] - <http://spxj.nl/1Rvxb90>

DISCUSSIONS

- ▶ Is osteoarthritis (OA) knee pain purely physical in origin or are there other factors that you need to take into account? How would this affect your assessment of your patient?
- ▶ What treatments would you consider for patients in the early (acute) stages of OA?
- ▶ What treatments would you consider for patients in the recovery stage of OA?
- ▶ What do you need to communicate to the patient to help their expectation management?

KEY POINTS

- Knee pain is common, particularly in the over 50s, and can reduce quality of life (QOL).
- Strengthening the knee musculature (as well as exercise in general) can improve QOL, which can in turn provide psychological benefits.
- 'Arthritis' simply means joint inflammation; osteoarthritis involves cartilage degradation with little initial inflammation.
- OA knee pain perception is hugely individual and is affected by a number of psychological factors, as well as central sensitisation.
- X-radiography findings do not often correlate well with the patient's pain level.
- There is no clear link between increased levels of exercise and increased risk of knee OA.
- Obesity has been linked to an increased risk of OA.
- In the acute phase, joint mobilisation and joint distraction are useful for providing pain relief, as is early exercise therapy.
- Early therapy is usually 'symptom contingent', whereas exercise therapy in the recovery phase becomes 'time contingent'.
- Knee strengthening exercises include knee bracing, leg extension, leg-press, supported lunge, mini-squat and step-up.

Want to share on Twitter?

HERE ARE SOME SUGGESTIONS

Tweet this: Chronic knee pain can lead to a significant reduction in quality of life <http://spxj.nl/2ljbsKI>

Tweet this: In OA, the subtle balance between cellular breakdown and repair is upset <http://spxj.nl/2ljbsKI>

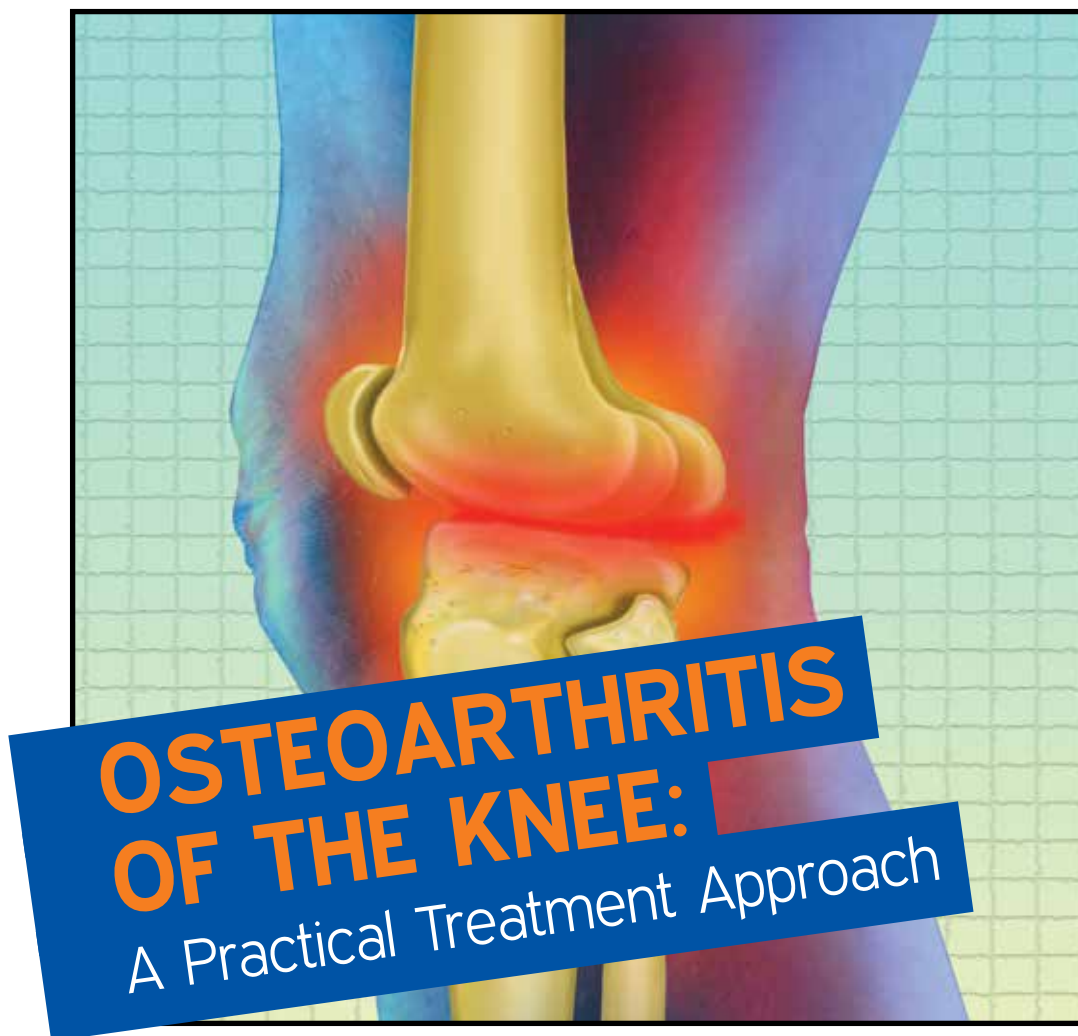
Tweet this: 'Motion is lotion' is an apt adage for the OA knee <http://spxj.nl/2ljbsKI>

Tweet this: Central sensitisation may explain why some patients feel long-term pain after joint replacement <http://spxj.nl/2ljbsKI>

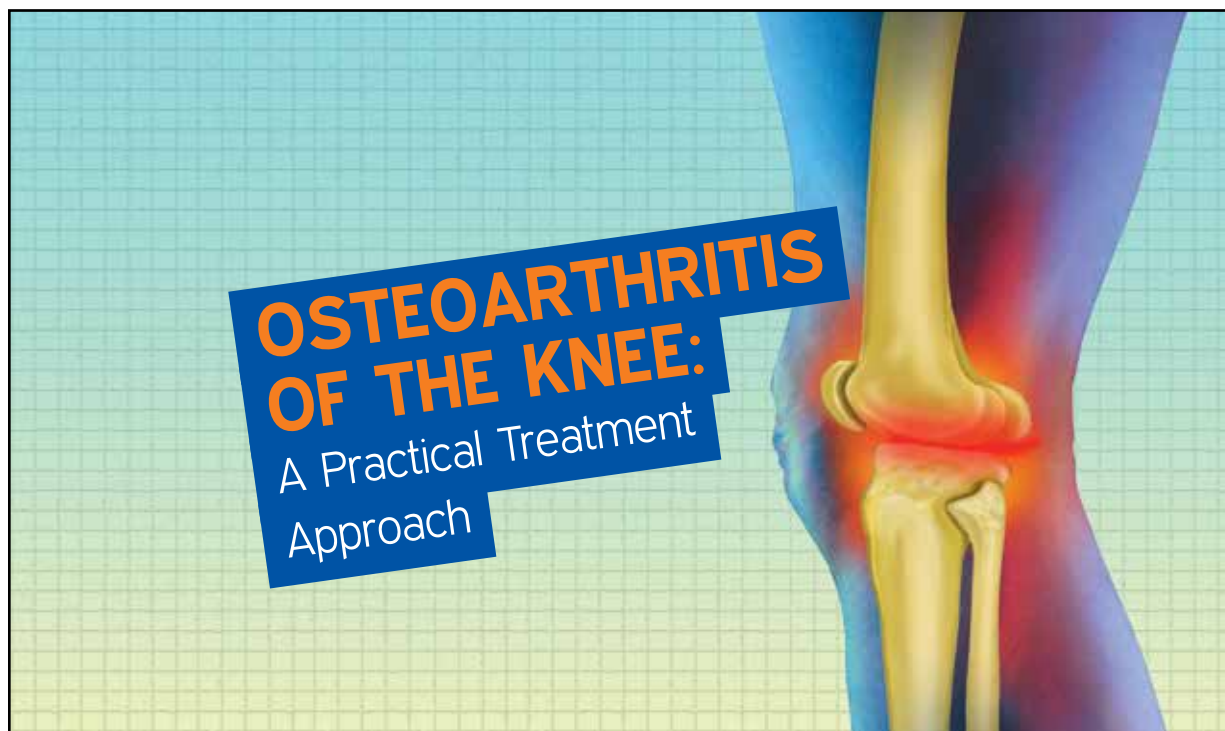
Tweet this: Animal studies have failed to show a direct link between exercise and arthritis <http://spxj.nl/2ljbsKI>

Tweet this: Exercise therapy plays the primary pivotal role in the management of OA in the knee <http://spxj.nl/2ljbsKI>





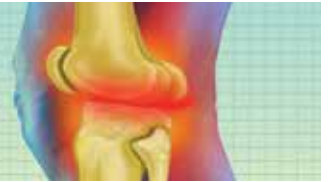
1280 x 760 px



728 x 90 px

OSTEOARTHRITIS OF THE KNEE:

A Practical Treatment Approach



1280 x 760 px

OSTEOARTHRITIS OF THE KNEE:

A PRACTICAL
TREATMENT
APPROACH

1280 x 760 px

OSTEOARTHRITIS OF THE KNEE:

A PRACTICAL
TREATMENT APPROACH

OSTEOARTHRITIS OF THE KNEE:

A Practical Treatment Approach

This article discusses the issue of osteoarthritis of the knee, the role of exercise, its relationship with (or not) arthritis and progresses to physical therapy interventions including exercises which should be included as part of a strengthening and stretching plan. The article is supported by videos which show manual therapy techniques that can be used as part of a treatment programme and additional videos that can be used as part of a patient education programme. There is also a downloadable/printable patient information leaflet. Read this online <http://spxj.nl/2ljbsKI>



