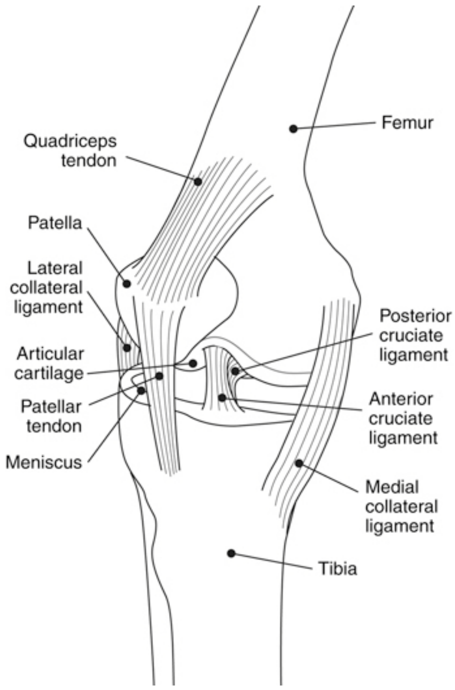
National Council for NCOR Osteopathic Research

Osteopathic management of knee joint symptoms – a snap-shot summary statement (Oct 2010)

- **Key messages**
- A wide range of techniques are used in the management if knee joint symptoms, including:
- *HVLA*
- *Soft tissue / massage techniques*
- *Articulation*
- *Muscle energy techniques*
- *Counterstrain*
- *Myofascial techniques*
- *Lymphatic pump techniques*
- There is still very little research in this area.

Context

Osteopathic care contains over 100 different techniques or procedures[1,2,3,4,5].



It is notable in treatment of knee joint symptoms that a wide range of techniques are used.

The most commonly used techniques are broadly grouped into seven major types:

- High velocity low amplitude (HVLA)
- Soft tissue/massage techniques[6]
- Articulation involving gentle repetitive movement of the joint.
- Muscle energy involving repeated isometric contractions with passive joint movement[2,3].
- Counterstrain involving the symptomatic joint being placed in a position of least discomfort while at the same time monitoring the degree of tenderness at a nearby tender point until the tenderness reduces[2,3,7].
- Myofascial release techniques to stretch muscle and reduce tension[3].
- Lymphatic pump techniques to mechanically assist lymphatic drainage[8].

Studies focussing on the osteopathic management of the knee joint describe the use of a range of techniques. The number of published studies is much smaller than for other areas of the body. The studies undertaken include a range involving animal studies, laboratory work, intervention studies, case studies and opinion pieces/commentaries, and randomised controlled trials.

Animal studies have focussed mainly on the knee joint in the rabbit. Laboratory studies include investigation of the effects of techniques to correct measurements of the knee angle, the physiological effects of the lack of weight on the knee, the introduction of surfactants in the early management of cell death of the articular cartilage following knee trauma, and the effect of fatigue on different muscle groups (notably the hamstrings).

Most of the published studies on knee symptoms have been undertaken in American osteopathic institutions and have investigated the effect of osteopathic management on patients after surgery. These studies have looked at the effects of different drug management programmes, and different surgical approaches in terms of fixation media and the usefulness of unilateral or bilateral knee arthoplasty. One study looked at the use of osteopathic manipulative treatment in patients following either hip or knee arthroplasty[9]. The protocol used in the study involved myofascial release, strain/counterstrain, muscle energy, soft tissue, high velocity low amplitude (HVLA) manipulation, and craniosacral techniques. The treatments administered in the study were not found to be efficacious for the hospital-based patient population.

A small number of published clinical studies were identified; they are summarised in the table overleaf.

There are a large number of laboratory and post-surgical trials published. There is a notable absence of published work documenting the various management techniques used in everyday osteopathic practice for our patients. The National Council for Osteopathic Research will be undertaking a data collection project in 2011 to try and address this paucity of data. An email invitation to participate will be circulated to osteopaths.

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Title of study	Type of study	Intervention	Population size (N)	Summary of findings	Link
Brantingham *et al*[10]. Manipulative therapy for lower extremity conditions	Literature review	Manual therapy using a variety of approaches	N/A	A total of 39 relevant per-reviewed papers were identified for this literature review demonstrating management of a number of lower extremity disorders.	http://www.ncbi.nlm.nih.gov/pubmed/19121464
Opila-Correia[11]. Kinematics of high-heeled gait	Investigational study	Measurement of three-dimensional kinematics of the tibia, knee, hip, pelvis, trunk and upper trunk for high or low-heeled gait	N=14	High-heeled gait subjects had shorter stride lengths, walked more slowly, and had higher stance time. Knee flexion was increased at heel strike and during stance phase; lower knee and hip flexion occurred during swing phase, and lower range of motion of the pelvis in the saggital plane,	http://www.ncbi.nlm.nih.gov/pubmed/2327881
Campos *et al*[12]. Muscular adaptations in response to three different resistance-training regimens	Investigational study	An eight week progressive resistance training programme to investigate the strength-endurance continuum. Interventions included low repetitions (LR)[3-5 sets of reps with 3 mins rest between 4 sets], intermediate repetitions (IR) [9-11 reps, 2 mins reps between 3 sets], high	N=32	Maximal aerobic power increased for HR group only, all three major muscle fibre types hypertrophied for the LR and IR groups, and the HR group adapted better for submaximal prolonged contractions.	http://www.ncbi.nlm.nih.gov/pubmed/12436270

		repetition (HR)[20-28 reps with 1 min rest between 2 sets), and a non-exercising Control (CTL).			
Meyer *et al*[13]. Excessive compression of the human tibio-femoral joint causes ACL rupture	Laboratory study on previously asymptomatic knees from fresh cadavers.	Excessive axial compression load was applied to the tibio-femoral joint at 60, 90 or 120° of flexion	N=16	The maximum force for ACL failure was 5.1kN for all flexion angles combined; at 90° flexion injury occurred with relative anterior displacement, lateral displacement and internal rotation of the tibia on the femur.	http://www.ncbi.nlm.nih.gov/pubmed/16154
McClinton *et al*[14]. Influence of step height on the quadriceps onset timing and activation during stair descent in individuals with patellofemoral pain syndrome (PFPS)	Case control study	Data concerning knee kinematics and quadriceps activity was collected during ascending of 5 different step heights	N=20	Quadriceps onset timing and magnitude was similar regardless of step height between subjects with or without (PFPS)	http://www.ncbi.nlm.nih.gov/pubmed/17549952
Meyer and Haut[15]. ACL injury induced by internal tibial torsion or tibiofemoral compression	Laboratory study involving knees from 7 cadavers	Compression or torsion experiments were conducted to assess if the magnitude and type of motion before ACL rupture would significantly change from	N=7	ACL injury was documented in all knees at 5.4kN of compression or 33Nm of internal tibial torque.	http://www.ncbi.nlm.nih.gov/pubmed/19007932

		just before ACL rupture.			
Jarski *et al*[16]. The effectiveness of OMT treatment as complementary therapy following surgery	Prospective match-controlled outcome study	Treatment group received OMT on postoperative days 2 -5.	N=76	Participants receiving osteopathic care in the early postoperative period negotiated stairs earlier and walked greater distances than the control group participants.	http://www.ncbi.nlm.nih.gov/pubmed/10979164
Smith and Fryer[17]. A comparison of two muscle energy techniques for increasing flexibility of the hamstring muscle group	Laboratory based investigational study	Muscle energy technique (MET) was applied with 30 s post-isometric stretch phase, or with 3s post-isometric stretch phase. Hamstring measurement was undertaken using active knee extension (AKE).	N=40	Both techniques appeared to be equally effective in increasing hamstring extensibility.	http://www.ncbi.nlm.nih.gov/pubmed/19083689
Barron and Rubin[18]. Managing osteoarthritic knee pain	Commentary		N/A	Pharmacological and non-pharmacological approaches to treating patients with osteoarthritic pain are discussed.	http://www.ncbi.nlm.nih.gov/pubmed/17986674

Gugel and Johnston[19]. Osteopathic manipulative treatment of a 27 year old man after ACL reconstruction	Case study	Somatic dysfunction was identified in the lumbopelvic region, in addition to increased muscular tension around the injured knee, ankle joint, lower thorax and between ribs 6-9.	N=1	OMT was used post surgery. Increased mobility in the lumbopelvic region was recorded, areas of somatic dysfunction resolved and the patient was able to return to regular sporting activity 6 months after surgery.	http://www.ncbi.nlm.nih.gov/pubmed/16790541
Rubin[20]. Management of osteoarthritic knee pain	Commentary	N/A	N/A	Pharmacological and non-pharmacological approaches to treating patients with osteoarthritic pain are discussed.	http://www.ncbi.nlm.nih.gov/pubmed/16249363
Meyer *et al*[21]. Osteochondral microdamage from valgus bending of the human knee	Laboratory based investigational study	Four pairs of knees were loaded in valgus bending until gross injury occurred. Peak valgus movement and resultant movement of the joint were recorded. Pressure sensitive film documented the location and magnitude of tibiofemoral contact. Micro-CT scans identified microcracks in the subchondral bone.	N=8 (knees)	Peak bending with ligamentous failure occurred at 107Nm. Cartilage fissures and subchondral bone microcracks occurred in areas of high contact pressure.	http://www.ncbi.nlm.nih.gov/pubmed/19505750

Cheng and Shi[22]. Rehabilitation exercises after single total knee replacement	Case series	Postoperative rehabilitation raining was undertaken at a Chinese osteopathic hospital	N=38	The authors recorded that the rehabilitation programme had produced satisfactory results and recommended wider implementation.	http://www.ncbi.nlm.nih.gov/pubmed/20415085
Pedowitz[23]. Use of osteopathic manipulative treatment for iliotibial band friction syndrome	Case study	Treatment used osteopathic techniques but specifically counterstrain technique	N=1	A tender point was identified 0-3cm proximal to the lateral femoral condyle and was treated accordingly.	http://www.jaoa.org/cgi/content/full/105/12/563