THE HONG KONG COLLEGE OF ORTHOPAEDIC SURGEONS

POSITION STATEMENT
IN MANAGEMENT OF OSTEOARTHRITIS OF KNEE

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CONTENT

INTRODUCTION

Osteoarthritis of knee (OA knee) is common in middle-aged and elderly subjects. The incidence and severity of OA knee increases with age (Tang, 2016).[1] However, there is no direct relationship between the symptoms and radiological abnormalities. At least 70% of individuals suffering from radiographic evidence of OA knee do not have any symptom (Framingham Osteoarthritis Study, 1987).[2] Since clinical and radiographic signs of OA knee are common incidental findings in asymptomatic middle-aged and elderly subjects (Culvenor, 2019)[3], these "abnormalities" can be present as concomitant findings in patients presenting with knee pain. Hence, it is important to rule out other possible differential diagnosis (e.g. "displaceable" degenerative meniscus tear, symptomatic loose bodies, crystal deposition disease, inflammatory arthritis, etc) before considering osteoarthritis of knee as the only cause of the patient's complaints.

Some of the pathologies leading to knee pain can result in rapidly progressing secondary osteoarthritis if they are not properly managed (e.g. full-thickness, full-width root tear of meniscus, spontaneous osteonecrosis of knee - SPONK, etc) (Driban, 2020).[4] Early detection and proper treatment of these "joint threatening" pathologies is an important strategy to reduce the need for joint replacement surgery in relatively young patients. Appropriate investigation (e.g. X-ray and MRI) should be performed at an early stage to allow prompt diagnosis of these "joint threatening" diseases.

Concerning the management of OA knee, the target is to reduce symptoms and to slow down the progression of underlying osteoarthritis. Symptoms of OA knee (e.g. knee pain and swelling) often improve with treatment. However, reversal of the underlying pathological changes (e.g. varus malalignment of lower limb on physical examination, narrowing of joint space in X-ray, etc) is rare once the condition becomes established (NICE, 2014).[5] The initial management of OA knee should be non-operative, with a combination of pharmaceutical and physical treatment. Surgery is reserved for those "joint threatening" situations and for patients suffering from persistent symptoms despite an adequate course of non-operative interventions (Figure 1).

Basing on evidence in the literature and consensus among the fraternity, the Hong Kong College of Orthopaedic Surgeons (HKCOS) has established a set of recommendations on interventions offered to patients suffering from osteoarthritis of knee.

REFERENCE:

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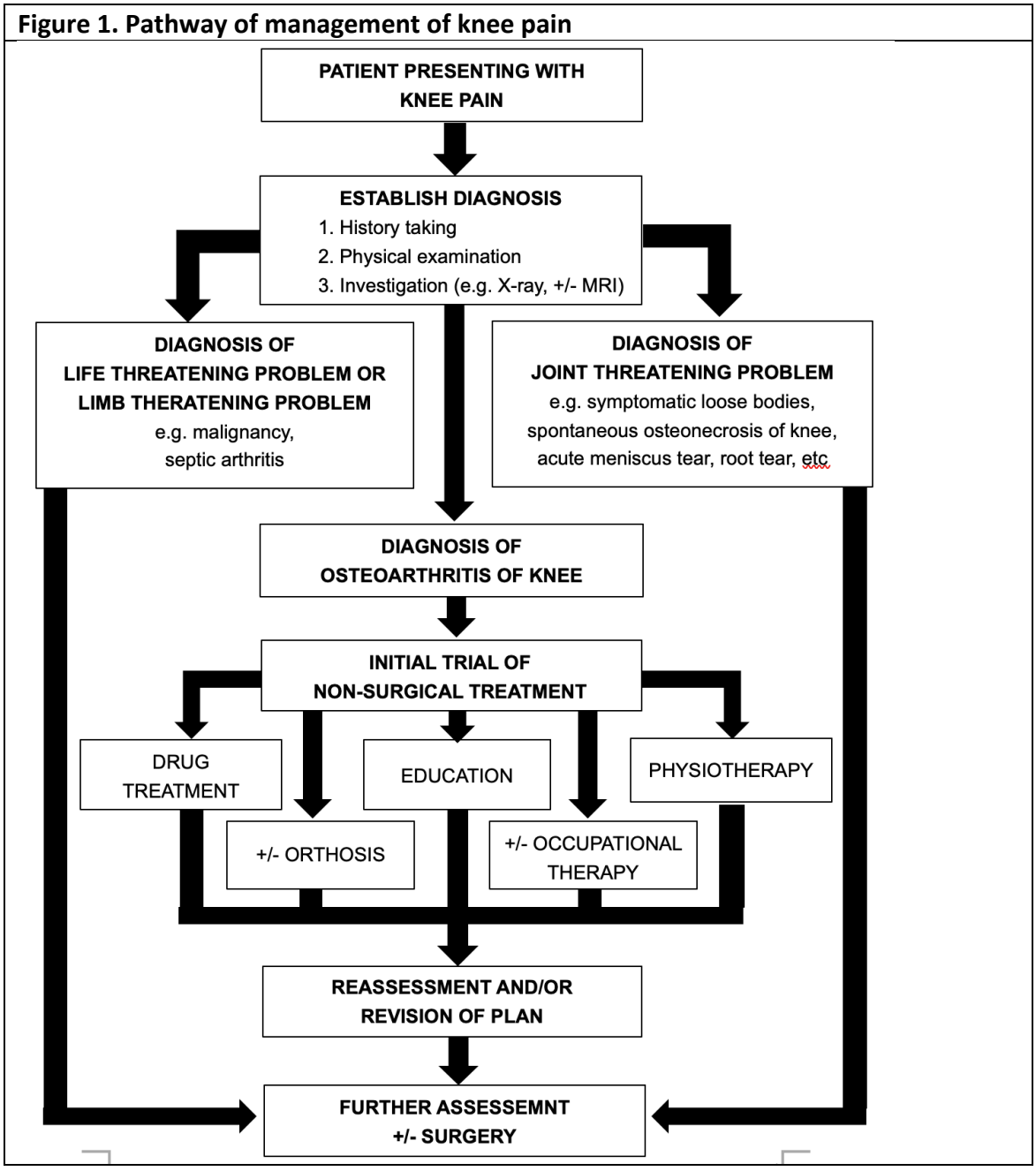
Figure 1. Pathway of management of knee pain



METHODOLOGY

The HKCOS Position Statement in Management of Osteoarthritis of Knee was prepared by the HKCOS osteoarthritis of knee working group (HKCOS-OAKWG).

To develop this position statement, the scope of the common interventions for osteoarthritis of knee are prepared by the working group according to the clinical practice of orthopaedic surgeon in Hong Kong, taking reference from international guidelines on management of osteoarthritis of knee (namely AAOS Guideline on Management of Osteoarthritis of the Knee [1] and OARSI guidelines for the non-surgical management of knee osteoarthritis [2]).

A literature search on the included interventions was conducted. The descriptions of the quality of the evidence was based on the Oxford Centre for Evidence-Based Medicine (OCEBM) Levels of Evidence developed by the Oxford Center for Evidence-Based Medicine. [3]

A Delphi study was performed among an expert panel formed by 106 fellows of the Hong Kong College of Orthopaedic Surgeons. The Delphi survey consisted of questions from six domains (Education and Exercise; Physical treatment; Pharmaceutical management; Oral supplements; Denervation therapy; Surgical management), covering a total of 26 interventions.

For each intervention, the Delphi survey was composed of (i) the rationale behind the proposed intervention; (ii) a concise literature review on the available Level 1 and Level 2 evidences, (iii) a single question concerning the recommendation on the use of the named intervention. The expert panel member was instructed to provide his opinion by selecting either one of the following three answers: (i) RECOMMEND; (ii) DO NOT RECOMMEND; (iii) ABSTAIN. The result of the voting of the expert panel and the evidence found in the literature review formed the recommendations in this Position Statement.

LEVEL OF EVIDENCE

The Oxford Centre for Evidence-Based Medicine (OCEBM) Levels of Evidence was used to describe the quality of the publications. [3] The relevant questions involved were those for treatment benefits ("Does this intervention help?") and treatment harms ("What are the common harms?").

Level 1 evidence referred to systematic review of randomized trials.

Level 2 evidence referred to randomized trial or observational study with dramatic effect.

The descriptions were made according to the ***number of level 1 study or level 2 study*** (if level 1 study is not available) in the literature and ***whether the studies shared consistent findings or conflicting results***.

If only level 3 or level 4 study were available in the literature, the description will be ***LIMITED EVIDENCE***.

If there was only level 5 evidence or there was no publication in the literature, the description will be ***NO EVIDENCE***.

REFERENCE:

1. American Academy of Orthopaedic Surgeons. Management of osteoarthritis of the knee (non-arthroplasty). Evidence-based clinical practice guideline. https://www.aaos.org/oak3cpg Published 08/31/2021. Published August 31st 2021.

2. McAlindon TE, Bannuru RR, Sullivan MC, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartilage*. 2014;22:363-388.

3. OCEBM levels of evidence working group. "The Oxford levels of evidence 2". Oxford Centre for Evidence-Based Medicine. https://www.cebm.ox.ac.uk/resources/levels-of-evidence/ocebm-levels-of-evidence. Accessed May 5, 2022.

RECOMMENDATION

The recommendations were based on the result of the Delphi study performed among an expert panel composed of the fellows of the Hong Kong College of Orthopaedic Surgeons and the evidence found in the literature review. The description will appear as either one of the followings:

1. ***We <u>RECOMMEND</u>*** *…..*
   if a majority of more than 70% expressing support for the use of the concerned intervention was established among the expert panel; AND
   if the majority of opinions was in line with the evidence in the latest literature review.

2. ***We <u>DO NOT RECOMMEND</u>*** ……
   if a majority of more than 70% expressing disapproval of the use of the concerned intervention was established among the expert panel; AND
   if the majority of opinions was in line with the evidence in the latest literature review.

3. ***We <u>ARE NOT ABLE TO ADVOCATE</u>*** **for or against** ……
   if a majority of more than 70% could NOT be established among the expert panel; OR
   if the majority of opinions was NOT in line with the evidence in the latest literature review.

RESULT

(A) INTERVENTIONS OFFERED TO PATIENTS SUFFERING FROM OSTEOARTHRITIS OF KNEE

(I) NON-SURGICAL MANAGEMENT

a. Non-pharmaceutical management

(i) ***Education and Exercise***

Patient education
Land-based exercise
Water-based exercise
Self-management program
Weight reduction

(ii) ***Physical treatment***

Thermotherapy
Transcutaneous electrical nerve stimulation
Percutaneous electrical nerve stimulation and pulsed electromagnetic wave therapy
Acupuncture

(iii) ***Orthosis and braces***

Cane
Valgus off-loading knee brace
Knee sleeve
Laterally wedged insole

b. Pharmaceutical management

(i) ***Analgesics and anti-inflammatory agent***

Paracetamol
Topical non-steroidal inflammatory drug
Oral non-steroidal inflammatory drug
Opioid

(ii) ***Intra-articular injections***

Intra-articular steroid injection
Intra-articular hyaluronic acid injection
Intra-articular platelet rich plasma injection

c. Oral supplements (glucosamine, chondroitin and vitamin D)

d. Denervation therapy

(II) SURGICAL MANAGEMENT

a. Non-arthroplasty surgery

(i) Arthroscopic lavage and debridement
(ii) Partial meniscectomy
(iii)High tibial osteotomy

b. Knee arthroplasty

(B) SUMMARY OF RECOMMENDATION

(I) NON-SURGICAL MANAGEMENT

a. Non-pharmaceutical management

(i) ***Education and Exercise***

Patient education

We RECOMMEND patients suffering from osteoarthritis of knee to receive education program for symptoms relief.

Land-based Exercise

We RECOMMEND land-based exercise (both supervised and unsupervised exercise) for pain relief and functional improvement in patients suffering from osteoarthritis of knee.

Water-based Exercise

We RECOMMEND water-based exercise as a treatment for patients suffering from osteoarthritis of knee.

Self-management program

We RECOMMEND patients suffering from osteoarthritis of knee to receive self-management program for pain relief and functional improvement.

Weight reduction

We RECOMMEND patients with high body mass index (BMI) to achieve effective and sustainable weight control for pain relief and functional improvement.

(ii) ***Physical treatment***

Thermotherapy

We ARE NOT ABLE TO ADVOCATE for or against the use of thermotherapy in the management in knee osteoarthritis.

Transcutaneous electrical nerve stimulation

We ARE NOT ABLE TO ADVOCATE for or against the use of transcutaneous electrical nerve stimulation as a treatment for patients suffering from osteoarthritis of knee.

Percutaneous electrical nerve stimulation and pulsed electromagnetic wave therapy

We ARE NOT ABLE TO ADVOCATE for or against the use of percutaneous electrical nerve stimulation and pulsed electromagnetic field therapy in management of osteoarthritis of knee.

Acupuncture

We ARE NOT ABLE TO ADVOCATE for or against the use of acupuncture in management of osteoarthritis of knee.

(iii) ***Orthosis and braces***

Cane

We RECOMMEND the use of cane to improve pain and function of patients suffering from osteoarthritis of knee.

Valgus off-loading Knee brace

We ARE NOT ABLE TO ADVOCATE for or against the use of brace to improve pain, function and quality of life of patients suffering from osteoarthritis of knee.

Knee sleeve

We ARE NOT ABLE TO ADVOCATE for or against the use of knee sleeve to improve pain and function of patients suffering from osteoarthritis of knee.

Lateral wedge insole

We DO NOT RECOMMEND the use of lateral wedge insole for patient with knee osteoarthritis.

b. Pharmaceutical management

(i) ***Analgesics and anti-inflammatory agent***

Paracetamol

We RECOMMEND the use of paracetamol as a first-line analgesic for patients suffering from osteoarthritis of the knee.

Topical non-steroidal inflammatory drug

We RECOMMEND the use of topical NSAIDs as first-line treatment for patients suffering from osteoarthritis of knee.

Oral non-steroidal inflammatory drug (NSAID)

We RECOMMEND the use of oral NSAIDs (in conjunction with a proton-pump inhibitor) as a second-line treatment for patients suffering from osteoarthritis of knee. However, the patients should not have contraindications to this type of medication and have had a poor response to the first line agents.

Opioid

We ARE NOT ABLE TO ADVOCATE for or against the use of opioid analgesics in the treatment of pain associated with osteoarthritis of knee.

(ii) ***Intra-articular injections***

Intra-articular steroid injection

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular steroid injection in management of osteoarthritis of the knee for short-term pain relief of symptomatic osteoarthritis of knee. There is a concern of

increased risk of peri-prosthesis infection if the patients are potential candidates of total knee arthroplasty.

Intra-articular hyaluronic acid injection

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular hyaluronic acid injections as a treatment of symptomatic osteoarthritis of knee.

Intra-articular platelet rich plasma injection

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular platelet rich plasma injection in management of osteoarthritis of knee.

c. Oral supplements (glucosamine, chondroitin and vitamin D)

We ARE NOT ABLE TO ADVOCATE for or against the use of oral supplements as a treatment for patients suffering from osteoarthritis of knee.

d. Denervation therapy

We DO NOT RECOMMEND the use of denervation therapy as a treatment for patients suffering from osteoarthritis of knee.

(II) SURGICAL MANAGEMENT

a. Non-arthroplasty surgery

(i) ***Arthroscopic lavage and debridement***

We DO NOT RECOMMEND arthroscopic lavage as a treatment for patients suffering from osteoarthritis of knee.

(ii) ***Partial meniscectomy***

We ARE NOT ABLE TO ADVOCATE for or against arthroscopic partial meniscectomy as a standard treatment for patients suffering from osteoarthritis of knee. However, there may be a role in selected patients who present with symptoms of locking, and fail to respond to an initial trial of non-operative treatment.

(iii)***High tibial osteotomy***

We RECOMMEND performing high tibial osteotomy in selected patients who suffer from symptomatic osteoarthritis of medial compartment of knee.

b. Knee arthroplasty

We RECOMMEND performing knee arthroplasty for patients suffering from symptomatic end-stage osteoarthritis of knee after failure of initial attempt of non-operative management.

(C) RESULTS OF DELPHI STUDY AND EVIDENCES IN THE LITERATURE

Patient education

The essential components provided to patients in most patient education program include the following:

1. Nature, presenting symptoms and natural history of osteoarthritis of knee
2. Available treatment options and the importance of adherence to treatment
3. Preventive lifestyle behaviours
4. Modification of behaviour beliefs and outcome evaluations

Patient education can be provided in one of the following formats:

1. Face-to-face education (either delivered in one session or in multiple sessions)
2. Patient handout or information leaflet
3. Digital format in terms of presentation file, educational video or movie, which are either stored in portable storage device (e.g. USB, DVD, etc) or accessible in the internet
4. Group discussion and sharing

On top of adherence to treatment and prevention of repeated injury, patient education works through the theory of planned behaviour-based intervention (TPB) (Saffari, 2018). [1] By modifying the patient's attitude (which is an individual's evaluation of a given behaviour), the subjective norms of family members (which are the viewpoints of other important people in the person's life toward the behaviour), and the perceived behaviour control of the patient (which is how much a behaviour is easy or difficult to perform and whether the person has sufficient control over his or her ability to engage in the behaviour), the perceived quality of life of the patient can be modified, despite a similar physical condition (Saffari, 2018). [1]

Recommendation

We RECOMMEND patients suffering from osteoarthritis of knee to receive education program for symptoms relief.

Question and Results of Delphi Survey

"Do you recommend patient education as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

100 % of expert panel recommended patient education; 0 % did not recommend; 0 % abstained.

Evidence

There is level 2 evidence supporting the efficacy of education in reducing the pain and improving the quality of life of patients suffering from osteoarthritis of knee [1 - 4]. In the randomized controlled trial performed by Saffari, significant larger improvement in quality of life was observed in the patient-education group when compared with the control group. In Saffari's study, a total of 120 patients suffering from osteoarthritis of knee or hip were recruited. [1] The intervention group (60 patients) received an educational program based on TPB while the control group did not receive this treatment. After a period of 1 month, the quality of life in the patient education group was significantly better than the control group in nearly all the domains measured (all except the vitality domain of Short-Form 12; all the domains of EuroQol; and all, except social functioning domain, of Osteoarthritis Knee and Hip Quality of life questionnaire). Similar findings in terms of superior improvement in pain and physical function in the education groups were observed in other randomized clinical trials [2 - 4].

REFERENCE

1. Saffari M, Meybodi MKE, Sanaeinasab H, Karami A, Pakpour AH, Koenig HG. A theory of planned behaviour-based intervention to improve quality of life in patients with knee/hip osteoarthritis: a randomized controlled trial. *Clin Rheumatol*. 2018; 37:2505-2515. doi:10.1007/s10067-018-4120-4.

2. Cagnin A, Choiniere M, Bureau NJ, et al. A multi-arm randomized clinical trial of the use of knee kinesiography in the management of osteoarthritis patients in a primary care setting. *Postgrad Med*. 2020; 132(1):91-101. doi: 10.1080/00325481.2019.1665457.

3. Rini C, Porter LS, Somers T, et al. Automated internet-based pain coping skills training to manage osteoarthritis pain: a randomized controlled trial. *Pain*. 2015; 156(5):837-848. doi:10.1097/j.pain.0000000000000121.

4. Rodrigues da Silva JM, Rezende MU, Spada TC, et al. Educational program promoting regular physical exercise improves functional capacity and daily living physical activity in subjects with knee osteoarthritis. *BMC Musculoskelet Disord*. 2017; 18(1):546. doi:10.1186/s12891-017-1912-7.

Land-based exercise

Exercise helps reduce symptoms of osteoarthritis of knee through improvement in muscle strength and overall physical fitness. The increase in the strength of muscle around the knee modifies the biomechanics of the joint, leading to a reduction of loading on the cartilage, and resulting in a decrease in pain. Improvement in physical fitness is achieved by performing regular aerobic exercise. It increases the peak oxygen uptake of muscle, and renders the performance of daily tasks by the patient easier, thus improving the physical function of the patient. To achieve the maximum benefit, exercise should be performed on a regular basis in adequate, but not excessive, mileage.

Land-based exercise for treatment of osteoarthritis of knee can be categorized into five types according to the exercise program:

1. Quadriceps strengthening exercise only
2. Lower limb strengthening exercise
3. Combination of strengthening and aerobic exercise (e.g. static biking, treadmill walking)
4. Walking program
5. Others (including Tai Chi, Qigong, Baduanjin, etc)

These exercise program can be delivered in different modes, either in the clinic under supervision (including both individual program and class-based program) or at home by patient with no supervision.

Recommendation

We RECOMMEND land-based exercise (both supervised and unsupervised exercise) for pain relief and functional improvement in patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend land-based exercise as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

99 % of expert panel recommended land-based exercise; 1 % did not recommend; 0 % abstained.

Evidence

There is level 1 evidence in the literature supporting the effectiveness and safety of land-based exercise as treatment of osteoarthritis of knee (Fransen, 2015). [1] The latest update of Cochrane Library systematic review reported a meta-analysis of 54 randomized controlled trials, which compared land-based exercise with either a non-exercise group or a non-treatment control group. The overall quality of evidence concerning the outcomes pain and quality of life was high when assessed by the GRADE approach (Grading of Recommendations, Assessment, Development and Evaluations).

In terms of reduction of pain, 44 studies provided data on 3573 patients. When compared with the control group, land-based exercise resulted in a small but significant short-term improvement of pain (VAS score of 1.2 out of a maximum of 10 point) that was sustained for up to six months after stopping the exercise. Besides, there was also slight short term improvement in physical function (0.4 point improvement in a scale of 0 to 10 points) in the land-based exercise group over the control group. No significant difference in the improvement of pain and physical function was noted among different types of exercise program. However, there was substantial difference in the outcomes among different modes of delivery. Individual clinic-based treatment program resulted in average improvement in pain of 1.9, while the improvement of pain in class-based program and home-based program were 1 and 0.9 respectively (Fransen, 2015). [1]

REFERENCE

1. Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee. *Cochrane database systematic reviews*. 2015; 2015(1):CD004376. doi: 10.1002/14651858.CD004376.pub3.

Water-based Exercise

Water-based exercise is often known as pool therapy or hydrotherapy, which is conducted in a pool filled with warm water of 32 to 36 degree of Celsius. As in land-based exercise, water-based exercise helps increase the muscle strength and aerobic capacity of patients. On top of this, warm water provide additional benefits to patients suffering from OA knee in term of a decrease in pain sensation, an increase in muscle relaxation and a subsequent reduction in stiffness of the joint.

Recommendation

We RECOMMEND water-based exercise as a treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend water-based exercise as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

91 % of expert panel recommended water-based exercise; 3 % did not recommend; 6 % abstained.

Evidence

There is level 1 evidence in the literature supporting the effectiveness and safety of water-based exercise as treatment of osteoarthritis of knee and osteoarthritis of hip (Bartel, 2016).[1] The latest update of Cochrane Library systematic review reported a meta-analysis of 13 randomized controlled trials, which compared water-based exercise performed in a therapeutic / heated indoor pool to a control group (e.g. usual care, education, no exercise, etc). The total number of participants was 1190. Patients suffering from OA knee were recruited in 11 out of the 13 studies.

There was a small but significant improvement in pain and physical function in the water-based exercise group when compared with the control group. The effect size was a difference of 0.5 point (on a scale of 0 to 10) in the treatment group compared to the control group, both in the domain of pain reduction and physical function improvement.

There is one level 2 evidence comparing the effectiveness of water-based exercise and land-based exercise in management of osteoarthritis of knee (Silva, 2008).[2] After a treatment period of 18 weeks, there was no difference in the pain reduction and function improvement between the two groups.

REFERENCE

1. Bartels EM, Juhl CB, Christensen R, et al. Aquatic exercise for the treatment of knee and hip osteoarthritis. *Cochrane database systematic reviews*. 2016; 2016(3):CD005523. doi:10.1002/14651858.CD005523.pub3.

2. Silva LE, Valim V, Pessanha APC, et al. Hydrotherapy versus conventional land-based exercise for the management of patients with osteoarthritis of the knee: a randomized clinical trial. *Physical therapy*. 2008; 88(1):12-21. doi:10.2522/ptj.20060040.

Self-management program

Self-management programmes are often delivered in a number of sessions within a day or over a few weeks. The target is to equip patients with management strategies to gain control over their symptoms. There is overlap between self-management program and patient-education program because education on medication compliance, injury prevention and exercise advice are also core components in most self-management programmes. However, on top of education, formalized training in management strategies is provided in self-management programmes. These include pain coping and management techniques (Somers, 2012) [1] ; exercise programmes and joint protection strategies during physical activities (Hurley, 2007) [2] ; and stress management techniques (Helminen, 2015) [3] .

Recommendation

We RECOMMEND patients suffering from osteoarthritis of knee to receive self-management program for pain relief and functional improvement.

Question and Results of Delphi Survey

"Do you recommend self-management program as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

83 % of expert panel recommended activity modification; 9 % did not recommend; 8 % abstained.

Evidence

There is level 2 evidence in the literature supporting the use of different types of self-management program in treating patients with osteoarthritis of knee [1-2] . In the randomized controlled trial carried out by Somers, the focus was put on pain coping skill training [1]. 232 patients were randomized into four groups. Patients randomized to the group of pain coping training and lifestyle behaviour weight management intervention had significantly better results than the other three groups in terms of pain and physical disability. In the ESCAPE study (Enabling Self-management and Coping with Arthritic Knee Pain through Exercise), Hurley randomized 418 participants into three groups and showed that the rehabilitated group (no matter it was individual rehabilitation or group rehabilitation) had better functions than the group randomized to receive usual primary care [2].

REFERENCE

1. Somers TJ, Blumenthal JA, Guilak F, et al. Pain coping skills and lifestyle behavioural weight management in patients with knee osteoarthritis: a randomized controlled study. *Pain*. 2012; 153(6):1199-1209. doi: 10.1016/j.pain.2012.02.023.

2. Hurley MV, Walsh NE, Mitchell HL, et al. Clinical effectiveness of a rehabilitation program integrating exercise, self-management, and active coping strategies for chronic knee

pain: a cluster randomized trial. *Arthritis Rheum*. 2007; 57(7):1211-1219. doi:10.1002/art.22995.

3. Helminen EE, Sinikallio SH, Valjakka AI, Vaisanen-Rouvali RH, Arokoski JPA. Effectiveness of a cognitive-behaviour group intervention for knee osteoarthritis pain: a randomized controlled trial. *Clin Rehabil.* 2015; 29(9):868-881. doi:10.1177/0269215514558567.

Weight reduction

Obesity is a known risk factor for development of osteoarthritis of knee. Hence, weight reduction is a reasonable non-surgical treatment option for management of osteoarthritis of knee in overweight patients.

Recommendation

We RECOMMEND patients with high body mass index (BMI) to achieve effective and sustainable weight control for pain relief and functional improvement.

Question and Results of Delphi Survey

"Do you recommend weight reduction as a treatment for obese patients suffering from symptomatic osteoarthritis of knee?"

97 % of expert panel recommended weight reduction; 0 % did not recommend; 3 % abstained.

Evidence

A systematic review published in 2007 suggested that disability of osteoarthritis of knee in obese patients could be reduced when there was over 5% weight reduction achieved within a 5-month period [1]. 4 randomized controlled trials with a total of 454 participants were recruited in this systematic review. Despite being statistically significant, the effect size in pain relief and disability improvement were small (0.2 for pain relief and 0.23 for self-reported disability improvement) [1]. A subsequent randomized controlled trial published in 2011 supported the effectiveness of weight reduction in obese patient through an intensive low-energy diet (LED) weight reduction program when compared with a group with minimal attention. With an average weight loss of 11% in the LED group at 12-month, there was a significant reduction in pain in the treatment group but not in the control [2].

REFERENCE

1. Christensen R, Bartels EM, Astrup A, Bliddal H. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. *Ann Rheum Dis*. 2007; 66(4):433-439. doi:10.1136/ard.2006.065904.

2. Bliddal H, Leeds AR, Stigsgaard L, Astrup A, Christensen R. Weight loss as treatment for knee osteoarthritis in obese patients: 1-year results from a randomised controlled trial. *Ann Rheum Dis*. 2011; 70(10):1798-1803. doi:10.1136/ard.2010.142018.

Thermotherapy

Thermotherapy refers to the use of heat or cold to change the temperature of soft tissue in order to achieve therapeutic effect. It is commonly used for pathology of joint and other superficial tissue (e.g. muscle). If the underlying problem is an acute injury or pathology with elements of inflammation, cryotherapy should be performed. It helps reduce effusion and swelling. If the problem is chronic pain, heat therapy can be considered. It increases blood flow to the involved area, helps muscle relax and reduces pain and stiffness.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of thermotherapy in the management in knee osteoarthritis.

Question and Results of Delphi Survey

"Do you recommend appropriately applied thermotherapy (both heat therapy and cryotherapy) as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

67 % of expert panel recommended thermotherapy; 17 % did not recommend; 16 % abstained.

Evidence

There is level 1 evidence in the literature supporting the effectiveness of appropriately applied cryotherapy in patients suffering from osteoarthritis of knee [1]. Three randomized controlled trials with a total of 179 patients were included. Although the evidence base on thermotherapy provided by this meta-analysis was limited, clinically important benefits in quadriceps strength increase was demonstrated in patients receiving treatment with ice therapy when compared with the control. There were also statistical significant improvements in knee flexion and functional status, but the improvement did not reach the level of clinical benefit. It was also found that cold packs helped reduce knee swelling. However, no significant improvements were found in pain relief when compared with control. The included randomized controlled trials in this meta-analysis did not examine the effectiveness of heat therapy in pain control in OA knee patients.

REFERENCE

1. Brosseau L, Yonge KA, Welch V, et al. Thermotherapy for treatment of osteoarthritis. *Cochrane database systematic reviews.* 2003; 2003(4):CD004522. doi:10.1002/14651858.CD004522.

Transcutaneous electrical nerve stimulation (TENS)

Transcutaneous electrical nerve stimulation refers to the use of electric current that is applied through the skin as a treatment of pain. By stimulating the large diameter sensory afferent cutaneous neurones, the inhibitory interneurons in the spinal cord dorsal horn is activated, leading to a subsequent attenuation of transmission of nociceptive signals from small diameter sensory fibre and hence a reduction in the perceived pain – "Gate-Control Theory".

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use transcutaneous electrical nerve stimulation as a treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend transcutaneous electrical nerve stimulation as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

33 % of expert panel recommended transcutaneous electrical nerve stimulation; 44 % did not recommend; 23 % abstained.

Evidence

There is level 1 and level 2 evidence concerning the use of transcutaneous electrical nerve stimulation in treatment of osteoarthritis of knee. The latest Cochrane Library review on this topic was updated in 2009 [1] . A total of 18 small trials involving 813 patients were included. It was commented by the author of the meta-analysis that the quality of methodology and reporting in the included trials were poor. A high degree of heterogeneity was noted among the trials. The author concluded that the effectiveness of TENS in pain relief in OA knee patients could not be confirmed. There was another high quality randomized controlled trial published in 2014 [2] . A total of 224 patients were involved. All of them received education and exercise program. TENS and sham TENS were used as adjunct treatment and their effectiveness were compared in that randomized controlled trial. Despite all outcomes improved over time, there was no difference between the TENS group and sham TENS group, suggesting TENS provided no additional benefit when it was used as an adjuvant treatment with education and exercise.

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2. Palmer S, Domaille M, Cramp F, et al. Transcutaneous electrical nerve stimulation as an adjunct to education and exercise for knee osteoarthritis: a randomized controlled trial. *Arthritis Care Res.* 2014; 66(3):387-394. doi:10.1002/acr.22147.

Pulsed electromagnetic field (PEMF) therapy / Percutaneous electrical nerve stimulation (PENS)

Pulsed electromagnetic field therapy leads to increase in blood flow, decrease in inflammation and temporary pain relief in patients suffering from osteoarthritis of knee. The exact mechanism is under investigation but it is proposed that the externally applied electromagnetic field affects the piezoelectric current around chondrocytes and leads to increased synthesis and decreased degradation of proteoglycan, hence favouring the homeostasis and repair of extra-cellular matrix of cartilage. The pulse electromagnetic field can be delivered by two methods: (i) pulsed electromagnetic field therapy, and (ii) percutaneous electrical stimulation. In pulsed electromagnetic field therapy (PEMF), the device need not be in direct contact with patient's skin. With the use of an external time-varying pulsed electromagnetic field, electric current is induced in the patient's body. For percutaneous electric al nerve stimulation (PENS), electrical field is directly applied to the targeted tissue by placing electrodes on the skin surface.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of percutaneous electrical nerve stimulation and pulsed electromagnetic field therapy in management of osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend percutaneous electrical nerve stimulation and pulsed electromagnetic wave therapy as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

43 % of expert panel recommended percutaneous electrical nerve stimulation and pulsed electromagnetic wave therapy; 29 % did not recommend; 28 % abstained.

Evidence

There is level 1 and level 2 evidence supporting the use of pulsed electromagnetic field therapy in treatment of osteoarthritis of knee. The latest Cochrane Library review on this topic was updated in 2013 [1]. Nine studies with 636 patients were included. When compared with sham treatment, patients who received electromagnetic field therapy had significant improvement of pain (1.5 point on a scale of 0 to 10) when compared with patients who received sham treatment. However, there was no difference in terms of improvement in function and quality of life between the two groups. Bagnato subsequently published a high quality randomized controlled trial of 66 patients in 2016 [2]. Significant improvement in both VAS pain score and WOMAC score were found in the PEMF group when compared with sham PEMF group. Similar observation was reported in another high quality randomized controlled trial published in 2019, reporting the results of 72 patients who were randomized to PENS treatment and sham PENS [3].

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Acupuncture

Acupuncture can be divided into traditional Chinese acupuncture and Western medical acupuncture.

In traditional Chinese acupuncture, it is believed that illness is a result of blockage of "meridian" energy circulation. Needles are inserted at specific "meridian" acupuncture points in correct combinations to restore the health of patients. When the needle is properly applied, a sensation of numbness or tingling, which is often referred as "de qi", is produced. The mechanism of traditional Chinese acupuncture cannot be fully explained by western medicine.

In Western medical acupuncture, needles may also be inserted at non-meridian tender spots. Stimulation is done by passing electric current for up to 20 minutes. It is believed that Western medical acupuncture works through stimulation of release of endogenous opioids.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of acupuncture in management of osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend acupuncture as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

26 % of expert panel recommended acupuncture; 42 % did not recommend; 32 % abstained.

Evidence

There is a significant number of level 1 and level 2 evidence in the literature. However, the conclusions from these studies are inconsistent. The latest Cochrane review published in this topic was in 2010 [1]. 16 randomized controlled trials were included. Ten of these trials reported data comparing acupuncture with a sham control. It was found that for patients suffering from osteoarthritis, both acupuncture and sham control (including sham acupuncture) resulted in improvement of pain at 8 weeks and 26 weeks after the procedure. Acupuncture led to small but significant improvements in pain and physical function when compared with sham treatment. However, the conclusions of three pieces of level 2 evidence published in subsequent years (2010 to 2014) were very different from that of the meta-analysis published in 2010. A total of 951 participants were recruited in these three high quality randomized controlled trials with blinding of the participants to the treatment they received. It was found that acupuncture is not superior to sham treatment in all these three studies [2-4]. In the study by Chen [3], it was noted that there was an association between a positive expectation of relief from acupuncture and the reported improvement.

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Cane

The use of cane helps reduce weight bearing in the arthritic joint and hence results in improvement of pain.

Recommendation

We RECOMMEND the use of cane to improve pain and function of patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend the use of cane for selected patients suffering from symptomatic osteoarthritis of knee?"

90 % of expert panel recommended the use of cane; 4 % did not recommend; 6 % abstained.

Evidence

There were two level 2 publications in the literature. They reported consistent results supporting the use of cane in patients suffering from osteoarthritis of knee.

Jones (2012) performed a randomized controlled study on 64 patients with a diagnosis of OA knee. [1] 32 were randomized to experimental group (EG) to use cane for 60 days. 32 patients were in the control group and were asked to continue their normal lifestyle and not to use assistive walking devices. The EG had significant improvement of pain, Short Form-36 bodily pain domain and function measured by the Lequesne knee Questionnaire and Short Form-36 physical function domain.

Van Ginckel (2019) performed a randomized control trial on 79 patients with medial tibiofemoral OA. [2] 40 patients were randomized to the experimental group with the use of cane for 3 months. 39 patients were in the control group and were asked to continue their normal lifestyle and not to use assistive walking devices. Result showed that the use of cane had a greater likelihood of global improvement in knee pain.

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2. Van Ginckel A, Hinman RS, Wrigley TV, et al. Effect of cane use on bone marrow lesion volume in people with medial tibiofemoral knee osteoarthritis: randomized clinical trial. *Osteoarthritis Cartilage*. 2019; 27(9):1324-1338. PMID: 31121294. DOI: 10.1016/j.joca.2019.05.004.

Valgus off-loading knee brace

Valgus off-loading knee brace unloads the medial compartment of knee and reduces the stress on the affected compartment in patients suffering from varus malalignment.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of brace to improve pain, function and quality of life of patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend the use of valgus off-loading knee brace for patients suffering from symptomatic medial compartment osteoarthritis of knee?"

22 % of expert panel recommended the use of valgus off-loading knee brace; 52 % did not recommend; 26 % abstained.

Evidence

There were two pieces of level 1 evidence in the literature. However, the conclusions of these two systematic reviews were conflicting.

The first systematic review was a Cochrane library review published in 2015. [1] Four studies concerning the use of knee brace were included in the Cochrane review but only one study (total number of patients: 115) compared the use of valgus-loading brace (n=58) versus no brace (n=57). The authors of the Cochrane library review concluded that wearing a valgus-off loading knee brace had little or no effect in reducing pain and improving function in patients suffering from osteoarthritis of knee at a follow-up of 12 months.

The second meta-analysis was published by Moyer in 2015. [2] A total of six randomized controlled trials comparing valgus-offloading knee brace (experimental group) and control groups (which were composed of both negative control, i.e. no brace; and a variety of positive controls, including neutral knee brace, knee sleeve, shoe insert). The number of patients in the experimental group and control group were 191 and 412 respectively. Moyer concluded that the results of the meta-analysis favoured the use of valgus off-loading knee brace in terms of improvement in pain and function.

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67(4):493-501. PMID: 25201520. doi: 10.1002/acr.22472.

Knee sleeve

The effect of knee sleeves in osteoarthritis of knee is proposed to be secondary to improvement in proprioception and knee stability.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of knee sleeve to improve pain, function and quality of life of patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend the use of knee sleeves for patients suffering from osteoarthritis of knee?"

28 % of expert panel recommended the use of knee sleeve; 43 % did not recommend; 29 % abstained.

Evidence

There were two pieces of level 1 evidence in the literature. However, the conclusions of these two systematic reviews were inconsistent.

The first systematic review was a Cochrane library review published in 2015. [1] Four studies concerning the use of knee brace were included in the Cochrane library review. Three of them compared the use of knee sleeves or neutral knee brace (experimental group) with no brace (control group). Although these studies reported improvement in pain and function in the experimental group (i.e. knee sleeves or neutral brace), the authors of the Cochrane library review commented that the data in these three studies were not helpful in performing meta-analysis. They further concluded that the benefits of bracing in patients suffering from osteoarthritis of knee was inconclusive.

The second meta-analysis was published by Cudejko in 2018. [2] A total of eleven studies were included (6 randomized controlled trials, 2 non-randomized controlled trials and 3 laboratory studies). There were 527 patients in the experimental group (i.e wearing soft knee brace) and 382 patients in the control group. Cudejko concluded that wearing of soft braces (when compared with not wearing) resulted in small to moderate improvement in pain and self-reported physical function in patients suffering from knee osteoarthritis.

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Lateral wedge insole

Lateral wedge insole is intended to change the knee adduction moment and thus help reduce the medial compartment pressure and the associated knee pain. It can be in the form of an insert for the heel alone; or as a part of an arch support; or as a built-in component of shoe.

Recommendation

We DO NOT RECOMMEND the use of lateral wedge insole for patient with knee osteoarthritis.

Question and Results of Delphi Survey

"Do you recommend the use of lateral wedge insole for patients suffering from osteoarthritis of knee?"

8 % of expert panel recommended the use of lateral wedge insole; 78 % did not recommend; 14 % abstained.

Evidence

There were two pieces of level 2 evidence in the literature [1-2] . Two randomized controlled trials were found in the literature comparing the use of lateral wedge insole and control (normal insole in one study and standard walking shoes in the other study) in the management of symptomatic knee osteoarthritis. A total of 340 patients were recruited (173 in the treatment group and 171 in the control group). Both studies found no difference in the control of knee pain between the two groups. Non-compliance of up to 17% was observed in the treatment group in one research

REFERENCE

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Paracetamol

Paracetamol is a commonly used medication for management of pain associated with OA knee. Overall, paracetamol is a safe medication. However, there is still a potential of overdose with risk of hepatotoxicity and death, so, proper patient education regarding dosing and long-term use should be given.

Recommendation

We RECOMMEND the use of paracetamol as a first-line analgesic for patients suffering from osteoarthritis of the knee.

Question and Results of Delphi Survey

"Do you recommend oral paracetamol as the first-line treatment for patients suffering from symptomatic osteoarthritis of knee?"

92 % of expert panel recommended oral paracetamol; 4 % did not recommend; 4 % abstained.

Evidence

There is level 2 evidence in the literature supporting the use of oral paracetamol as a treatment for patients suffering from osteoarthritis of knee.

Altman compared 160 patients treated with high dose acetaminophen (1300 mg three times daily) and 165 controls and found greater improvements in Western Ontario and McMaster Universities Osteoarthritis Index pain and physical function subscale scores and mean patient global assessment at 12 weeks compared to placebo [1] .

Prior compared 267 patients treated with acetaminophen with 275 controls. This study found greater improvements in WOMAC pain, physical function subscale and mean patient's global assessment of response to therapy at 12 weeks compared to placebo [2] .

REFERENCE

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Topical Non-steroidal anti-inflammatory drugs (NSAIDs)

Topical NSAIDs have been used as an alternative to traditional oral NSAIDs and have been shown to result in significantly lower incidence of complications.

Recommendation

We RECOMMEND the use of topical NSAIDs as a first-line treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend topical NSAIDs as a first-line treatment for patients suffering from symptomatic osteoarthritis of knee?"

78 % of expert panel recommended topical NSAIDs; 11 % did not recommend; 11 % abstained.

Evidence

There is level 2 evidence in the literature supporting the use of topical NSAIDs as a treatment for patients suffering from osteoarthritis of knee. In a randomised controlled trial, Dehghan compared the efficacy of topical ketoprofen and controls and found significant improvement in pain scores in the topical ketoprofen group compared to the control group [1]. Roth examined 326 patients and randomised them into two groups (placebo and topical diclofenac). Topical diclofenac use resulted in greater improvements in terms of pain, physical function, pain on walking, stiffness and patient global assessment compared to placebo at 12 weeks. [2]

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Oral Non-steroidal anti-inflammatory drugs (NSAIDs)

Oral NSAIDS are a commonly prescribed medication in the treatment of pain associated with osteoarthritis of the knee. This class of medications have been found to be effective in improving pain and function of such patients. However, the side effects of this class of medications are well-known, including potential gastrointestinal, renal and cardiovascular adverse effects.

Recommendation

We RECOMMEND the use of oral NSAIDs (in conjunction with a proton-pump inhibitor) as a second-line treatment for patients suffering from osteoarthritis of knee. However, the patients should not have contraindications to this type of medication and have had a poor response to the first line agents.

Question and Results of Delphi Survey

"Do you recommend oral NSAIDs as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

96 % of expert panel recommended oral NSAIDs; 2 % did not recommend; 2 % abstained.

Evidence

There was level 2 evidence in the literature supporting the use of oral NSAIDs in patients without significant co-morbidity. However, adverse side effects are a concern in some of the randomized controlled trials.

Schnitzer in a RCT found that oral naproxen was significantly superior in improving pain and function compared to placebo up to 13 weeks post-treatment. Of note, however, 56.4% of patients in the naproxen group suffered from adverse effects, although most were of mild-moderate severity [1] .

Puopolo examined 548 patients in a RCT who were randomised to receive either etoricoxib, ibuprofen or placebo. Etoricoxib and ibuprofen were superior to placebo in terms of improvement in WOMAC pain and function subscales and Patient Global Assessment of Disease status scores up to 12 weeks of treatment. Similar efficacy was found between etoricoxib and ibuprofen [2].

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2. Puopolo A, Boice JA, Fidelholtz JL, et al. A randomized placebo-controlled trial comparing the efficacy of etoricoxib 30 mg and ibuprofen 2400 mg for the treatment of patients with osteoarthritis. *Osteoarthritis and Cartilage.* 2007; 12:1348-1356.

Opioids

One of the most commonly used opioids in Hong Kong is Tramadol. Other commonly prescribed oral opioids include codeine, oxycodone and tapentadol. Despite being effective in pain control, opioids are associated with a number of adverse central nervous system and gastrointestinal side effects, including nausea, drowsiness, mental fog, constipation, etc. Opioid related constipation can be troublesome in elderly patients. Prolonged use of opioid may also result in addiction.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of opioid analgesics in the treatment of pain associated with osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend opioids (including Tramadol) as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

40 % of expert panel recommended opioids; 46 % did not recommend; 14 % abstained.

Evidence

There is a number of level 2 evidence studying the efficacy and side effects of opioid in the treatment of osteoarthritis of knee.

Serrie, in their randomized controlled study involving 990 patients (who were randomized into 3 groups, placebo, tapentadol and oxycodone), found no significant difference in pain intensity at 12 weeks [1] .

Afilalo investigated the safety of efficacy of oral opioid in the management of osteoarthritis related pain by performing a randomized controlled trial in 1030 patients. Despite being more effective in controlling pain when compared with placebo, 76% of patients receiving tapentadol and 87% of patients receiving oxycodone reported at least one treatment-emergent adverse event during the 16-week investigation period [2] .

Fishman performed a randomized controlled trial in 552 patients suffering from painful osteoarthritis of knee. 87% of patients receiving Tramadol reported adverse events during the study period. These include nausea, dizziness, vertigo, vomiting, somnolence and constipation [3] .

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Intra-articular steroid injection

Intra-articular steroids have been utilized as an anti-inflammatory measure to mitigate the symptoms of flares of osteoarthritic knees. However, the effect is typically short lasting. Besides, there is a concern of increasing risk of peri-prosthetic infection in patients scheduled to have total knee arthroplasty.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular steroid injection in management of osteoarthritis of the knee for short-term pain relief of symptomatic osteoarthritis of knee. There is a concern of increased risk of peri-prosthesis infection if the patients are potential candidates of total knee arthroplasty.

Question and Results of Delphi Survey

"Do you recommend intra-articular steroid injection as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

31 % of expert panel recommended intra-articular steroid injection; 53 % did not recommend; 16 % abstained.

Evidence

There is a number of level 2 evidence supporting the effectiveness of intra-articular steroid injection in controlling symptoms related to exacerbation of osteoarthritis of knee.

In a randomized controlled trial conducted by Yilmaz [1] , pain (measured by visual analogue scale, VAS) and function (measured with WOMAC scores) was significantly improved at one month after injection compared to that at baseline. In another randomized controlled trial, Conaghan [2] found that reduction in average daily pain intensity was greater with patients who had received a prolonged release corticosteroid (triamcinolone acetonide) injection compared to those with received a saline placebo. Furthermore, this study also found that a higher dose (32mg) resulted in improved therapeutic effect compared to the use at a lower dosage (16mg).

REFERENCE:

1. Yilmaz E. The evaluation of the effectiveness of intra-articular steroid, tenoxicam, and combined steroid-tenoxicam injections in the treatment of patients with knee osteoarthritis. *Clin Rheumatol*. 2019; 38(11):3243-3252. doi:10.1007/s10067-019-04641-y.

2. Conaghan PG, Cohen SB, Berenbaum F, Lufkin J, Johnson JR, Bodick N. Brief report: a phase IIb trial of a novel extended-release microsphere formulation of triamcinolone acetonide for intraarticular injection in knee osteoarthritis. *Arthritis & Rheumatol* 2018; 70(2): 204-211. doi:10.1002/art.40364.

Intra-articular hyaluronic acid injection

Hyaluronic acid is a long chain polymer with repeating disaccharide units that can provide shock absorption and lubrication. Intra-articular injections of hyaluronic acid have been widely used in the treatment of osteoarthritis of the knee.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular hyaluronic acid injections as a treatment of symptomatic osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend intra-articular hyaluronic acid injection as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

60 % of expert panel recommended intra-articular hyaluronic acid injection; 24 % did not recommend; 16 % abstained.

Evidence

There is level 2 evidence in the literature studying the efficacy of intra-articular injection of hyaluronic acid in the treatment of osteoarthritis of knee. However, the findings in these studies were inconsistent.

Van der Weegan studied 196 patients and compared the effect of 3-weekly hyaluronic acid injections with placebo saline injections. Although improvements in pain and functional scores were found for both groups at 6 months post-injection, there was no significant difference in pain scores at 30, 90 and 180 days after the last injection [1] . Baltzer in a randomized controlled trial compared 135 patients randomized to hyaluronic acid injection group with 107 patients allocated to a saline placebo injection group. No significant difference in pain and patient reported outcomes were found between the two groups up to 6 months of follow-up [2] . In the latest meta-analysis performed by American Association of Orthopaedic Surgeons (AAOS), it was commented that the there was a low chance for patients receiving intra-articular hyaluronic acid injection to achieve clinically important benefits [3] .

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3. American Academy of Orthopaedic Surgeons management of osteoarthritis of the knee (Non- Arthroplasty) Evidence-Based Clinical Practice Guideline. https://www.aaos.org/oak3cpg. Published 08/31/2021.

Intra-articular platelet rich plasma injection

Autologous platelet rich plasma (PRP) contains higher levels of platelet growth factor (PGF) and cytokines compared to peripheral blood. Such substances may participate in the regulation of inflammatory and cartilage building processes. The potential benefits to patients suffering from osteoarthritis of knee can be symptoms relief in short term and slowdown of osteoarthritis progression in long run.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of intra-articular platelet rich plasma injection in management of osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend intra-articular platelet rich plasma injection as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

25 % of expert panel recommended intra-articular platelet rich plasma injection; 48 % did not recommend; 27 % abstained.

Evidence

There are multiple level 2 evidences comparing intra-articular platelet rich plasma injection with placebo; intra-articular platelet rich plasma injection with intra-articular hyaluronic acid injection; and intra-articular platelet rich plasma injection with intra-articular corticosteroid injection. However, results from these level 2 randomized controlled trials are inconsistent.

Rayegani in an randomized controlled trial found no significant difference in pain, function and stiffness of patients who had received platelet rich plasma injections and those who had received placebo up to 6 months post-injection [1] . Conversely, Gormeli found significant improvements in IKDC and EQ-VAS scores in patients who had received intra-articular PRP injections compared to placebo injections [2]. However, significant heterogeneity existed in the patient groups included in these studies as patients with varying degrees of severity of OA were recruited.

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osteoarthritis: a randomized, double-blind, placebo-controlled trial. *Knee Surg, Sports Traumatol, Arthrosco*. 2017; 25(3): 958-965. doi:10.1007/s00167-015-3705-6.

Oral supplements

Numerous oral supplements including glucosamine, chondroitin and vitamin D have been advocated for use in treatment of pain and dysfunction associated with osteoarthritis of the knee.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against the use of oral supplements as a treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend oral supplements as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

34 % of expert panel recommended oral supplements; 49 % did not recommend; 17 % abstained.

Evidence

There are multiple pieces of level 2 evidence in the literature comparing the effect of oral glucosamine with control; oral chondroitin with control; and oral vitamin D with control, in patients suffering from osteoarthritis of knee. However, the results are inconsistent among different studies.

Clegg compared 313 patients treated with chondroitin with 317 controls [1] . No significant difference was found between the chondroitin and placebo groups in terms of pain reduction at 24 weeks. In the same study, Clegg also compared 248 patients treated with glucosamine and the control group. Again, no significant difference in pain reduction between glucosamine and placebo groups was found at 24 weeks.

Jin compared 183 patients treated with oral vitamin D supplements with a control group (n=168) who was given a placebo [2] . No significant difference in WOMAC knee pain scores was found between the two groups over a 2-year period.

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Denervation therapy

Denervation therapy in the treatment of osteoarthritis of the knee targets branches of the genicular nerve in an attempt to block transmission of pain signals.

Recommendation

We DO NOT RECOMMEND the use of denervation therapy as a treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend denervation therapy as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

2 % of expert panel recommended denervation therapy; 77 % did not recommend; 21 % abstained.

Evidence

There is level 2 evidence in the literature comparing various types of denervation procedures with placebo in controlling pain in patients suffering from osteoarthritis of knee. According to the latest meta-analysis performed by American Association of Orthopaedic Surgeons (AAOS), it was commented that the evidence in denervation therapy was inconsistent [1] .

Mendes compared chemical denervation with placebo in patients with OA knee [2] . Improved WOMAC pain scores were found in the chemical denervation group. Radnovic examined the effect of cryoneurolysis compared to controls and found improved WOMAC pain, stiffness, physical function and total scores compared to placebo [3] . Conversely, McAlindon also compared chemical denervation with placebo and found similar efficacy between the two groups [4].

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Arthroscopic Lavage

During arthroscopic lavage, knee joint is irrigated with copious amount of fluid. Debris from cartilage wear and meniscus tear are removed.

Recommendation

We DO NOT RECOMMEND arthroscopic lavage as a treatment for patients suffering from osteoarthritis of knee.

Question and Results of Delphi Survey

"Do you recommend arthroscopic lavage as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

13 % of expert panel recommended arthroscopic lavage; 76 % did not recommend; 11 % abstained.

Evidence

Moseley (2002) performed a randomized controlled trial on patients with osteoarthritis of knee. 180 patients were randomly assigned to received arthroscopic debridement, arthroscopic lavage or placebo surgery [1]. The result showed that the outcomes after arthroscopic lavage with or without debridement were no better than those after a placebo procedure.

Kirkley (2008) performed a randomized controlled trial in patients with moderate to severe osteoarthritis of knee [2]. Patients were randomly assigned to the treatment group, with surgical lavage and debridement together with optimized physical and medical therapy, or the control group, with physical and medical therapy alone. Results after 2 years demonstrated that there were no benefits of arthroscopic lavage and debridement compared to physical therapy and medical treatment for osteoarthritis of knee.

Kalunian (2000) performed a multicenter randomized controlled trial to compare the WOMAC score at 12 months for arthroscopic irrigation with 3000ml saline (treatment group) and minimal irrigation with 250ml saline (placebo group) [3]. In this study, no significant differences were found in the aggregate WOMAC score between these 2 groups.

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Partial Meniscectomy

In mild and moderate osteoarthritis, arthroscopic partial meniscectomy can be considered if patients present with symptoms of obstructive meniscal tear (i.e. symptoms of intermittent locking) and do not respond to an initial trial of nonsurgical treatment.

Recommendation

We ARE NOT ABLE TO ADVOCATE for or against arthroscopic partial meniscectomy as a standard treatment for patients suffering from osteoarthritis of knee, although there may be a role in selected patients, who present with symptoms of locking and fail to respond to an initial trial of non-operative treatment.

Question and Results of Delphi Survey

"Do you recommend partial meniscectomy as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

33 % of expert panel recommended partial meniscectomy; 54 % did not recommend; 13 % abstained.

Evidence

Katz (2013) performed a multicenter, randomized controlled trial to compare the efficacy of arthroscopic partial meniscectomy and standardized physical therapy for patient aged 45 years or older with symptomatic mild to moderate osteoarthritis knee with meniscal tear [1]. 351 patients were recruited and randomized to either arthroscopy group or physical therapy alone group. The author found that there was no significant difference between the two groups in functional status and pain at 6 months after recruitment. However, 30% of patients in the physical therapy alone group (51 patients) had undergone arthroscopic partial meniscectomy at that time. These findings should help inform decision making by patients and their physicians.

In the multicenter randomized trial conducted by Van de Graaf in 2018, 321 patients suffering from meniscal tear were randomized to either the arthroscopic partial meniscectomy group or the physical therapy group [2]. Patients were aged between 45 to 70 years old. There were similar improvements in knee function in both groups at 24 months after recruitment. However, in the physical therapy group, 29% of patients had arthroscopic partial meniscectomy performed within two years.

Herrlin published a randomized controlled trial for patients suffering from non-traumatic medial meniscal tear in 2007 [3]. 90 patients (mean age of 56 years old) were randomized to arthroscopic partial meniscectomy followed by supervised exercise or supervised exercise alone. Knee function and level of physical activities were evaluated with the Knee Injury and Osteoarthritis Outcome Score, the Lysholm Knee Scoring Scale, the Tegner Activity Scale and a Visual Analogue Scale prior to the intervention, at 8 weeks and 6 months after the intervention. Decrease of knee pain and improvement of knee function were observed in

both groups. However, there was no significant difference in pain and function between these two treatments.

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High Tibial Osteotomy

High Tibial osteotomy can improve pain and function of patients who suffer from symptomatic osteoarthritis of medial compartment of knee.

Recommendation

We RECOMMEND performing high tibial osteotomy in selected patients, who suffer from symptomatic osteoarthritis of medial compartment of knee.

Question and Results of Delphi Survey

"Do you recommend high tibial osteotomy as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

74 % of expert panel recommended high tibial osteotomy; 16 % did not recommend; 10 % abstained.

Evidence

Nerhus (2017) performed a randomized controlled trial with 2 years of follow up [1]. 70 consecutive patients with osteoarthritis of medial compartment of knee were randomly allocated to open or closing wedge high tibial osteotomy. The result found that both groups showed improvement after operation.

Brouwer (2006) performed a randomized controlled trail to compare open and closing wedge high tibial osteotomy [2]. 92 patients were randomized into closing wedge osteotomy stabilized by 2 staples or open wedge osteotomy stabilized by Puddu plate. Both techniques showed improvement in knee function at one year after the procedure.

Van Outeren (2017) performed a study to compare the data of 2 randomized controlled trials conducted in the same period in 2 different hospitals by the same research group. One randomized controlled trial of 117 patients compared an unloader brace to a usual care treatment program. The second randomized controlled trial of 92 patients compared lateral closing-wedge with medial opening-wedge osteotomy in patient with medial compartment knee osteoarthritis. Baseline characteristics were matched between the 2 groups. High tibial osteotomy group had significant reduction in pain compared with brace or usual care treatment. Significant functional improvement was only found in the comparison between high tibial osteotomy group and usual care group.

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Joint replacement surgery

Recommendation

We RECOMMEND performing knee arthroplasty for patients suffering from symptomatic end-stage osteoarthritis of knee after failure of initial attempt of non-operative management.

Question and Results of Delphi Survey

"Do you recommend joint replacement surgery as a treatment for patients suffering from symptomatic osteoarthritis of knee?"

99 % of expert panel recommended joint replacement surgery; 0 % did not recommend; 1 % abstained.

DISCUSSION AND CONCLUSION

The Hong Kong College of Orthopaedic Surgeons is the official professional body for the organization of training of orthopaedic surgeons and the conducting of professional examinations for orthopaedic specialists in Hong Kong. The College is also responsible for setting the standard of care in orthopaedic surgery, which includes but is not limited to the investigation, preservation and restoration of the form and function of the extremities, spine and associated structures with the aim of bringing relief to patients of all ages suffering from the effect of injury or disease of the musculoskeletal system.

Osteoarthritis of knee is one of the most common musculoskeletal problems leading to chronic pain and disability in middle-aged and elderly subjects in Hong Kong. There are a number of treatment options in managing symptomatic osteoarthritis, ranging from education, non-pharmaceutical management, pharmaceutical treatment, oral supplements to surgical interventions. It is the responsibility of the College to provide an updated evidence-based position statement on these interventions for the benefit of the public.

The current position statement is prepared by referencing the latest level 1 and level 2 evidence available in the literature and the consensus of orthopaedic experts in Hong Kong. The recommendations are made by considering both the efficacy and the potential side effects of the intervention. The treatment options covered include (1) education and exercise; (2) physical therapy; (3) biomechanical interventions; (4) pharmaceutical treatment; and (5) surgery. These recommendations are in line with the guidelines published by other international organizations and represent the best clinical practice currently available in Hong Kong.

The limitation of the current position statement is that it does not provide a comprehensive account of all potential interventions for osteoarthritis of knee. Only those management options that are commonly practiced in Hong Kong are included. Besides, treatment methods lacking high quality medical evidence are omitted. There is also a need of regular update of this position statement because of possible changes in the literature with time.

To conclude, to safeguard the interests of the general public, the Hong Kong College of Orthopaedic Surgeons prepares a position statement in the management of osteoarthritis of knee. The recommendations provided represent the consensus of local orthopaedic experts and the best clinical practice currently available for treating osteoarthritis of knee in Hong Kong.

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