Benefits of Arthroscopy in Osteoarthritis of the Knee

Sorawut Thamyongkit, MD, Pongsak Yuktanandana, MD

Department of Orthopaedics, Faculty of Medicine, Chulalongkorn University,

King Chulalongkorn Memorial Hospital, Bangkok, Thailand

As the life span of the world's population continues to rise, the prevalence of osteoarthritis (OA) is also expected to increase. The goals of treatment are to reduce symptoms and slow the progression of the disease. Numerous treatment strategies are used for osteoarthritis of the knee including non-operative and operative procedures. Arthroscopic surgery has been used for many procedures in knee osteoarthritis with the advantage of only a small incision for many procedures. However, recent studies show that arthroscopy in knee OA patients has limited benefit and is not recommended as a routine treatment. Patients with acute onset of pain and effusion, loose bodies or large meniscal tears could get better results. Therefore, proper evaluation and management of osteoarthritis of the knee are key factors.

Key words: *Arthroscopic knee, Osteoarthritis, Knee, Arthroscopic lavage*

The Thai Journal of Orthopaedic Surgery: 39 No.1-2: 43-48
Full text. e journal: *http://www.rcost.or.th, http://thailand.digitaljournals.org/index.php/JRCOST*

Introduction

Osteoarthritis (OA) is a large health problem among populations across the world. The knee is the most common joint to be affected by this disease. According to the Framingham study, the prevalence of radiographic knee OA in adults aged ≥ 45 was 19.2% among the participants. In the third National Health and Nutrition Examination Survey (NHANES III), approximately 37% of participants aged 60 years or older had radiographic knee osteoarthritis. The prevalence increases with age and many factors are risks for osteoarthritis of the knee.

The disease causes pain, stiffness and disturbs daily life activities. Joint pain in osteoarthritis is exacerbated by many causes. Biological, psychological and social factors have significant roles in pain. Chemical mediators are released into the joint, which sensitize primary afferent nerves during inflammation. So, normal movements can elicit a painful response. Mechanical stimuli from incongruent joints, meniscal lesions and loose bodies can also be the cause.

The goals of treatment are to reduce symptoms and slow the progression of the disease. Numerous treatment strategies are used for osteoarthritis of the knee including non-operative and operative procedures. Research and technique development for treatments is on-going.

Correspondence to: Thamyongkit S, Department of Orthopaedics, Faculty of Medicine, Chulalongkorn University, 1873 Rama IV Road, Pathumwan, Bangkok 10330, Thailand
E-mail: drsorawut@outlook.com

After arthroscopy was introduced for knee osteoarthritis in the 1970s, arthroscopic surgery has been used for many procedures in knee osteoarthritis. With small incisions, this technique allows the surgeon to carry out joint lavage, joint debridement, cartilage procedures and meniscal procedures. Despite the wide use of arthroscopy in knee osteoarthritis, the value of arthroscopy in patients with osteoarthritis of the knee is still controversial.

The purpose of this article is to summarize the role of arthroscopic techniques play in treatment strategies for osteoarthritis of the knee from recent studies.

Arthroscopic procedures on knee osteoarthritis

Lavage with or without debridement

The purposes of this procedure are to remove the free particles, tissue debris, and irritating lesions from cartilage and meniscus. It also has the effect of reducing and diluting chemical mediators.

Although a closed-joint lavage by needle improves symptoms and function in knee osteoarthritis patients[1], those who have mechanical symptoms may benefit from arthroscopic lavage and debridement because the procedure can remove the structure or lesion causing the symptoms.

In an earlier study, a prospective review of 254 patients with moderate or severe knee pain due to degenerative joint disease, treated by arthroscopic debridement of menisci, articular cartilage, osteophytes, and loose bodies was made 24 to 140 months after surgery. 75% had improved

function and 85% were satisfied with the treatment. Those with less radiographic arthritis, less severe involvement of articular cartilage, and of younger age had greater improvement.

In 1991, Liveley et al. conducted a control trial to evaluate pain scores after arthroscopic lavage in 37 painful cases of osteoarthritis of the knee, comparing 24 knees in a control group treated with physiotherapy alone. Pain at rest and activity were improved in both groups, but significantly better in the lavage group at three and six months. Signs of inflammation also improved. They concluded that simple joint lavage should be considered in the management of painful osteoarthritis of the knee when no other procedures are indicated.

In fact, this procedure does not correct all causes of pain from osteoarthritis when the progression of disease is still continuing. The benefits of arthroscopic lavage and debridement may be limited over time after this procedure[2].

A randomized-control trial (RCT) study published in 2002 in The New England Journal of Medicine by Moseley et al. found no benefit of arthroscopic lavage and debridement for OA of the knee. They randomly assigned 180 patients with OA of the knee to receive arthroscopic debridement, arthroscopic lavage, or placebo surgery. The placebo group received skin incisions and underwent a simulated debridement without insertion of the arthroscope. Outcomes were assessed at 12 months and 24 months after surgery. No difference was found between all groups.

Moreover, in a study published in 2008, Kirkley et al. conducted a non-blind RCT of 188 patients with moderate to severe OA of the knee. Kirkley's study avoided the criticisms of the earlier study by using a validated outcome measure, excluding patients with large meniscal tears, inflammatory arthritis, previous trauma, malalignment, and performing a subgroup analysis of patients with mechanical symptoms. Even though better Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores at 3 months were registered, there was no difference in the secondary outcomes of quality of life, pain, and function at the end of 2 years after intervention, nor did surgery provide any benefit to the subgroup of patients with mechanical symptoms.

NICE guidelines state that patient selection is important. For example, patients with early osteoarthritic changes and those with large effusions are among those most likely to benefit.

A systematic review of OA and arthroscopy in 2007 found limited evidence-based research to support the use of arthroscopy as a treatment method for OA of the knee. It should not be used as a routine treatment for all patients with knee osteoarthritis. Indeed, the 2008 guidelines from the American Academy of Orthopaedic Surgeons (AAOS) state that "arthroscopic partial meniscectomy or loose body removal is an option in patients with symptomatic OA of the knee who also have primary signs and symptoms of a torn meniscus and/or a loose body"[3]. Moreover, for medial compartment osteoarthritis of the knee, arthroscopic debridement may be useful assisting high tibia osteotomy procedures. This can improve cartilage examination by removing loose bodies and repairing meniscus lesions.

Meniscectomy

During the past 20 years, many studies have been performed to evaluate the outcomes of arthroscopic meniscectomy in knee OA patients. Earlier studies show some good results in short term follow-ups[4,5].The satisfaction from meniscectomy in traumatic tear patients was greater than degenerative tear patients (Fig. 1)[6]. This result may be from the osteoarthritic changes of the knee in patients with degenerative tears. So, outcomes in patients with degenerative changes in radiographs are less favorable than the normal radiographs group[7].

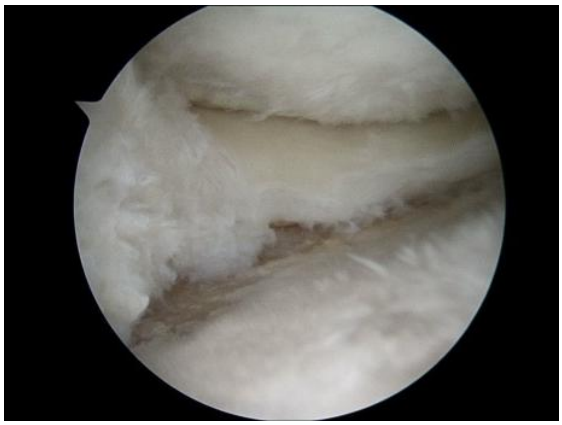


Fig. 1 Arthroscopic image demonstrates a degenerative tear with a generalized cartilage lesion in an OA knee.

A prospective randomized study compared 2 treatments after a non-traumatic medial meniscal tear; arthroscopic partial meniscectomy followed by supervised exercise, or supervised exercise alone. After intervention, both groups reported decreased knee pain, improved knee function, and recorded a high satisfaction, but when evaluated between groups there was no difference from 8 weeks to 5 years follow-up[8,9].

In 2013, the same outcome was observed when Katz el al. compared the functional outcomes of physical therapy versus arthroscopic partial meniscectomy for symptomatic patients with meniscal tears and OA. They found that arthroscopy followed by postoperative physical therapy had no significant differences in functional

improvement at 6 months over physical therapy alone[10].

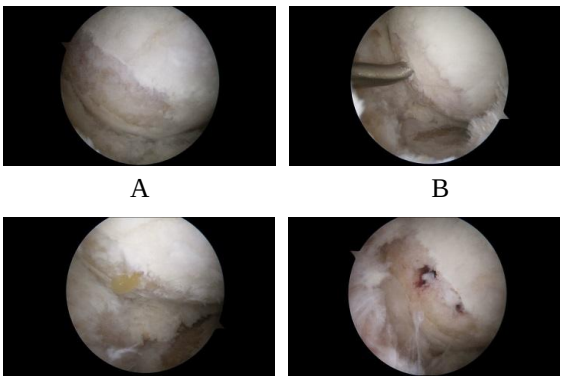
Dervin et al. found that only some variables were significantly associated with improvement such as the presence of medial joint-line tenderness, a positive Steinman test, and the presence of an unstable meniscal tear at arthroscopy[11].

Cartilage procedures

Cartilage procedures include both reparative and restorative. Reparative operations include abrasion, laser, and thermal chondroplasty, drilling, microfracture, and osteochondral autograft/allograft transfers. Restorative operations involve the use of autologous chondrocyte implantations. Most chondroplasty procedures have limited outcomes due to the size of cartilage lesions in OA knees and the age of the patients.

Microfracture

The advantage of microfracture (Fig. 2), which is a marrow-stimulation technique, is that it is a safe minimally invasive single-stage procedure that produces new cover cartilage[12,13]. However, it produces the most fibrocartilage, which is less durable over time, and does not restore normal hyaline cartilage[14]. In a systematic analysis, Mithoefer et al. showed that microfracture provides short-term functional improvement and increases failure rate over time[15].



A B C D

Fig. 2 Arthroscopic image of microfracture procedure. A, Damage cartilage was removed and create contained rim. B, An awl is used to make multiple holes in to the subchondral bone. C, Fat globule from the subchondral marrow was observed. D, Surface should have bone bridge between holes 3-4 mm.

Moreover, the microfracture procedure is only suitable for cartilage lesions less than 1-2 cm. Gibb et al. show that when microfracture is applied in young patients with smaller lesions, it can offer good clinical results. Lesion size is a more important prognostic factor of outcome than age, but patients with osteoarthritis of the knee usually have generalized lesions and may not obtain the contained border necessary for this procedure.

Autologous Chondrocyte Implantation

Chondrocyte implantation (Figs. 3 and 4) cartilage displays a better clinical outcome than microfracture[16,17]. Therefore, it is the most promising procedure for treating cartilage defects, but the results in elderly osteoarthritis patients may be different[18,19].

Both reparative and restorative operations have many predicting factors that influence results. Age, pre-operative activity level, duration of symptoms, previous surgery, and location of lesions all affect the procedures' outcomes[20], so most osteoarthritic patients may not be good candidates for these procedures[21].

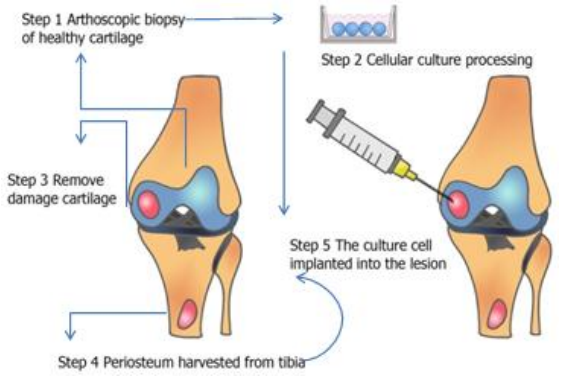


Fig. 3 Autologous Chondrocyte Implantation technique.

Fig. 4 Tissue engineering techniques for treating cartilage defects.

Summary

Recent studies show that arthroscopy in knee OA patients has limited benefits and is not recommended as a routine treatment. However, there are some specific patients that could experience good outcomes from the procedure (Table 1). Patients with acute onset of pain and effusion, loose bodies, or large meniscal tears could have the best results. Conversely, patients with malalignment, chronic symptoms of OA, or diffuse osteoarthritic change will get less favorable outcomes. So, patient selection is very important for the patient's benefit. At present, the indications for autologous chondrocyte implantation are expanding and may include osteoarthritis of the knee, but the results are controversial, and further well-designed studies are needed.

Table 1 Advantages and disadvantages of arthroscopic procedures in knee OA

Arthroscopic procedures	Advantage	Disadvantage
Lavage/Debridement	− Improves symptoms and functions − Simple technique − Low cost	− Short-term pain relieve − Does not improve cartilage − Does not correct the causes of pain
Meniscectomy	− Improves symptoms and functions − Simple technique	− Limited benefit to patients who have mechanical symptoms from a meniscus tear
Chondroplasty*	− Simple technique	− Not suitable for larger ($\geq$2cm^2) lesions in knee OA
Microfracture*	− Simple technique	− Not suitable for larger ($\geq$2cm^2) lesion in knee OA
Autologous Chondrocyte Implantation*	− Hyaline cartilage expected − Can use in larger lesions	− Complex procedure − High costs − Outcomes decline by patients' age

***Poor outcome in knee OA due to many influencing factors

References

1. Chang RW, Falconer J, Stulberg SD, Arnold WJ, Manheim LM, Dyer AR. A randomized, controlled trial of arthroscopic surgery versus closed- needle joint lavage for patients with osteoarthritis of the knee. Arthritis Rheum 1993; 36: 289-96.
2. Spahn G, Klinger HM, Hofmann GO. The effect of arthroscopic debridement and conservative treatment in knee osteoarthritis: Results of a 5-year follow-up and literature review. Sportverletz Sportschaden 2013; 27: 226-31.
3. American academy of orthopaedic Surgeons. Treatment of osteoarthritis of the knee (non-arthroplasty). full guideline. December 6, 2008. available at: http://www.aaos.org/research/guidelines/ GuidelineoaKnee.asp. accessed February 16, 2009.
4. Jackson RW, Rouse DW. The results of partial arthroscopic meniscectomy in patients over 40 years of age. J Bone Joint Surg Br 1982; 64: 481-5.
5. Bonamo JJ, Kessler KJ, Noah J. Arthroscopic meniscectomy in patients over the age of 40. Am J Sports Med 1992; 20: 422-9.
6. McBride GG, Constine RM, Hofmann AA, Carson RW. Arthroscopic partial medial meniscectomy in the older patient. J Bone Joint Surg Am 1984; 66: 547-51.
7. Lotke PA, Lefkoe RT, Ecker ML. Late results following medial meniscectomy in an older population. J Bone Joint Surg Am 1981; 63: 115-9.
8. Herrlin S, Hållander M, Wange P, Weidenhielm L, Werner S. Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomised trial. Knee Surg Sports Traumatol Arthrosc 2007; 15: 393-401.
9. Herrlin S, Wange P, Lapidus G, Hållander M, Werner S, Weidenhielm L. Is arthroscopic surgery beneficial in treating non-traumatic, degenerative medial meniscal tears? A five year follow-up. Knee Surg Sports Traumatol Arthrosc 2013; 21: 358-64.
10. Katz JN, Brophy RH, Chaisson CE, de Chaves L, Cole BJ, Dahm DL, et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. N Engl J Med 2013; 368: 1675-84.
11. Dervin GF, Stiell IG, Rody K, Grabowski J. Effect of Arthroscopic Débridement for Osteoarthritis of the Knee on Health-Related Quality of Life. J Bone Joint Surg Am 2003; 85-A: 10-9.
12. Bae DK, Yoon KH, Song SJ. Cartilage Healing After Microfracture in Osteoarthritic Knees. Arthroscopy 2006; 22: 367-74.
13. Asik M, Ciftci F, Sen C, Erdil M, Atalar A. The microfracture technique for the treatment of full thickness articular cartilage lesions of the knee: midterm results. Arthroscopy 2008; 24: 1214-20.
14. Nehrer S, Spector M, Minas T. Histologic analysis of tissue after failed cartilage repair procedures. Clin Orthop Relat Res 1999; 365: 149-62.
15. Mithoefer K, McAdams T, Williams RJ, Kreuz PC, Mandelbaum BR. Clinical efficacy of the microfracture technique for articular cartilage repair in the knee: an evidence-based systematic analysis. Am J Sports Med 2009; 37: 2053-63.
16. Saris DB, Vanlauwe J, Victor J, Almqvist KF, Verdonk R, Bellemans J, et al. Treatment of symptomatic cartilage defects of the knee: characterized chondrocyte implantation results in better clinical outcome at 36 months in a randomized trial compared to microfracture. Am J Sports Med 2009; 37: 10S-19S.

17. Harris JD, Siston RA, Pan X, Flanigan DC. Autologous chondrocyte implantation: a systematic review. J Bone Joint Surg Am 2010; 92: 2220-33.
18. Baker CL Jr, Ferguson CM. Future treatment of osteoarthritis. Orthopedics 2005; 28: s227-34.
19. Minas T. Autologous chondrocyte implantation in the arthritic knee. Orthopedics 2003; 26: 945-7.
20. Krishnan SP, Skinner JA, Bartlett W, Carrington RW, Flanagan AM, Briggs TW, et al. Who is the ideal candidate for autologous chondrocyte implantation? J Bone Joint Surg Br 2006; 88: 61-4.
21. Camp CL, Stuart MJ, Krych AJ. Current concepts of articular cartilage restoration techniques in the knee. Sports Health 2014; 6: 265-73.

ประโยชน์ของการผ่าตัดแบบส่องกล้องในผู้ป่วยโรคข้อเข่าเสื่อม

สรวุฒิ ธรรมยงค์กิจ, พบ, พงศ์ศักดิ์ ยุกตะนันทน์, พบ

ปัจจุบันประชากรของโลกมีอายุยืนยาวมากขึ้น ประชากรผู้สูงอายุก็เพิ่มมากขึ้น โรคข้อเสื่อมจึงเป็นปัญหาหนึ่งที่พบได้มาก การรักษาโรคข้อเสื่อมได้แก่การบรรเทาอาการปวดและพยายามชะลอความเสื่อมออกไป วิธีการรักษาในปัจจุบันนั้นมีมากมายหลายวิธีอาจแบ่งออกได้เป็นการรักษาแบบผ่าตัดและไม่ผ่าตัด การส่องกล้องช่วยผ่าตัดในข้อเข่าถูกนำไปใช้ในการรักษาหลายอย่างเนื่องจากบาดแผลมีขนาดเล็ก และสามารถตรวจสภาพข้อได้อย่างละเอียด อย่างไรก็ตาม ผลการศึกษาในปัจจุบันนั้นพบว่าการผ่าตัดส่องกล้องในผู้ป่วยโรคข้อเข่าเสื่อมนั้นมีประโยชน์เฉพาะในบางกรณี จึงไม่ได้แนะนำให้เป็นการรักษาในทุกราย ผู้ป่วยที่มีอาการเฉียบพลัน มีน้ำในข้อเข่า มีเศษเนื้อเยื่อหลุดลอยในข้อเข่า หรือมีการฉีกขาดของหมอนรองข้อเข่า อาจได้ผลการรักษาโดยวิธีนี้ที่ดีกว่าผู้ป่วยอื่นๆ ดังนั้นการตรวจประเมินผู้ป่วยจึงมีความสำคัญต่อการเลือกการรักษาสำหรับผู้ป่วยในแต่ละราย

คำสำคัญ: *การผ่าตัดส่องกล้องในข้อเข่า, ข้อเข่าเสื่อม, การส่องกล้องล้างข้อเข่า*