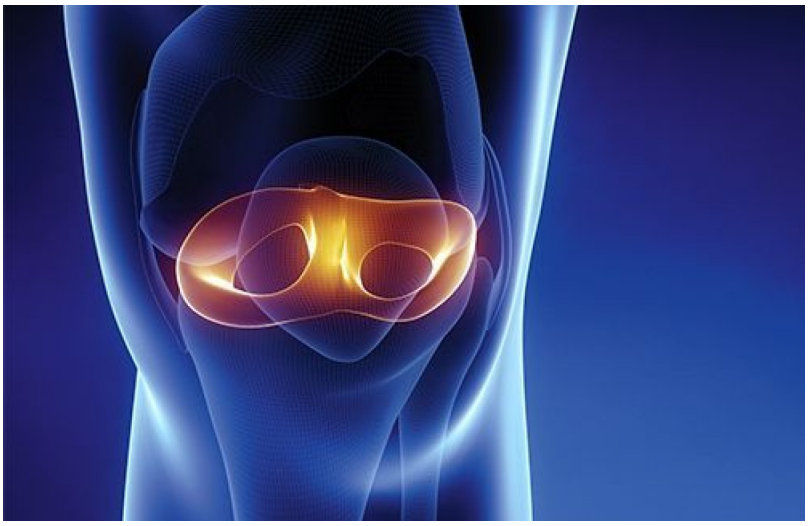
Dynamic Chiropractic



CHRONIC / ACUTE CONDITIONS

Managing the Meniscus (Part 2)

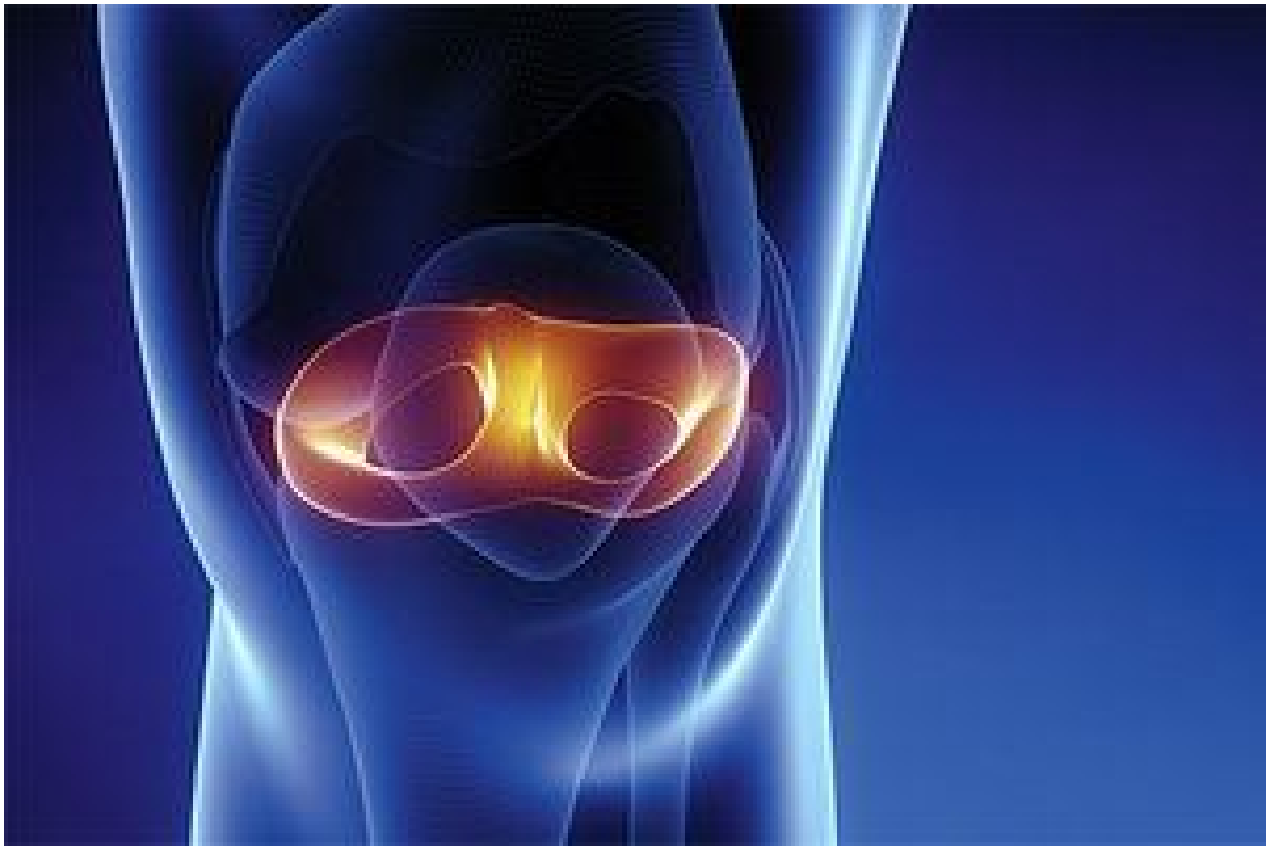
SURGICAL INDICATIONS, CONSERVATIVE TREATMENT OPTIONS.

Mark Lueck, DC, PT, DPT

Editor's note: As explained by the author in part 1 of this article, it is important for chiropractors to remain up-to-date with the most current knowledge regarding extremity injuries, particularly those who specialize in sports chiropractic or otherwise routinely encounter extremity injuries, including knee injuries. Part 1 discussed knee anatomy, injury mechanisms and diagnostic considerations; part 2 reviews surgical indications and conservative treatment options when patients present with a suspected meniscus injury.

Meniscus tears have variable healing potential depending on the location of the tear, type of tear and patient characteristics. Because of the meniscus vascular supply, tears in the outer third of the meniscus have excellent healing potential, tears in the middle third have good healing potential, and tears in the inner third have poor healing potential.[1]

Tears that have good healing potential include vertical tears < 10 mm, stable vertical longitudinal tears, partial-thickness tears less than 50 percent of the meniscus depth, and radial tears < 3 mm.[1] After the age of 50, vascular supply to the meniscus diminishes and healing potential decreases.[2]



Surgical Indications / Outcomes

Surgical indications for meniscus tears include knee pain, swelling, and locking that interfere with activities of daily living, work / sports, and when conservative treatment is not effective.[3] However, recent research into arthroscopic partial meniscectomy surgery has questioned the value of surgical treatment for certain patients with meniscus tears.

An RCT in *The New England Journal of Medicine* by Sihvonen, et al. (2013), enrolled 146 patients 35-65 years of age with a non-traumatic onset of knee pain lasting more than three months.[4] That study concluded that patients who had symptomatic and arthroscopically confirmed degenerative meniscus tears, but without knee osteoarthritis, had similar outcomes after 12 months whether they were treated with a partial meniscectomy or with a sham surgical procedure.

Although both groups had significant improvement, there was no advantage from the real surgery compared to the sham surgery. The authors point out that degenerative meniscus tears may merely be an early stage of arthritis and therefore, do not necessitate surgical treatment.

A study by Katz, et al. (2013), in the same medical journal randomly assigned 351 symptomatic patients ages 45 and older with a meniscus tear and mild to moderate knee osteoarthritis (diagnosed with imaging) to surgery with postoperative PT or standardized PT treatment without surgery.[5] Results at six and 12 months demonstrated no significant differences between groups. However, it should be noted that 30 percent of patients treated by a physical therapist elected to have surgery within six months.

The most common surgical treatment for a meniscus tear when meniscus repair is not indicated is an arthroscopic partial meniscectomy. A complete meniscectomy is rarely performed any longer because early osteoarthritis results when the meniscus is completely removed.

The surgical treatment for a partial meniscectomy involves resecting the mobile segments and smoothing the meniscal rim.[3] The surgeon attempts to preserve as much of the meniscus as possible. If a meniscal cyst is present, it will be decompressed. The rate of complications is low, but can include infection, hemarthrosis, nerve / vascular injury, deep vein thrombosis, reflex sympathetic dystrophy, knee osteoarthritis, surgical failure, and pain.[6]

Short-term outcomes (two years) have an 80-90 percent success rate.[3] The majority of people are able to resume normal athletic activities without restriction. Patients less than 40 years of age have better outcomes, as do those who have medial meniscus surgery compared to lateral meniscus surgery.[7]

Arthroscopic partial meniscectomy surgery usually results in a future increase in knee osteoarthritis compared to individuals without surgery.[7] Patients with increased BMI and those who have had a lateral meniscectomy are also at an additional risk of developing knee osteoarthritis.[7]

Patients with pre-existing osteoarthritis or articular cartilage damage have worse outcomes after a partial meniscectomy.[8] Women have an additional increase in developing knee osteoarthritis and tend to have a slower recovery compared to men.[8]

A meniscus repair is another option for appropriate candidates. Meniscus repair surgery is usually performed arthroscopically, but sometimes open repair techniques are used which increases tissue trauma and results in a longer recovery period.[9] There is a good prognosis for repair if the patient is younger – especially an adolescent athlete; can tolerate a longer period of rehabilitation; if the surgery is performed within eight weeks of the initial injury; and/or the patient has a stable knee.[9] However, success rates vary widely depending on the type of surgery performed and patient variables, with successful results declining after two years.[3]

Meniscus factors that predict a good prognosis include small tears (1-2 cm in length), single-plane tears in red-red or red-white zone [see part 1 for an explanation of zones], tears within 3 mm of the vascular periphery and vertical / longitudinal tears.[9-11] Complex / degenerative tears, bucket-handle tears, transverse tears, and tears in the white-white zone have poor prognosis for repair.[9-10,12] The most common complication is failure to heal, which can be treated by a second attempt at repair or a partial meniscectomy.[3] Other complications are similar to partial meniscectomy complications.

Meniscal transplants have been performed since 1984,[13] but are not widely performed in the U.S. and are not covered by Medicare. Clinical indications in select patients include a previous meniscectomy (especially total or subtotal) age 50 or less, joint-line pain, and a stable knee with normal alignment.[14]

This is an arthroscopic surgery in which the remaining meniscus is removed, and a cadaver meniscal allograft is sutured and tied into place with a plastic screw or button.[13] There have been more than 30 clinical trials suggesting variable results depending upon patient selection.[14]

The majority of patients have short- and medium-term improvement, but the long-term results are

not fully known and depend on proper patient selection.[15] Complications from meniscal transplants are similar to other meniscus surgeries.

Conservative Treatment

Treatment for meniscus injuries is determined by each patient's specific impairments based on their evaluation. Common impairments include knee pain, decreased knee ROM, decreased patellar joint play, lower extremity muscle tightness, and decreased lower extremity muscle performance – especially the quadriceps musculature.

The following is a summary of treatments for patients with meniscus injuries that can be utilized depending upon a patient's impairments. This is not a comprehensive list of all possible treatment options that could be performed, but it is a starting point for developing a rehabilitation program for meniscus tears, as well as postsurgical treatment following partial meniscectomy.

(I do not cover rehabilitation after a meniscus repair or transplant since these are not likely to be encountered in a typical chiropractic office.)

These protocols are commonly used in PT practice and can be incorporated in a chiropractic practice. However, the extent to which they may be utilized will depend on the type of rehabilitation equipment available, and clinician knowledge and experience. Knee manipulation, elastic therapeutic taping, and specialized soft-tissue techniques such as Graston and ART are not covered because information on those topics can be acquired in chiropractic college, chiropractic residency programs, or postgraduate seminars, and should be familiar to many practicing chiropractors.

Rehabilitation for meniscus tears depends on what impairments are present, and to what extent the impairments are thought to affect a patient's activity limitations and participation restrictions:

- Knee range-of-motion deficits can be addressed early in a patient's rehabilitation for a meniscus tear. Limitations in knee flexion can be improved with knee flexion PROM and heel slides. Limitations in knee extension can be improved with knee PROM and supine heel hangs.
- Patellar mobilization may be used to restore patellofemoral joint play, which may decrease pain and improve knee flexion and extension ROM. Muscle stretching to improve flexibility can be performed manually or by the patient to stretch the hamstring, calf and quadriceps musculature. Tibiofemoral traction performed manually or with ankle weights is often palliative.
- Quadriceps strength can be increased with open-chain exercises such as quadriceps setting, straight-leg raises and short- / long-arc quadriceps exercises. Quadriceps strengthening can be progressed with closed-chain exercises such as standing terminal knee extensions, leg presses, total gym squats, wall squats, half squats, forward / lateral step-ups, and lateral and forward step-downs.
- Hamstring curls can be used to increase hamstring strength.
- Hip strengthening exercises to improve knee biomechanics can include clams, bridge progressions, side-lying hip abduction / adduction, prone hip extension, and resisted hip external rotation in sitting using a band or weights. Progression can then be made to closed-chain exercises such as side-stepping and various resisted hip exercises in standing using bands or weights.
- Balance training on level ground progressing to a rocker board, balance disc / half-ball or foam roller can be useful to improve balance and prepare athletes for return to increased activity levels. Patients can progress their balance training by transitioning from two legs to one leg, eyes open to eyes closed, and resisting external / internal perturbations by catching

/ throwing balls of various weights.
- For athletes, agility training using an agility ladder can round out a treatment program.
- Modalities such as electrical muscle stimulation to decrease pain, and ice with elevation to decrease swelling, can be utilized as needed.

Formal rehabilitation after an uncomplicated partial meniscectomy is not without controversy. Research by Goodwin, et al. (2003), did not find any significant differences in outcome after a 50-day follow-up of patients undergoing supervised PT for six weeks combined with a home exercise program, compared to those who only performed a home exercise program.[16] They concluded that routine physical therapy after uncomplicated partial meniscectomy was not clinically indicated.

A literature review performed by Goodwin et al. (2003) showed that physical therapy would have little effect on return to ADL for patients with an uncomplicated partial meniscectomy.[17] Out of eight studies reviewed, three found no effect of a supervised PT program, one study found an increase in knee strength and one study found a quicker return to sport.

On the other hand, two studies found that PT combined with electrical muscle stimulation resulted in an increase in knee strength and ROM, and decreased pain, compared to those treated only with therapeutic exercise. Finally, one study found that PT combined with cognitive behavioral therapy resulted in decreased pain, decreased anxiety, and quicker return to function compared to PT alone.

Weaknesses of the literature review included research studies with methodological problems, low subject numbers, and ineffective outcomes. Furthermore, the results of the studies are limited by their inclusion / exclusion criteria, and only a limited number of treatment options could be tested in those studies.

Despite the research literature questioning the benefits of post-operative rehabilitation after a partial meniscectomy, most orthopedic surgeons routinely refer their patients for physical therapy, although some do not. Rehabilitation after a partial meniscectomy is typically unremarkable, with most patients progressing quickly. However, individuals with knee osteoarthritis and those with a sub-total meniscectomy may have a delayed or incomplete recovery.

The general focus is on decreasing knee pain / swelling, restoring knee ROM, improving lower extremity strength, increasing lower extremity flexibility, and a progressive return to previous level of function or preparation for athletic activities.[12]

Patients are weight-bearing as tolerated and typically use crutches for a few days to one week. Ice and elevation are important to decrease knee joint swelling. The same exercises used to treat patients with meniscal tears can be applied after partial meniscectomy surgery.

Short-duration / low-intensity biking is usually well tolerated early after surgery. It can improve knee ROM and be used as a warm-up exercise. Knee ROM stretching and quadriceps strengthening can be started immediately after surgery. Electrical muscle stimulation of the quadriceps can be useful initially to increase quadriceps strength because of quadriceps inhibition caused from post-surgical knee joint swelling.

The importance of quadriceps strengthening cannot be emphasized enough since quadriceps strength is decreased 9-10 percent after arthroscopic partial meniscectomy compared to the contralateral leg.[18] This decrease in strength is correlated with increased knee pain and decreased knee function.

Improving hip strength is also important since an increase in hip extension, abduction, and external rotation strength can decrease stressful loading on the knee.

Finally, medical exercise therapy (MET), with an emphasis on performing various exercises with low weight and high repetition in a pain-free manner, is another treatment option.[19] Patients are typically advised to avoid twisting and repetitive impact activities for 4-6 weeks after surgery.[3] Athletes can benefit from sport-specific training later in their course of rehabilitation, which could include agility drills and plyometrics as tolerated.

References

1. Jeong H, Lee S, Ko C. Meniscectomy. *Knee Surg & Related Res*, 2012;24(3):129-136.
2. Gray J. Neural and vascular anatomy of the menisci of the human knee. *JOSPT*, 1999;29(1):23-30.
3. Magee D, Zachazewski J, Quillen W. *Pathology and Intervention in Musculoskeletal Rehabilitation*. St. Louis; Saunders Elsevier, 2009: pp. 579-593.
4. Sihvonen R, Paavola M, Malmivaara, Itala A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *NEJM,* 2013;369(26):2515-2524.
5. Katz J, Brophy R, Chaisson C, Chaves Leigh, et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *NEJM,* 2013;368(18):1675-1684.
6. Small N. Complications in arthroscopic surgery performed by experienced arthroscopists. *Arthroscopy*, 1988;4(3):215-221.
7. Salata M, Gibbs A, Sekiya J. A systematic review of clinical outcomes in patients undergoing meniscectomy. *Amer J Sports Med,* 2010;38(9):1907-1916.
8. Fabricant R, Rosenberger P, Jokl P, Ickovics J. Predictors of short-term recovery differ from those of long-term outcome after arthroscopic partial meniscectomy. *Arthroscopy: J Arthroscopic & Related Surg,* 2008;24(7):769-778.
9. Pyne S. Current progress in meniscal repair and postoperative rehabilitation. *Curr Sports Med Reports*, 2002;1:265-271.
10. Noyes F, Barber-Westin S. Repair of complex and avascular meniscal tears and meniscal transplantation. *J Bone & Joint Surg,* 2010;92A(4).
11. Starke C, Kopf S, Petersen W, Becker R. Current concepts meniscal repair. *Arthroscopy: J Arthroscopic & Related Surg,* 2009;25(9):1033-1044.
12. Brindle T, Nyland J, Johnson D. The meniscus: review of basic principles with application to surgery and rehabilitation. *J Athletic Train,* 2001;36(2):160-169.
13. Heckmann T, Barber-Westin S, Noyes F. Meniscus repair and transplantation: indications, techniques, rehabilitation, and clinical outcome. *JOSPT*, 2006;36(10):795-814.
14. Noyes F, Heckmann T, Barber-Westin S. Meniscus repair and transplantation: a comprehensive update. *JOSPT*, 2012;42(3):274-90.
15. Ryzewicz M, Peterson B, Siparsky P, Bartz R. The diagnosis of meniscus tears. *Clin Orthopaedics & Related Res,* 2007;455:123-133.
16. Goodwin P, Morrissey M, Omar R, Brown M, et al. Effectiveness of supervised physical therapy in the early period after arthroscopic partial meniscectomy. *Phys Ther,* 2003;83:520-535.
17. Goodwin P, Morrissey M. Physical therapy after arthroscopic partial, meniscectomy: is it effective? *Exercise & Sports Sci Rev,* 2003;31(2):85-90.
18. Ericsson Y, Roos E, Dahlberg L. Muscle strength, functional performance, and self-reported outcomes four years after arthroscopic partial meniscectomy in middle-aged patients. *Arthritis & Rheumatism*, 2006;55(6):946-952.
19. Osteras H, Osteras B, Torstensen T. Is postoperative exercise therapy necessary in patients with degenerative meniscus? A randomized controlled trial with one year follow-up. *Knee Surg Sports Traumatol Arthrosc*, 2014;22(1):200-206.