

EDITORIAL

Save the Meniscus, A good Strategy to Preserve the Knee

Mohammad Razi, MD¹; S.M. Javad Mortazavi, MD²

1 Orthopedic Department, Iran University of Medical Sciences, Tehran, Iran

2 Joint Reconstruction Research Center, Tehran University of Medical Sciences, Tehran, Iran

With increasing life expectancy, the demand for preservation of native articular cartilage is increasing to delay joint arthroplasties. There are different strategies to preserve the articular cartilage, including corrective osteotomies, chondral injury restoration, intraarticular injection of cells, or growth factors. However, one of the essential strategies in knee preservation is meniscal saving. It was highlighted again in the 4th international meeting The Meniscus held in Bologna late in January 2016. As the loss of the meniscus can be regarded as a pre-arthritis condition, a knee surgeon must save the meniscuses as much as he or she can.

The menisci perform many essential biomechanical functions. These functions include load transmission, shock absorption, stability, nutrition, joint lubrication, and proprioception. They also serve to decrease contact stress and increase contact area and joint congruency. The knee would be deprived of all these functions if the meniscus removed. Therefore, in the knees without the meniscus, the impact and load are three times higher.

Rehabilitation after meniscal repair is slower and different from rehabilitation after meniscectomy. The physiotherapist and surgeon should respect the slow process of biological healing of the meniscus and therefore they need to be careful with the rehabilitation program especially in active flexion. The return to sport should be delayed for up to 6 months; however, 86 to 91% of patients could back to play (1).

It is also crucial for the patient to know there is 8 to 20% risk of failure and re-operation, however, the long term outcome of meniscal repair is better than partial meniscectomy because of chondroprotective action of meniscus (2). Different types of meniscal tear including longitudinal, radial and complex tear are repairable, however, the clinical outcome of repair depends on the size of tear, site of tear and associated injuries. Peripheral tear smaller than 2 cm heal better especially if they combined with ACL reconstruction (3, 4).

Return to sport is faster after meniscectomy, however, the rapid chondrolysis after lateral meniscectomy has been reported. Rapid chondrolysis after partial lateral meniscectomy can occur in professional athletes due to rapid excessive loading of the articular cartilage of the lateral compartment of the knee (5-8). The effect of meniscectomy is more significant in lateral meniscus due to the convexity of the lateral tibial plateau. Removal of the lateral meniscus increases shear stress 200 percent more than medial meniscectomy (9). Therefore, in professional athletes practicing impact loading sport with a lateral meniscal lesion one should try to avoid meniscectomy. If meniscectomy is inevitable, the surgeon need to inform the patient about potential risk of it and the necessity to slow down the rehabilitation program and return to sport. Eighty to ninety % of patients can return to sport 4 to 6 months after meniscal repair (10). In competitive athletes, repair of medial and/or lateral meniscal tears

Corresponding Author: S.M. Javad Mortazavi, Joint Reconstruction Research Center, Tehran University of Medical Sciences, Tehran, Iran

Email: smjmort@yahoo.com



THE ONLINE VERSION OF THIS ARTICLE
ABJS.MUMS.AC.IR

are essential in presence of concomitant ACL injuries. While for isolated medial meniscal injury meniscectomy could be an option, repair is a must for isolated lateral meniscus tear.

Second-look arthroscopy is the most accurate tool for assessment of meniscal healing. Conventional MRI is not reliable in the evaluation of meniscal healing with an accuracy of 62%. However, indirect M.R. arthrography (intravenous contrast) or direct MRI orthography (intraarticular) have better accuracy for the evaluation of the repair. It is very important to know there is always a mismatch between clinical and functional results and the status of meniscal healing. There is still persistent abnormal signal in the meniscus at one year after repair; however, meniscal shortening and lack of extrusion are good indicators for the meniscal healing.

Meniscus repair is not a small surgery without complication. It is technically challenging and has a steep learning curve. General complications of arthroscopy such as venous thromboembolism, infection and vascular injury could occur. Specific complication including nerve injuries, ligamentous injury, iatrogenic cartilage lesions, and poor suture techniques can happen during meniscal repair. The surgeon should depict and accept the eventual complications and address them as rapidly as possible. It is also important to form patients about potential complications.

Failure of meniscal repair occur in up to 25 % of patients. This variability is related to different definition of failure. Poor functional outcome based on Barrett is the subjective definition of failure. Postoperative MRI can show healing process failure, however, Pujol et al showed that there is no correlation between fictional outcome and objective healing assessment (11). Failures in the first six months of surgery are usually related to technical issues during repair, while failures between 6 and 24 months are indicating poor healing process. Failure later than 2 years of repair show retear or degenerative processes in the meniscus. Barrett et al showed that failure rate of meniscal repair is decreasing over the time from 23% to 12.5% and they attributed it to technical improvement in the field (12). A repair as soon as possible seems to be better for the clinical outcome and less failure rate; however, there is no established cut off point.

Secondary meniscectomy is a treatment for failed meniscal repair. The amount of meniscal resection is less in 35% of cases, which shows partial healing of the meniscus. Revision of meniscal repair is another option and two small series reported 25 to 33% failure rate for the procedure (13, 14).

Approximately 26.6 to 40% of patients who undergo primary ACL reconstruction are suffering from ramp lesions of medial meniscus (15). The incidence of this lesion in acute ACL injuries is about 21.8%, while in chronic injuries the incidence would increase to 32.8%, which showed chronic knee instability is a potential cause of this kind of meniscal tear (16). In revision ACL reconstruction, the incidence of ramp

lesion is up to 39% (17). It is called hidden lesion as it is easily overlooked in routine arthroscopic examination, therefore, sequential arthroscopic approach is necessary to increase diagnostic accuracy of ramp lesion. It is started by anterolateral portal to examine the mobility of posterior meniscal horn, followed by Gillquist portal using 30 or 70-degree arthroscope to see the posteromedial synovial fold, and then the probing of the region using a needle from the posteromedial portal. Men, patients younger than 30, history of contact injury, medial plateau edema, more than 6 mm laxity, longer time from the insulting injury and revision ACLR are the main risk factors for the presence of ramp lesions (17-21). Indications for repair of ramp lesions have not very well-defined yet, however, they need to be repaired if they are chronic, longer than 15 mm, associated with meniscal instability, occurred in younger than 30 years old patients, or encounters during ACL revision (3, 18, 22). All inside meniscal repair using the meniscal hook is the preferred method for the repair of ramp lesion (23). The viewing portal could be either the Gillquist or posterolateral transseptal. Commercially available all inside meniscal suture is not appropriate for the repair of the ramp lesion, as they could not address the pathology in a right way. The failure rate of repaired ramp lesion is 10.8% (17).

There is almost no place for meniscectomy at the time of ACL reconstruction. It was clearly shown that outcome of meniscal repair in ACL reconstruction is better than partial meniscectomy (24). It is better to neglect minimal tears than remove them. It was shown that acute longitudinal tear or partial tears might heal spontaneously in stable knees. In patients with ACL deficiency and locked knee, there is usually a bucket handle tear. Meniscal preservation is very important in these lesions. It was shown that reduction of bucket handle meniscal tears and let them in situ without repair at the time of ACL reconstruction is associated with 80 to 90 % healing rate (11, 22). Therefore, reduction and leaving the bucket handle lesion in situ is less harmful than meniscectomy during ACL reconstruction.

Meniscal root tear leads to meniscal extrusion, which in turn will increase axial load and progression of knee osteoarthritis. Root tear decreases the contact area from 17 to 64% and increases the mean joint pressure from 13 to 126%, which is similar to meniscectomy (25). It was shown that repair of the meniscal root would significantly decrease the extrusion in unloaded and loaded positions (effects of medial meniscal posterior horn avulsion of the knee).

Save the meniscus is the principle. Meniscal repair is almost always the best option in repairable lesions. We believe it is wise to take the risk to repair all the repairable meniscal tears, even if it does not always work. For a given patient, 25% of failure risk is better than 100% meniscectomy.

References

1. Logan M, Watts M, Owen J, Myers P. Meniscal repair in the elite athlete: results of 45 repairs with a minimum 5-year follow-up. *Am J Sports Med.* 2009; 37(6):1131-4.
2. Paxton ES, Stock MV, Brophy RH. Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes. *Arthroscopy.* 2011; 27(9):1275-88.
3. Ahn JH, Lee YS, Yoo JC, Chang MJ, Koh KH, Kim MH. Clinical and second-look arthroscopic evaluation of repaired medial meniscus in anterior cruciate ligament-reconstructed knees. *Am J Sports Med.* 2010; 38(3):472-7.
4. Haas AL, Schepsis AA, Hornstein J, Edgar CM. Meniscal repair using the FasT-Fix all-inside meniscal repair device. *Arthroscopy.* 2005; 21(2):167-75.
5. Ishida K, Kuroda R, Sakai H, Doita M, Kurosaka M, Yoshiya S. Rapid chondrolysis after arthroscopic partial lateral meniscectomy in athletes: a case report. *Knee Surg Sports Traumatol Arthrosc.* 2006; 14(12):1266-9.
6. Mariani PP, Garofalo R, Margheritini F. Chondrolysis after partial lateral meniscectomy in athletes. *Knee Surg Sports Traumatol Arthrosc.* 2008; 16(6):574-80.
7. Sonnery-Cottet B, Archbold P, Thauinat M, Carnesecci O, Tostes M, Chambat P. Rapid chondrolysis of the knee after partial lateral meniscectomy in professional athletes. *Knee.* 2014; 21(2):504-8.
8. Thauinat M, Archbold P, Conteduca J, Chatellard R, Sonnery-Cottet B. Rapid chondrolysis following an unoperated lateral meniscus tear in a young professional rugby player. *Orthop Traumatol Surg Res.* 2014; 100(4):445-8.
9. Ahmed AM, Burke DL. In-vitro measurement of static pressure distribution in synovial joints--Part I: Tibial surface of the knee. *J Biomech Eng.* 1983; 105(3):216-25.
10. Eberbach H, Zwingmann J, Hohloch L, Bode G, Maier D, Niemeyer P, et al. Sport-specific outcomes after isolated meniscal repair: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* 2018; 26(3):762-71.
11. Pujol N, Beaufile P. Healing results of meniscal tears left in situ during anterior cruciate ligament reconstruction: a review of clinical studies. *Knee Surg Sports Traumatol Arthrosc.* 2009; 17(4):396-401.
12. Barrett GR. Clinical results of meniscus repair in patients 40 years and older. *Arthroscopy.* 1998; 14(8):824-9.
13. Fuchs A, Kloos F, Bode G, Izadpanah K, Sudkamp NP, Feucht MJ. Isolated revision meniscal repair - failure rates, clinical outcome, and patient satisfaction. *BMC Musculoskelet Disord.* 2018; 19(1):446.
14. Imade S, Kumahashi N, Kuwata S, Kadowaki M, Ito S, Uchio Y. Clinical outcomes of revision meniscal repair: a case series. *Am J Sports Med.* 2014; 42(2):350-7.
15. Sonnery-Cottet B, Conteduca J, Thauinat M, Gunepin FX, Seil R. Hidden lesions of the posterior horn of the medial meniscus: a systematic arthroscopic exploration of the concealed portion of the knee. *Am J Sports Med.* 2014; 42(4):921-6.
16. Kim SH, Lee SH, Kim KI, Yang JW. Diagnostic accuracy of sequential arthroscopic approach for ramp lesions of the posterior horn of the medial meniscus in anterior cruciate ligament-deficient knee. *Arthroscopy.* 2018; 34(5):1582-9.
17. Sonnery-Cottet B, Saithna A, Blakeney WG, Ouanezar H, Borade A, Daggett M, et al. Anterolateral ligament reconstruction protects the repaired medial meniscus: a comparative study of 383 anterior cruciate ligament reconstructions from the SANTI study group with a minimum follow-up of 2 years. *Am J Sports Med.* 2018; 46(8):1819-26.
18. Liu X, Feng H, Zhang H, Hong L, Wang XS, Zhang J. Arthroscopic prevalence of ramp lesion in 868 patients with anterior cruciate ligament injury. *Am J Sports Med.* 2011; 39(4):832-7.
19. DePhillipo NN, Cinque ME, Chahla J, Geeslin AG, Engebretsen L, LaPrade RF. Incidence and detection of meniscal ramp lesions on magnetic resonance imaging in patients with anterior cruciate ligament reconstruction. *Am J Sports Med.* 2017; 45(10):2233-7.
20. Seil R, Mouton C, Coquay J, Hoffmann A, Nuhrenborger C, Pape D, et al. Ramp lesions associated with ACL injuries are more likely to be present in contact injuries and complete ACL tears. *Knee Surg Sports Traumatol Arthrosc.* 2018; 26(4):1080-5.
21. Kumar D, Su F, Wu D, Padoia V, Heitkamp L, Ma CB, et al. Frontal plane knee mechanics and early cartilage degeneration in people with anterior cruciate ligament reconstruction: a longitudinal study. *Am J Sports Med.* 2018; 46(2):378-87.
22. Duchman KR, Westermann RW, Spindler KP, Reinke EK, Huston LJ, Amendola A, et al. The fate of meniscus tears left in situ at the time of anterior cruciate ligament reconstruction: a 6-year follow-up study from the MOON cohort. *Am J Sports Med.* 2015; 43(11):2688-95.
23. Ahn JH, Wang JH, Yoo JC. Arthroscopic all-inside suture repair of medial meniscus lesion in anterior cruciate ligament--deficient knees: results of second-look arthroscopies in 39 cases. *Arthroscopy.* 2004; 20(9):936-45.
24. Melton JT, Murray JR, Karim A, Pandit H, Wandless F, Thomas NP. Meniscal repair in anterior cruciate ligament reconstruction: a long-term outcome study. *Knee Surg Sports Traumatol Arthrosc.* 2011; 19(10):1729-34.

25.Seo JH, Li G, Shetty GM, Kim JH, Bae JH, Jo ML, et al. Effect of repair of radial tears at the root of the posterior horn of the medial meniscus with

the pullout suture technique: a biomechanical study using porcine knees. *Arthroscopy*. 2009; 25(11):1281-7.