

Meniscus Extrusion Scientific Update

There are multiple pathologies that can lead to knee osteoarthritis. One of these factors may be the meniscus losing stability and being forced out of the joint, also known as meniscus extrusion. A disruption of the meniscotibial ligaments or the joint capsule can lead to this pathology. While the concept of meniscus extrusion is not novel, reducing the extrusion is a relatively new concept. While there is much more to understand about meniscus extrusion, there has been a recent increase in published research.

Krych AJ,
Bernard CD,
Leland DP,
et al

Meniscus Extrusion

[Isolated meniscus extrusion associated with meniscotibial ligament abnormality.](#) *Knee Surg Sports Traumatol Arthrosc.* 2020;28(11):3599-3605. doi:10.1007/s00167-019-05612-1

- Meniscus extrusion is concomitant with other meniscus pathology, such as a meniscus tear.
- Isolated meniscus extrusion is rare; however, the patient may experience pain on the side of the extrusion.

Takeaway

A disruption of the meniscotibial ligaments can be assumed when a patient presents with limited meniscus pathology and 3 mm or greater of meniscus extrusion.

Emmanuel K,
Quinn E,
Niu J,
et al

[Quantitative measures of meniscus extrusion predict incident radiographic knee osteoarthritis--data from the Osteoarthritis Initiative.](#) *Osteoarthritis Cartilage.* 2016;24(2):262-269. doi:10.1016/j.joca.2015.08.003

- Quantitative measures of meniscus extrusion were most reliable in determining a greater risk of knee osteoarthritis.

Takeaway

Complex posterior root meniscus tears are more commonly associated with meniscus extrusion.

Crema MD,
Roemer FW,
Felson DT,
et al

[Factors associated with meniscal extrusion in knees with or at risk for osteoarthritis: the Multicenter Osteoarthritis study.](#) *Radiology*. 2012;264(2):494-503. doi:10.1148/radiol.12110986

- Meniscal tears are not the only factor leading to extrusion. Individuals who have or are at risk for developing knee osteoarthritis can develop meniscal extrusion.
- A strong correlation between meniscal damage and meniscal extrusion was shown in both medial and lateral compartments.
- Meniscal root tears were strongly associated with meniscal extrusion in the medial compartment.
- The severity of cartilage damage is independently associated with meniscal extrusion as well as varus and valgus malalignment.

Takeaway

There is no evidence of meniscal extrusion association with knee effusion or higher BMI; however, higher BMI can lead to other degenerative joint changes that can cause meniscus extrusion.

Lee DH,
Lee BS,
Kim JM,
et al

[Predictors of degenerative medial meniscus extrusion: radial component and knee osteoarthritis.](#) *Knee Surg Sports Traumatol Arthrosc*. 2011;19(2):222-229. doi:10.1007/s00167-010-1274-2

- Patients who present with a radial tear of the meniscus display greater meniscus extrusion compared to patients without a radial tear.
- The incidence and degree of meniscus extrusion greater than 3 mm was more prevalent with associate root tears than with nonroot tears.

Takeaway

Meniscal repair can be considered in patients with meniscus extrusion in the setting of a radial tear.

Costa CR,
Morrison WB,
Carrino JA

[Medial meniscus extrusion on knee MRI: is extent associated with severity of degeneration or type of tear?](#) *AJR Am J Roentgenol*. 2004;183(1):17-23. doi:10.2214/ajr.183.1.1830017

- Medial meniscus extrusion is defined as meniscus translation greater than 3 mm beyond the tibial margin.

Takeaway

Meniscus extrusion is associated with meniscal degeneration, meniscus tears, and posterior horn meniscus tears.

Berthiaume MJ,
Raynauld JP,
Martel-Pelletier J,
et al

[Meniscal tear and extrusion are strongly associated with progression of symptomatic knee osteoarthritis as assessed by quantitative magnetic resonance imaging.](#) *Ann Rheum Dis*. 2005;64(4):556-563. doi:10.1136/ard.2004.023796

- Over 75% of patients who presented with primary symptomatic osteoarthritis had meniscus damage and did not report previous trauma to the knee.

Takeaway

Meniscal tears and meniscus extrusion are associated with the progression of knee osteoarthritis.



El-Khoury GY,
Usta HY,
Berger RA

[Meniscotibial \(coronary\) ligament tears.](#) *Skeletal Radiol.* 1984;11(3):191-196. doi:10.1007/BF00349493

- Cadaveric dissection and identification of the medial collateral ligament, joint capsule, meniscotibial ligament, and medial meniscus showed that all structures are related.

Takeaway

Researchers determined that the meniscotibial (coronary) ligaments appear to be responsible in part for securing the medial meniscus to the tibial plateau.

Park DY,
Yin XY,
Chung JY,
et al

[Circumferential rim augmentation suture around the perimeniscal capsule decreases meniscal extrusion and progression of osteoarthritis in rabbit meniscus root tear model.](#) *Am J Sports Med.* 2022;50(3):689-698. doi:10.1177/03635465211064297

- Purpose of the study was to analyze the role circumferential rim augmentation plays in meniscal extrusion prevention.
- The study was divided into three different groups: root tear, root tear and suture repair, and root tear and circumferential rim augmentation suture.

Takeaway

When compared to the other groups, the root tear and circumferential rim augmentation suture group experienced less meniscal extrusion, a smaller gap within the tear site, and less cartilage degeneration.

Diagnosis

Chiba D,
Sasaki E,
Ota S,
et al

[US detection of medial meniscus extrusion can predict the risk of developing radiographic knee osteoarthritis: a 5-year cohort study.](#) *Eur Radiol.* 2020;30(7):3996-4004. doi:10.1007/s00330-020-06749-1

- Radiographic evaluation of 472 patients (944 knees) was conducted determining baseline medial meniscus extrusion and knee osteoarthritis.
- Five-year follow-up showed 7.5% of patients with no osteoarthritis at baseline and 12.7% of patients with incident radiographic knee osteoarthritis and progressive osteoarthritis, respectively.

Takeaway

Patients who displayed 4 mm or greater of medial meniscus extrusion at baseline had a higher probability of developing osteoarthritis.



Koga H,
Watanabe T,
Horie M,
et al

Root Tear and Extrusion

[Augmentation of the pullout repair of a medial meniscus posterior root tear by arthroscopic centralization.](#) *Arthrosc Tech.* 2017;6(4):e1335-e1339. doi:10.1016/j.eats.2017.05.014

- In the presence of medial meniscus extrusion and posterior medial meniscus root tear, a pullout repair of the posterior root does not reduce meniscus extrusion.

Chung KS,
Ha JK,
Ra HJ,
Nam GW,
Kim JG

[Pullout fixation of posterior medial meniscus root tears: correlation between meniscus extrusion and midterm clinical results.](#) *Am J Sports Med.* 2017;45(1):42-49. doi:10.1177/0363546516662445

- Repair of medial meniscus posterior root tear (MMPRT) with a transtibial technique showed favorable outcomes at 1-year follow-up.
- Patients with less meniscus extrusion showed more favorable scores than those with greater meniscus extrusion.

Takeaway

Authors suggest meniscus extrusion should be addressed when repairing posterior medial meniscus root tears.

Biomechanics

Paletta GA Jr,
Crane DM,
Konicek J,
et al

[Surgical treatment of meniscal extrusion: a biomechanical study on the role of the medial meniscotibial ligaments with early clinical validation.](#) *Orthop J Sports Med.* 2020;8(7):2325967120936672. doi:10.1177/2325967120936672

- Medial meniscotibial ligaments contribute to meniscal stability.
- Biomechanical testing determined the repair of the meniscotibial ligaments reduced meniscus extrusion from 3.4 mm to 2.1 mm.

Takeaway

Clinical findings showed a reduction of meniscal extrusion of approximately 48% compared to preoperative measurements.