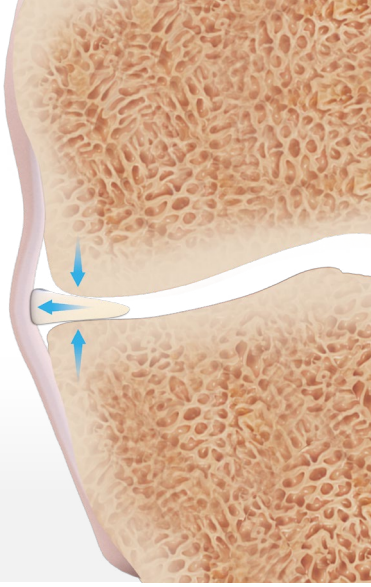
Meniscus Extrusion Scientific Update



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. The overall concept of meniscus extrusion is not novel but 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.

MENISCUS EXTRUSION

The relationship of meniscal extrusion to subchondral bone density in medial knee osteoarthritis.

Ebata T, Iwasaki K, Sato T, Hosokawa Y, Hamasaki M, Sato D, Matsuoka M, Onodera T, Kondo E, Iwasaki N

- Retrospective study evaluated influence of meniscal extrusion on subchondral bone density in 59 patients with medial knee osteoarthritis (OA) and 19 non-OA patients, measuring ratio of high-density area (HDA) in the medial and lateral compartments compared to total HDA.
- Analysis showed correlation of medial compartment HDA ratio in OA patients with hip-knee-ankle angle (R^2 = 0.216) and meniscal extrusion ratio (R^2 = 0.307).
- Correlation among non-OA patient group was only found between medial HDA ratio and meniscal extrusion ratio (R^2 = 0.217).
- Meniscal tears amplified the effect of extrusion on subchondral bone density distribution in subgroup analysis.

> **Takeaway:** Meniscal extrusion had a stronger impact on the subchondral bone density of knee OA patients than lower limb alignment.

Orthop J Sports Med. 2025;13(8):23259671251366424. doi:10.1177/23259671251366424

Isolated meniscus extrusion associated with meniscotibial ligament abnormality.

Krych AJ, Bernard CD, Leland DP, Camp CL, Johnson AC, Finnoff JT, Stuart MJ

- 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.

Knee Surg Sports Traumatol Arthrosc. 2020;28(11):3599-3605. doi:10.1007/s00167-019-05612-1

Quantitative measures of meniscus extrusion predict incident radiographic knee osteoarthritis--data from the Osteoarthritis Initiative

Emmanuel K, Quinn E, Niu J, Guermazi A, Roemer F, Wirth W, Eckstein F, Felson D

- 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.

Osteoarthritis Cartilage. 2016;24(2):262-269. doi:10.1016/j.joca.2015.08.003

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Factors associated with meniscal extrusion in knees with or at risk for osteoarthritis: the Multicenter Osteoarthritis study.

Crema MD, Roemer FW, Felson DT, Englund M, Wang K, Jarraya M, Nevitt MC, Marra MD, Torner JC, Lewis CE, Guermazi A

- 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.

Radiology. 2012;264(2):494-503. doi:10.1148/radiol.12110986

Predictors of degenerative medial meniscus extrusion: radial component and knee osteoarthritis.

Lee DH, Lee BS, Kim JM, Yang KS, Cha EJ, Park JH, Bin SI

- 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.

Knee Surg Sports Traumatol Arthrosc. 2011;19(2):222-229. doi:10.1007/s00167-010-1274-2

Medial meniscus extrusion on knee MRI: is extent associated with severity of degeneration or type of tear?

Costa CR, Morrison WB, Carrino JA

- 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.

AJR Am J Roentgenol. 2004;183(1):17-23. doi:10.2214/ajr.183.1.1830017

Meniscal tear and extrusion are strongly associated with progression of symptomatic knee osteoarthritis as assessed by quantitative magnetic resonance imaging.

Berthiaume MJ, Raynauld JP, Martel-Pelletier J, Labonté F, Beaudoin G, Bloch DA, Choquette D, Haraoui B, Altman RD, Hochberg M, Meyer JM, Cline GA, Pelletier JP

- 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.

Ann Rheum Dis. 2005;64(4):556-563. doi:10.1136/ard.2004.023796

Meniscotibial (coronary) ligament tears.

El-Khoury GY, Usta HY, Berger RA

› 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.

Skeletal Radiol. 1984;11(3):191-196. doi:10.1007/BF00349493

Circumferential rim augmentation suture around the perimeniscal capsule decreases meniscal extrusion and progression of osteoarthritis in rabbit meniscus root tear model.

Park DY, Yin XY, Chung JY, Jin YJ, Kwon HJ, Lee GB, Park JH, Min BH

› 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.

Am J Sports Med. 2022;50(3):689-698. doi:10.1177/03635465211064297

DIAGNOSIS

US detection of medial meniscus extrusion can predict the risk of developing radiographic knee osteoarthritis: a 5-year cohort study.

Chiba D, Sasaki E, Ota S, Maeda S, Sugiyama D, Nakaji S, Ishibashi Y

› 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.

Eur Radiol. 2020;30(7):3996-4004. doi:10.1007/s00330-020-06749-1

ROOT TEAR AND EXTRUSION

Augmentation of the pullout repair of a medial meniscus posterior root tear by arthroscopic centralization.

Koga H, Watanabe T, Horie M, Katagiri H, Otabe K, Ohara T, Katakura M, Sekiya I, Muneta T

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

› The note explains an arthroscopic centralization technique that is used to augment a pullout repair and to restore and maintain medial meniscus function by reducing extrusion.

Takeaway: Augmenting the repair of a medial meniscus posterior root tear with arthroscopic centralization could reduce meniscus extrusion and help prevent the development of osteoarthritis.

Arthrosc Tech. 2017;6(4):e1335-e1339. doi:10.1016/j.eats.2017.05.014

Pullout fixation of posterior medial meniscus root tears: correlation between meniscus extrusion and midterm clinical results.

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

› 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 that those with greater meniscus extrusion.

> **Takeaway:** Authors suggest meniscus extrusion should be addressed when repairing posterior medial meniscus root tears.

Am J Sports Med. 2017;45(1):42-49. doi:10.1177/0363546516662445

BIOMECHANICS

Surgical treatment of meniscal extrusion: a biomechanical study on the role of the medial meniscotibial ligaments with early clinical validation.

Paletta GA Jr, Crane DM, Konicek J, Piepenbrink M, Higgins LD, Milner JD, Wijdicks CA

› 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.

Orthop J Sports Med. 2020;8(7):2325967120936672. doi:10.1177/2325967120936672