



ISAKOS
CONGRESS
2023



Boston
Massachusetts
June 18 - June 21

Developing an experimental model of early knee
osteoarthritis after medial meniscus posterior root release:
An in vivo study.

Lika Dzdizishvili, Irene Isabel López-Torres, Emilio Calvo
Hospital Universitario Fundación Jiménez Díaz, HS-FJD,
Universidad Autónoma de Madrid





ISAKOS
CONGRESS
2023

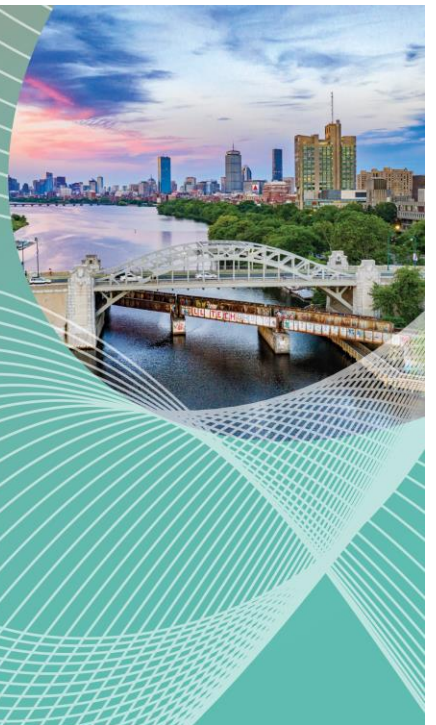


Boston
Massachusetts
June 18 - June 21

Author's Disclosure

L.D and I.L.L.T have nothing to disclose.

E.C. has received consulting fees from DePuy Synthes, Smith & Nephew, and Stryker.



Background and objective

The importance of meniscal root injuries has been widely recognized. However, the progression rate to knee osteoarthritis (OA) is still a concern.

The main purpose of the study was to develop a predictable and reproducible model of knee OA and to describe early radiological and histological changes after medial meniscus posterior root (MMPR) release and partial meniscectomy (PM).



ISAKOS
CONGRESS
2023



Boston
Massachusetts
June 18 - June 21



INSTITUTO DE
INVESTIGACIONES
BIOMÉDICAS
FUNDACIÓN JIMÉNEZ DÍAZ



Universidad Autónoma
de Madrid

Methods

MMPR injury was surgically induced in 13 male White New Zealand rabbits and contralateral knees were used as healthy controls.

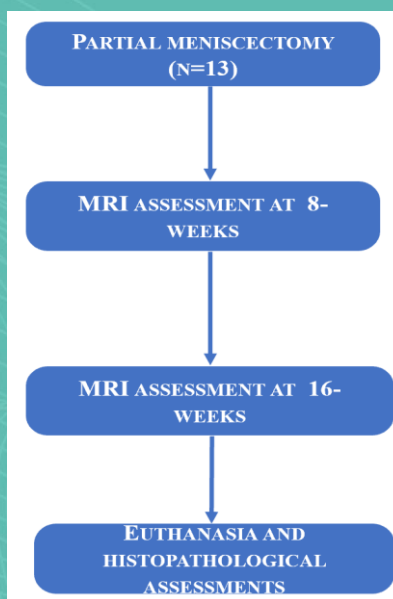


Figure 1. Flow diagram outlining the steps from the experiment to the final follow-up and histologic assessment.

Methods

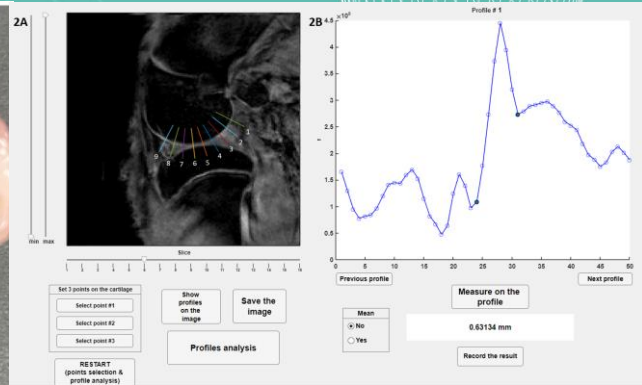
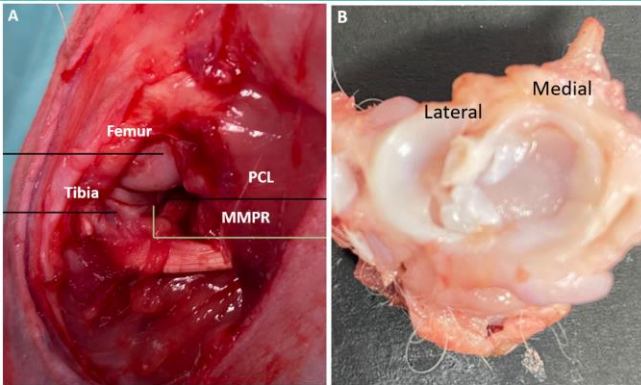


Figure 2. Radial root tear was created through medial parapatellar approach (A) and partial meniscectomy was performed (B). PCR: posterior cruciate ligaments, MMPR: medial meniscus posterior root.

Figure 3. Cartilage thickness was measured in the 3D sagittal gradient-echo images using high-resolution MRI.



Summary of results

Descriptives - cartilage thickness (mm)

time (months)	Mean	SD	N
0	0.617	0.071	88
4	0.592	0.031	46

Descriptives plots

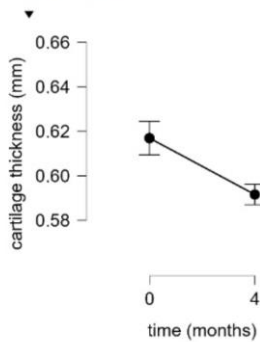


Figure 4. Progressive cartilage damage was observed after 16-weeks of post-menisectomy.

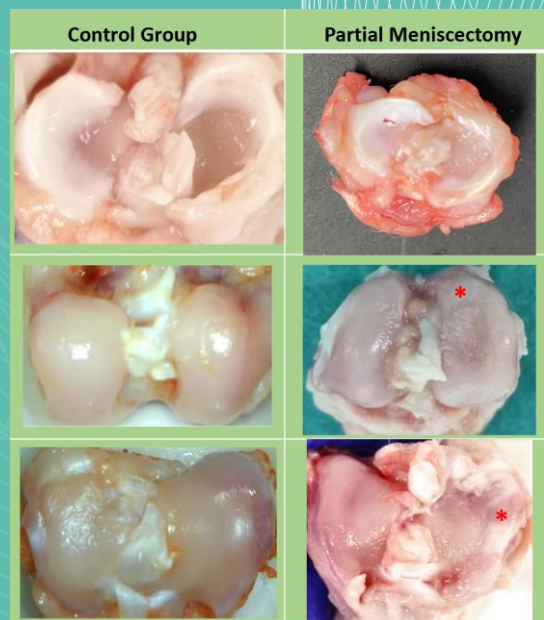


Figure 5. Early and severe osteoarthritic changes were the hallmark and the main findings after 16-weeks post-surgery.



Summary of results

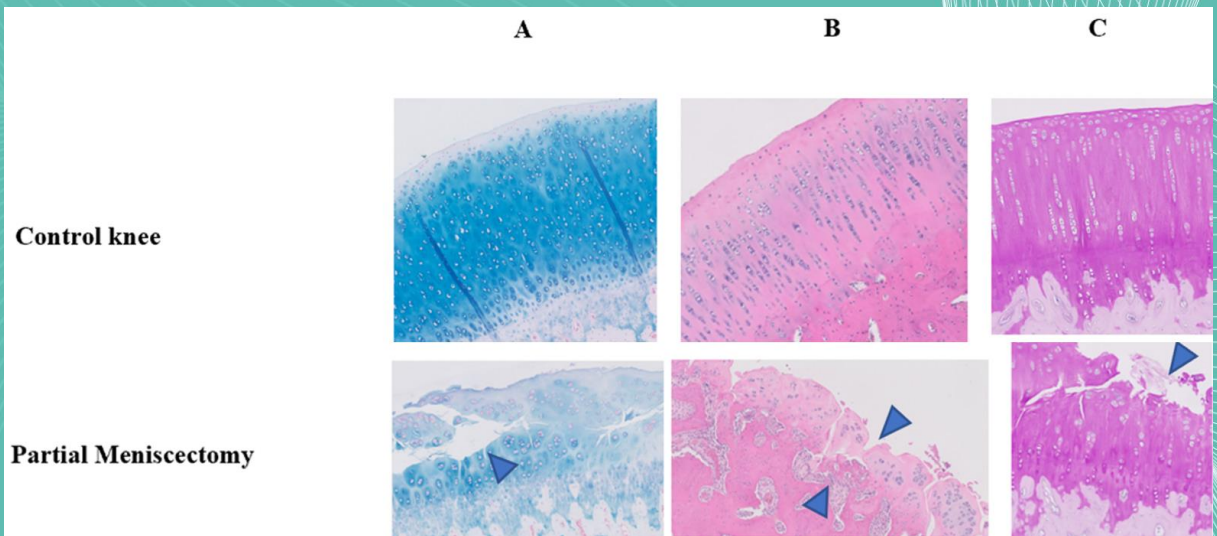


Figure 6. Representative histopathological specimens from the PM and control group. Alcian blue (A), hematoxylin and eosin (B), and Periodic Acid-Schiff (C).



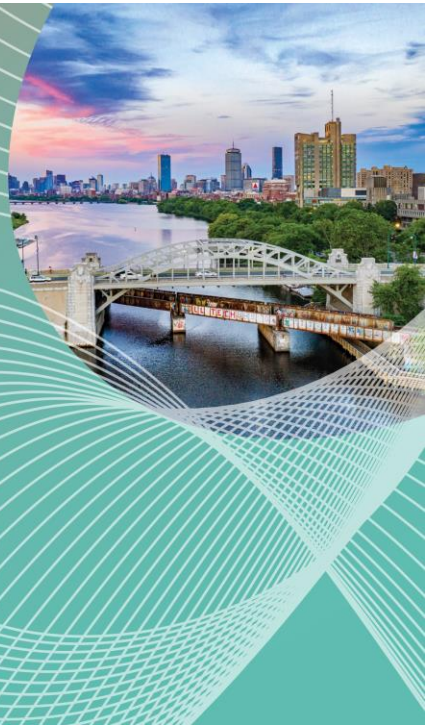
ISAKOS
CONGRESS
2023



Boston
Massachusetts
June 18 - June 21

Conclusions

This study describes a novel model of knee osteoarthritis that may guide the development of tailored interventions to delay or prevent knee osteoarthritis. This knowledge could shift the current treatment paradigm toward more conservative and knee salvageable treatment options.



UNIVERSIDAD
AUTÓNOMA
DE MADRID
INSTITUTO DE
ANATOMÍA
HISTOLÓGICA Y
FISIOLÓGICA

UAM Universidad Autónoma
de Madrid

References

- Cinque ME, Chahla J, Moatshe G, Faucett SC, Krych AJ, LaPrade RF (2018) Meniscal root tears: a silent epidemic. *Br J Sports Med* 52(13):872–876
- Allaire R, Muriuki M, Gilbertson L, Harner CD (2008) Biomechanical consequences of a tear of the posterior root of the medial meniscus. *J Bone Joint Surg Am* 90(9):1922–1931
- Baratz ME, Fu FH, Mengato R (1986) Meniscal tears: the effect of meniscectomy and of repair on intraarticular contact areas and stress in the human knee. A preliminary report. *Am J Sports Med* 14(4):270–275
- Luther JK, Cook CR, Cook JL (2009) Meniscal release in cruciate ligament intact stifles causes lameness and medial compartment cartilage pathology
- Duan X, Rai MF, Holguin N, Silva MJ, Patra D, Liao W, Sandell LJ (2017) Early changes in the knee of healer and non-healer mice following noninvasive mechanical injury. *J Orthop Res* 35(3):524–536
- Hongbin W, Jingyuan D, Linyun C, Yuming D (2004) Carboxymethylated chitin reduces MMP-1 expression in rabbit ACLT osteoarthritic. *Ann Rheum Dis* 63(4):369–372
- Colombo C, Butler M, O’Byrne E, Hickman L, Swartzendruber D, Selwyn M, Steinetz B (1983) A new model of osteoarthritis in rabbits I. Development of knee joint pathology following lateral meniscectomy and section of the fibular collateral and sesamoid ligaments. *Arthritis Rheum* 26(7):875–886
- Calvo E, Palacios I, Delgado E, Sanchez-Pernaute O, Largo R, Egido J et al (2004) Histopathological correlation of cartilage swelling detected by magnetic resonance imaging in early experimental osteoarthritis. *Osteoarthritis Cartilage* 12(11):878–886
- Pritzker KP, Gay S, Jimenez SA, Ostergaard K, Pelletier JP, Revell PA, Salter D, van den Berg WB (2006) Osteoarthritis cartilage histopathology: grading and staging. *Osteoarthritis Cartilage* 14(1):13–29



ISAKOS
CONGRESS
2023



Boston
Massachusetts
June 18 – June 21



Hospital
Universitario
Fundación
Jiménez Díaz
Grupo Quirónsalud



INSTITUTO DE
INVESTIGACIÓN
SANITARIA
FUNDACIÓN JIMÉNEZ DÍAZ



Universidad Autónoma
de Madrid