

## Changes in medial meniscus extrusion values and clinical outcomes after high tibial osteotomy: a systematic review and meta-analysis

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**ADMINISTRATIVE INFORMATION****Support** - Project of Basic Research Program of Yuncheng City.**Review Stage at time of this submission** - Preliminary searches.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202440102**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 April 2024 and was last updated on 25 April 2024.**INTRODUCTION**

**Review question / Objective** Knee osteoarthritis (KOA) is a globally widespread chronic disease, with medial knee osteoarthritis (MKOA) being the most common type, and the prevalence of MKOA continues to increase annually with global aging. Medial meniscal extrusion (MME) is associated with Kellgren-Lawrence (K-L) grading of knee osteoarthritis and knee valgus deformity, with higher K-L grades and more severe valgus deformity exacerbating medial meniscal extrusion, and meniscal extrusion contributing to worsening knee osteoarthritis. High tibial osteotomy (HTO) can correct the malalignment of the affected limb to correct the knee valgus deformity and change the width of the medial joint space, thus relieving symptoms and restoring function. Currently, there is no uniform conclusion on the changes in the medial meniscus extrusion values and clinical outcomes after high tibial osteotomy, and this review is a systematic review and meta-analysis of the changes in MME before and after HTO.

P: Patient with medial osteoarthritis of the knee combined with medial meniscus extrusion

I: High tibial osteotomy

C: Pre- and postoperative

O: active functional assessment, imaging assessment, MME values

S: retrospective study, randomized controlled study, cohort study.

**Condition being studied** Meniscal extrusion is characterized by the displacement of the meniscus beyond the tibial margin. Meniscal root tear, bucket-handle meniscal tear, joint space narrowing, and medial collateral ligament (MCL) injury may be among the causes of meniscal extrusion. A symptomatic meniscal extrusion is more frequent in the medial meniscus, measuring more than 3 mm at the midlevel of the MCL. Meniscal extrusion can disturb the mechanical capacity of the meniscus, increasing load stress and decreasing the contact area on the surface of the medial compartment of the knee. Knee varus malalignment can reduce the medial joint space, overloading this compartment. In eligible patients, surgical correction of varus alignment is an option

to reduce the load of the medial tibiofemoral compartment and to correct malalignment. Yet, the advantages of reducing medial meniscal extrusion (MME) after medial opening wedge high tibial osteotomy (HTO) to correct malalignment of the knee are not completely understood.

## METHODS

**Search strategy** This review was conducted using the Preferred Reporting Items for Systematic Evaluation and Meta-Analysis (PRISMA) statement. Computer searches of electronic databases (PubMed/Medline, Web of Science, Embase, and Cochrane) for English-language studies, for all relevant complete studies published up to April 2024, were conducted using the following keywords to maximize the sensitivity and specificity of the search: "high tibial osteotomy (HTO)", "meniscal extrusion", "meniscus extrusion", "menisci extrusion" and "medial".

**Participant or population** Patient with medial knee osteoarthritis combined with medial meniscus extrusion.

**Intervention** High tibial osteotomy.

**Comparator** Pre-operative and post-operative.

**Study designs to be included** Retrospective studies, randomized controlled studies, cohort studies.

**Eligibility criteria** All retrospective studies and prospective randomized studies that complied with the search strategy were included in this analysis if they met the following criteria: studies comparing the results of changes in MME values and clinical outcomes before and after HTO surgery that clearly described at least one of the metrics investigated in this analysis, articles published in English language, and cases with no previous history of knee injury. Titles and abstracts were independently reviewed by two reviewers. All disagreements were resolved by discussion until consensus was reached.

**Information sources** PubMed/Medline, Web of Science, Embase, and Cochrane.

**Main outcome(s)** Active Functional Assessment, Imaging Assessment, MME Values.

**Data management** NoteExpress.

**Quality assessment / Risk of bias analysis** Cochrane TOOL.

**Strategy of data synthesis** Heterogeneity was present and random effects were chosen to combine the data; fixed effects were chosen to combine the data in the absence of heterogeneity.

**Subgroup analysis** Subgroups of patients were studied according to their age, BMI, K-L classification, MME values, etc.

**Sensitivity analysis** After deleting any one of the documents, the combined results of the remaining documents are not significantly different from what they would have been without deletion, which means that the sensitivity analysis was passed.

**Country(ies) involved** China.

**Keywords** High tibial osteotomy; medial meniscus extrusion; clinical function; change in outcome.

### Contributions of each author

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