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Varus Alignment Was a Risk Factor For Osteoarthritis of the Knee After the Anterior Cruciate Ligament Injury: A Systematic Review and Meta-Analysis

Junya Itou*

Masafumi Itoh*, Umito Kuwashima*, Shinya Imai**, Yusuke Tsuboko**, Ken Okazaki*, Kiyotaka Iwasaki**

＊ Department of Orthopaedic Surgery, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, Tokyo 162-8666, Japan

＊＊ Cooperative Major in Advanced Biomedical Sciences, Graduate School of Advanced Science and Engineering, Joint Graduate School of Tokyo Women's Medical University, Waseda University, 2-2 Wakamatsu-cho, Shinjuku, Tokyo 162-8480, Japan.

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Disclosures:

We have nothing to declare for this study

Introduction

- Anterior cruciate ligament (ACL) injury is associated with subsequent development of osteoarthritis (OA) of the knee.
- The risk factors reported for knee OA following ACL injury include meniscal injury, cartilage or subchondral bone damage, functional impairment due to knee joint laxity, and changes in knee kinematics.
- There has been no exhaustive review addressing whether coronal malalignment has an impact on the risk of developing knee OA after ACL injury

Purpose

- To investigate whether coronal malalignment contributes to the development of knee OA following ACL injury without ACL reconstruction.

Hypothesis

- Coronal malalignment is associated with development of knee OA.

Materials and Methods

- In accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) recommendations, the Cochrane Library, PubMed, Embase, and Web of Science databases were searched from their inception through to July 31, 2022.
- The following terms were searched in the title and abstract fields: ((osteoarthritis) AND (anterior cruciate ligament) AND ((injury) OR (rupture) OR (tear))) NOT animal.

Materials and Methods

- Studies were included if they investigated knee OA following ACL injury without ACL reconstruction, evaluated coronal alignment, or assessed the degree of knee OA radiographically.
- Meeting abstracts and proceedings, non-English language articles, and in vitro and animal studies were excluded.
- The Cochrane Collaboration tool for risk of bias (QUADAS-2) was used to assess the included studies. Concerns about applicability and bias risk were determined to be low, high, or unclear.
- The analysis was performed using RevMan (version 5.4.1, Copenhagen: Nordic Cochrane Center, The Cochrane Collaboration, 2020).

Results

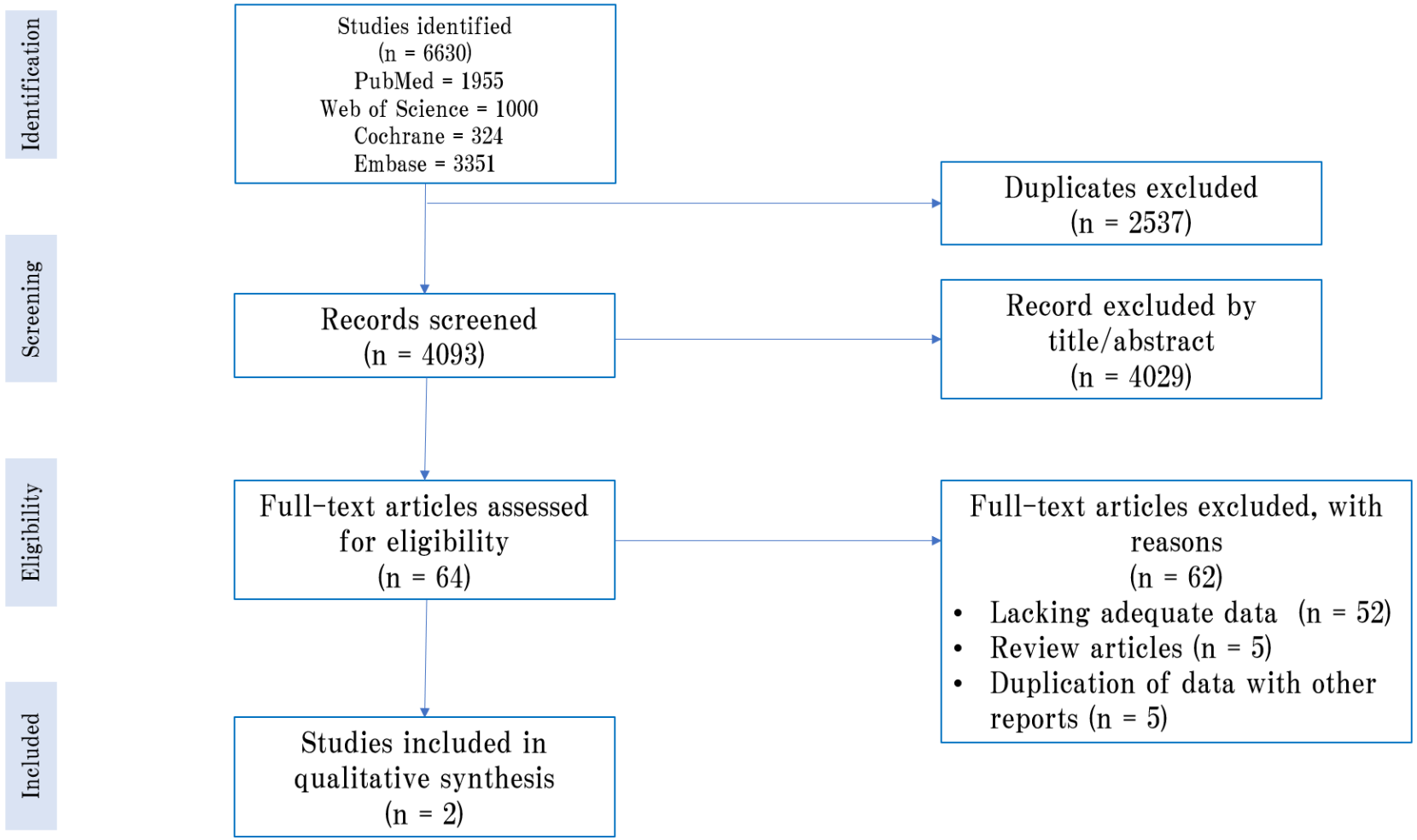

Figure 1. PRISMA flowchart for the inclusion of studies in the meta-analysis

Results

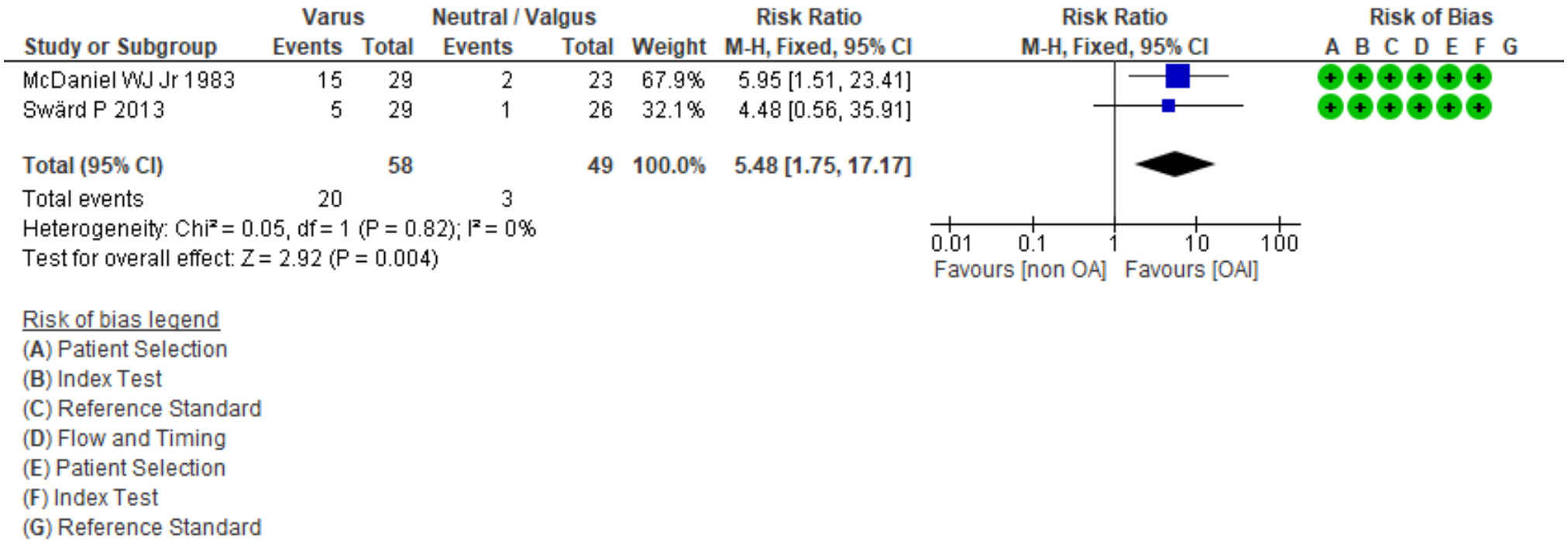

Figure 2. Forest plot showing the risk ratio for knee osteoarthritis. CI, confidence interval

Results

Study	Journal	Definition of OA	Definition of varus alignment
McDaniel et al (1983)	CORR	JSN	4° of valgus or less
Sward et al (2013)	KSSTA	JSN	HKA angle > 182°

Figure 3. Characteristics of the studies included in the meta-analysis
CORR, Clinical Orthopaedics and Related Research; HKA, hip-knee-ankle; JSN, joint space narrowing; KSSTA, Knee Surgery, Sports Traumatology, Arthroscopy; OA, osteoarthritis

Discussions

- The most important finding of this meta-analysis was that varus alignment is a risk factor for knee OA after ACL injury. To our knowledge, this is the first study to evaluate the relationship between coronal alignment of the knee and knee OA following ACL injury without ACL reconstruction.
- The prevalence of knee OA after ACL injury without ACL reconstruction ranges from 1.8% to 68.3%, whereas the global age-standardized prevalence is reported to be 3.8%.
- Considering the high risk of development of knee OA, surgeons should include coronal alignment when planning their treatment strategy.

Limitations

- The definition of varus alignment was not consistent and alignment was not consistently expressed by the HKA angle or the femorotibial angle.
- Knee OA was evaluated only radiographically, and several studies in which OA was diagnosed based on clinical symptoms or findings on magnetic resonance imaging were excluded.
- Potential publication bias might have an impact on the results.

Conclusion

- Varus alignment is one of the risk factors for knee OA after ACL injury.
- Considering the high incidence of OA, surgeons should bear this in mind when considering their treatment strategy.

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