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Double-Level Osteotomy:

A Systematic Review of Patient-Reported Outcomes, Conversion to Total Knee Arthroplasty, and Complications

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Disclosure of Interest

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Outline

I. Background & Objectives

II. Methods

III. Patient-Reported Outcomes

IV. Complications & Conversion to TKA

V. Alignment & Conclusions

Background

- DLO combines medial opening-wedge high-tibial osteotomy (MOWHTO) and lateral closing-wedge distal femoral osteotomy (LCWDFO) for severe varus alignment
- Indicated for patients with both tibial and femoral abnormalities
- Aims to achieve normal Joint Line Obliquity (JLO)
- Clinical results comparable or superior to sole OW HTO procedures

Objectives

1. Synthesize patient-reported outcomes for patients with medial-compartment OA
2. Evaluate conversion rates to total knee arthroplasty (TKA)
3. Assess complication profiles across reported studies
4. Guide evidence-based treatment decisions for varus malalignment

Methods

- PRISMA-guided search: SCOPUS, PubMed, Embase
- Terms: “double-level osteotomy,” “high tibial osteotomy”, “distal femoral osteotomy”
- Inclusion: >5 participants, MOWHTO + LCWDFO, mean follow-up >1 year
- Two independent reviewers with consensus resolution (G.D. & A.R.)
- 10 studies with 324 patients included in final analysis

Patient-Reported Outcomes

- All studies showed increased PROMs postoperatively
- KOOS score improvements (pain, symptoms, ADL, sport, QOL) in multiple studies
- UCLA, IKDC, and Lysholm scores showed statistically significant improvements
- Patient satisfaction consistently high across all studies

Complications

- Fractures most common: lateral cortical, medial cortical
- Minor: post-op hematomas, scar dehiscence, hardware discomfort
- Major (rare): deep wound infections, arterial injury w/ peroneal nerve palsy
- Lower fracture rates compared to isolated HTO procedures

Conversion to Total Knee Arthroplasty

- No non-unions reported in studies specifying this outcome
- Lower nonunion rate compared to HTO (reported as high as 4.9%)
- Only one case of recurrent deformity reported (heavy patient w/ femoral impaction)
- Minimal conversion to arthroplasty at minimum 1-year follow-up

Alignment

- Corrected HKA from mean values of:
  - ~166° to 172º (-15° to -10°) preoperatively
  - ~180º to 182º (0º to 4º) postoperatively
- Restored normal mLDFA (~85-86º) and mMPTA (~90-91º) parameters
- Reduced JLCA and improved Joint Line Obliquity (JLO)
- All studies demonstrated normalization of alignment parameters

Conclusions

- DLO demonstrates significant improvements in multiple validated PROMs
- Complications primarily manageable fractures w/ good recovery
- Lower complication rates than isolated HTO procedures (2.28% in severe genu varus)
- Recommended for severe varus malalignment w/ medial compartment OA

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