Medial Tibial Reduction Osteotomy in Total Knee Arthroplasty for Advanced Varus - is there a release algorithm?

Rodica MARINESCU MD PhD; University of Medicine and Pharmacy Carol Davila Bucharest
Iozefina BOTEZATU MD PhD, Dan LAPTOIU MD PhD,
Stefan CIUMEICA MD Colentina Clinical Hospital Bucharest, Romania
FACULTY DISCLOSURE

• Nothing to be disclosed
INTRODUCTION

• Varus increased the risk of incident OA
• In knees with OA, varus alignment increased the risk of OA progression (1)
• TKA in varus knee is challenging in terms of correct coronal alignment and balancing in flexion and extension (2)
• There are still controversy in the methods, order and amount of soft tissue release to achieve balanced gap during TKA of varus deformed osteoarthritic knee
  • Complementary surgical steps may be needed during correction of severe varus in TKA; = medial tibial reduction osteotomy (MTRO) (3)
MATERIAL AND METHOD

• From 118 cases grade 4 Kellgren-Lawrence OA operated in Colentina Clinical Hospital between Dec 2016 – Dec 2017 = 53 cases (44.9%) required MTRO

  • Preoperative complete X-ray examination, including FLWB Xrays, were obtained
  • Exclusion criteria’s: neutral/valgus alignment, extra-articular deformity, unstable knee

• Standard subvastus approach = all cases

• Intramedullary guides: Femoral distal resection at 70 valgus; Tibial cut at 900

• Peripheral osteophytes removal; Deep MCL release at menisco-capsular junction

• First Medial gap checking: medial capsule release (ant-med –tight flx., post-med tight ext)

• Patients demographics: female/male ratio: 6/1

• Varus HKA: median 15.50:
  • I <100: 35% cases
  • II >10<200: 52%
  • III >200: 13%

• BMI: 31.5 ± 5.40 (range 23.8 to 47 )

• The preoperative Knee Society Score (KSS) was poor - median 47 (range 32 to 59) for clinical score and 35 (20 to 40) for the functional score. The range of motion (ROM) of the knee was from 80 to 100.
MATERIAL AND METHOD

• MTRO technique: removal of unsustained tibial bone, after pre-contouring the tibial implant
• Performed with sagittal saw while protecting structures from medial side
• Osteotomy amount 2 - 8 mm
• Second extension gap checking
• Additional soft tissue release - third extension gap checking
• All PS implants (Triathlon, Stryker) implanted in all cases
SEVERE VARUS KNEE-ADDITIVE PROCEDURE

REDUCTION OSTEOTOMY

• Optimal alignment without extensive soft tissue release
• Good coverage without overhang (9)
REDUCTION OSTEOTOMY

OPTIMAL BONE COVERAGE

• Maximal cortical bearing with posteromedial and anterolateral support
REDUCTION OSTEOTOMY

OPTIMAL BONE COVERAGE

• Alternative method to pie-crust technique
• > effective in extension gap balancing

Ahn, 2016, Journal of Arthroplasty
RESULTS

• HKA was corrected to $90 \pm 4^0$ at 6 weeks after operation

• NO evidence of evolutive radiolucent line, osteolysis or subsidence.

• The results of KSS were significantly improved to 85 to 90 for clinical score and 80 to 90 for functional score; ROM of the knee was significantly increased to $(110 \pm 5)^\circ$ at last follow-up.

• No patients required constrained implants.

• No additional release of superficial medial collateral or semi membranous was needed
RESULTS

• Pearson statistical test was used for analyzing eventual correlations: the MTRO amount was significantly correlated to the BMI (p=0.004) and the preoperative HKA (p=0.001).
DISCUSSIONS

• integrity of the sMCL is crucial to the proper function and longevity of nonconstrained TKA; conservation of sMCL fibers at the tibial insertions, especially on the distal division (62.4 ± 5.5 cm distal to the joint line) is considered to be critical (4)

• classic extensive medial release are associated with iatrogenic injury to the pes anserine and saphenous nerve, or instability (5).

• MTRO is a feasible alternative to above mentioned

• MTRO during TKA in significant varus knee could end up in achieving higher KSS than the TKA series without reduction osteotomy potentially, due to reduce medial soft tissue release (6)

• also knee biomechanics is better preserved and longevity of non-constrained TKA is enhanced, as sMCL are retained (no release beyond 5 cm from joint line) (7)

• Previous studies pointed out that an algorithm exist
  • MTRO : Antero-medial release+ medial MTRO = increase flexion gap
  • Postero-medial release+ posterior MTRO = increase extension gap (8)

• Several authors reported that MTRO may improve alignment and functional scores in varus knee (9)

• MTRO - technically easy and reproducible while preserving medial structures

• It could achieve higher KSS than the TKA series without reduction osteotomy potentially due to reduced medial soft tissue release
CONCLUSIONS

• In TKA in varus knee MTRO may be a good technical solution for balancing

• Accurate analysis of pre-op FLWB X-rays may point out the need for MTRO
  • Amount of RO may also be predicted based on radiological examination (statistically correlated with HKA etc)
  • Clinical evaluation (statistically correlated with BMI)
REFERENCES


9. Martin Medial Tibial Reduction Osteotomy is Associated with Excellent Outcomes and Improved Coronal Alignment, JIS&RF, Volume 7, Number 1, March 2017.