Comparison Of Perioperative Leg Length Change Between The Medial Closing Wedge And Lateral Opening Wedge Distal Femoral Osteotomy For Valgus Knee Deformity.

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Disclosure

Presenter : Shintaro Onishi, M.D.

I have no conflict of interest to declare.

Leg length discrepancy

- ✓ Significant leg length discrepancy (LLD) (≧5 mm) can be a cause of postural and gait abnormalities as well as low back pain.

Cummings G et al. Spine. 1993, Khamis S et al. Gait Posture. 2017

- ✓ LLD after high tibial osteotomy (HTO) for varus knee OA
  - Medial opening wedge HTO = increase in leg length
  - Lateral closed wedge HTO = not significant change

Kim JI et al. AJSM. 2016, Lee OS et al. J Knee Surg. 2019

Limited data on LLD after DFO for valgus knee osteoarthritis.

Purpose

To compare the radiological outcomes, specifically the perioperative changes in leg length, between medial closing wedge DFO (MCWDFO) and lateral opening wedge DFO (LOWDFO).

Study Population

- ✓ 52 patients (26: MCWDFO, 26: LOWDFO)
- ✓ Sex : male 30, female 22
- ✓ Age: 39.9 ± 10.5 years (24-64)
- ✓ Minimum 1 years F/U

Exclusion

- ✓ History of arthroplasty or surgery for fractures
- ✓ Bilateral osteotomy

Surgical Indication and Strategy

Indication

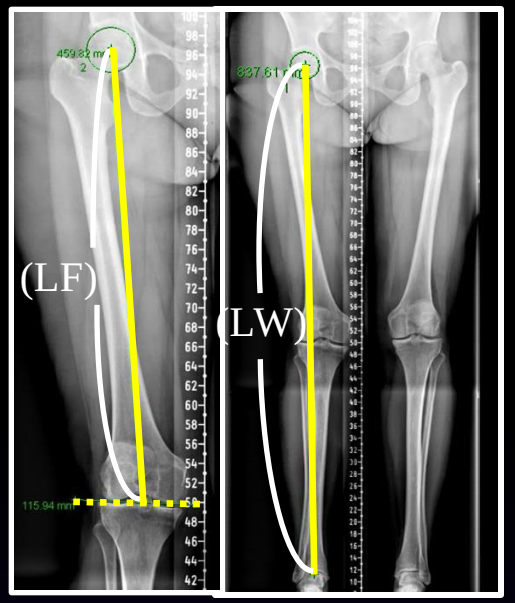
- DFOs for symptomatic severe valgus knee OA
- Isolated extra-articular femoral deformity (mLDFA < 85°)

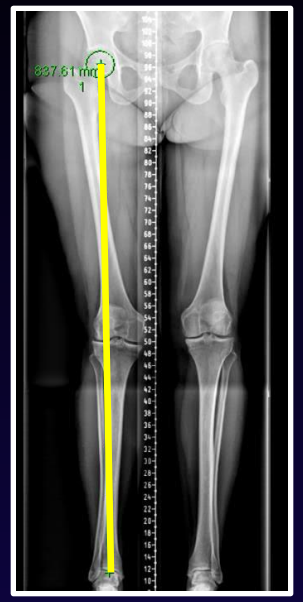
Intended alignment and surgical procedure

- Intended HKA = 0° (neutral)
- Intended postoperative mLDFA (85-90°)
- Biplanar-osteotomy

✓ Choice of the osteotomy was based on the surgeon's preference (taking account for pre-op LLD).
✓ mLDFA: Mechanical lateral distal femoral angle, mMPTA: Mechanical medial proximal tibial angle, HKA: Hip-knee-ankle angle

Radiographic Measurement





Pre-op

Post-op

- ✓ Preoperative and 1 year after surgery
- ✓ LF: Length of the femur

  is defined as the distance between the center of the femoral head and distal femoral joint surface.
- ✓ LW: Length of the whole leg

  is defined as the distance between the center of the femoral head and the center of tibial plafond.
- ✓ LLD = LW @ affected side – LW @ contralateral side
- ✓ Assumed postoperative LLD = (pre-op LLD) + (Δ LF)
- ✓ Straightening effect = (post-op LLD) – (assumed post-op LLD)

Radiological Analysis

Correction-related parameters

1. HKA
2. mMPTA
3. mLDFA
4. Intended correction angle

Length-related parameters

1. Length of the femur (LF)
2. Length of whole leg (LW)
3. LLD
4. Straightening effect on LW

MCWDFO vs LOWDFO, statistical significance : $P < 0.05$.

Results

Demographics	MCWDFO (n=26)	LOWDFO (n=26)	*p* value
Age (years)	39.1 ± 10.4	40.7 ± 10.8	0.587
Sex (Male / Female)	16 / 10	14 / 12	0.404
Height (cm)	171.4 ± 6.9	170.9 ± 6.3	0.770
Correction-related parameters			
Pre-op. HKA	9.1° valgus ± 1.0	8.8° valgus ± 0.8	0.210
Pre-op. mMPTA	85.3 ± 2.1	85.0 ± 2.4	0.577
Pre-op. mLDFA	79.8 ± 1.0	80.0 ± 0.7	0.327
Intended correction angle	8.2 ± 1.0	8.0± 0.7	0.327
Post-op. HKA	0.2 varus ± 1.2	0.3 varus ± 1.3	0.824
Post-op. mLDFA	87.5 ± 0.9	87.8 ± 0.7	0.230

		MCWDFO (n=26)	LOWDFO (n=26)	*p* value
LF (cm) (LF: length of the femur)	Pre	47.1 ± 2.4	46.9 ± 2.2	0.713
	Post	46.9 ± 2.4	47.2 ± 2.3	0.638
Δ LF (mm)		-2.7 ± 0.6	+2.7 ± 0.4	< **0.001**
LW (cm) (LW: length of the whole leg)	Pre	81.5 ± 9.9	77.8 ± 6.7	0.123
	Post	81.4 ± 9.9	78.0 ± 6.6	0.144
Δ LW (mm)		-0.5 ± 3.8	+1.7 ± 2.6	**0.020**
LLD (mm)	Pre	-1.7 ± 3.1	-1.4 ± 2.3	0.744
	Post	-2.2 ± 2.1	0.2 ± 1.6	< **0.001**
Assumed post-op LLD (mm)		-4.3 ± 3.1	1.3 ± 2.4	< **0.001**
Straightening effect (mm)		2.0 ± 4.1	-1.1 ± 2.5	< **0.001**

Discussion

Author	DFO	LLD	LOWDFO	MCWDFO
Madelaine et al. 2016	LOW	Pre	- 0.7 cm	N.A.
		Post	- 0.6 cm	N.A.
Kolb et al. 2019	LOW	Pre	- 6.4 mm	N.A.
		Post	+ 1.5 mm	N.A.
Present study	MCW & LOW	Pre	-1.4 ± 2.3 mm	-1.7 ± 3.1 mm
		Post	0.2 ± 1.6 mm	-2.2 ± 2.1 mm
		ΔLLD	+ 1.7 ± 2.6 mm	-0.5 ± 3.8 mm

✓ Present study : Smaller changes in leg length than those of previous studies.

→ Difference in measurement tech. and heterogeneity in backgrounds.

Conclusions

- ✓ Although the length of femur changed postoperatively depending on each surgery, the changes in the length of whole leg could be minimized due to the straightening effect of the alignment correction, resulting in the initial leg length being maintained.

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