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# Open-Wedge High Tibial Osteotomy with a Slight Valgus Correction From Neutral Limb Alignment Achieves Clinical Improvements Comparable with Those for Knees with Varus Deformity

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Disclosures:

We have nothing to declare for this study



# Introduction

- Medial open-wedge high tibial osteotomy (OWHTO) is widely known for its favorable outcomes when used to treat varus knees with osteoarthritis (OA) or osteonecrosis.
- However, when the degree of varus is slight, the surgical indications may be an issue.
- OWHTO for neutral or slightly varus alignment requires only a few degrees of valgus correction, and it is not clear whether such a slight change in limb alignment would achieve clinically significant improvement.

# Purpose

- To clarify the clinical outcome of OWHTO with neutral alignment when defined as within 4 degrees of varus.

# Hypothesis

- OWHTO for neutral alignment would have an outcome similar to that of OWHTO for varus alignment.



# Materials and Methods

- This retrospective study included 68 varus knees that underwent primary OWHTO between April 2017 and October 2020 at our institution.
- OWHTO was performed in patients who had accompanying medial degenerative disease such as radiographic medial OA, medial osteonecrosis, degenerative medial meniscus tear with bone marrow lesions in the medial compartment, or posterior root tear of the medial meniscus.
- At our institution, closed-wedge high tibial osteotomy was indicated for knees requiring more than 12° valgus correction.

# Materials and Methods

- The inclusion criteria were patient-reported outcome measures (PROMs) evaluated preoperatively and postoperatively during at least 2 years of follow-up and preoperative and postoperative full-length weight-bearing radiographs available.
- The exclusion criteria were medial degenerative disease other than medial OA, incomplete PROMs data, and inadequate radiological data.
- The knees were divided according to the preoperative hip-knee-ankle (HKA) angle measured on digital long-leg standing radiographs into a **neutral alignment group** ( $\leq 184^\circ$  of varus alignment) and a **varus alignment group** ( $> 184^\circ$  of varus alignment).

# Materials and Methods

- HTO was performed by the medial OWHTO method using a long locking plate (TriS, Olympus Terumo Biomaterials, Tokyo, Japan).
- The target point, known as the Fujisawa point, which is 62.5% of the overall width of the tibial plateau measured from the medial side, was set.
- PROMs: Forgotten Joint Score-12 (FJS-12), The Knee Injury and Osteoarthritis Outcome Score (KOOS)

# Results

	Neutral alignment (n = 27)	Varus alignment (n = 39)	<i>P</i> -value
Age, years, mean ± SD	54.8 ± 5.9	60.3 ± 8.4	<b>0.004</b>
Male sex, n (%)	12 (44.4)	17 (43.6)	1.00
K/L grade, 1, 2, 3, 4	15, 6, 6, 0	16, 12, 9, 2	0.24
Body mass index, mean ± SD	25.6 ± 4.3	25.2 ± 4.0	0.71
Right side affected, n (%)	14 (51.8)	18 (46.1)	0.80
Preoperative ROM, (°), mean ± SD	132.2 ± 16.0	133.8 ± 11.1	0.99
Postoperative ROM, (°), mean ± SD	141.6 ± 7.1	142.3 ± 5.4	0.93
Follow-up, months, median [range]	24.0 [24.0–41.0]	26.0 [24.0–35.0]	0.47
Preoperative UCLA, median [range]	6 [4–9]	6 [4–8]	0.98
Preoperative HKA, mean ± SD	182.2 ± 1.3	185.5 ± 1.2	<b>&lt;0.0001</b>
Postoperative HKA, mean ± SD	176.5 ± 1.2	176.9 ± 1.5	0.18
Correction angle, mean ± SD	5.7 ± 1.8	8.5 ± 1.7	<b>&lt;0.0001</b>

Table 1 Demographic and radiological data



# Results

	Preoperative			Postoperative		
	Neutral alignment (n = 27)	Varus alignment (n = 39)	<i>P</i> -value	Neutral alignment (n = 27)	Varus alignment (n = 39)	<i>P</i> -value
FJS-12	19.1 ± 13.7	23.7 ± 18.3	0.34	61.0 ± 26.5	60.3 ± 29.1	0.97
KOOS						
Pain	55.8 ± 16.7	53.4 ± 18.1	0.64	85.3 ± 15.1	87.5 ± 13.1	0.58
Symptoms	61.2 ± 19.3	57.9 ± 18.1	0.33	85.4 ± 13.4	86.1 ± 14.7	0.65
ADL	69.5 ± 16.9	66.1 ± 17.5	0.33	88.7 ± 13.7	90.2 ± 11.8	0.94
Sports	32.0 ± 23.0	31.7 ± 24.5	0.92	66.8 ± 28.1	69.8 ± 24.9	0.83
QOL	28.9 ± 20.0	31.6 ± 18.3	0.50	71.3 ± 23.7	71.3 ± 22.8	0.92

Table 2 Comparison of patient-reported outcome measures

# Discussions

- The most important finding in this study was that the short-term clinical outcomes of OWHTO were favorable for both neutral alignment ( $\leq 184^\circ$  of varus alignment) and varus malalignment ( $> 184^\circ$  of varus alignment).
- Few studies have evaluated preoperative slight varus alignment, such as preoperative neutral alignment, following OWHTO. Furthermore, the definition of neutral alignment itself has not yet been standardized.
- With varying definitions, preoperative neutral alignment has been reported in the range of 1–5 degrees to date.

# Limitations

- The sample size was small.
- All patients were Asian, and the possibility of anatomical differences between ethnic groups was not evaluated.
- The follow-up period was relatively short.
- Concurrent arthroscopic meniscus resection or repair was performed, and the effect of arthroscopic surgery cannot be excluded.
- Mean age was significantly different between the two alignment groups



# Conclusion

- The short-term clinical results of OWHTO were favorable for both neutral alignment and varus malalignment.
- This treatment method could be considered for slight varus malalignment of the knee.

# References

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