

Closed-wedge high tibial osteotomy is more advantageous to maintain the correction than open-wedge high tibial osteotomy in osteopenic patients

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INTRODUCTION:
Bone quality influences fixation stability and bone healing at the osteotomy site and may affect the postoperative outcome regarding correction loss. Initial stability in closed-wedge high tibial osteotomies (CWHTO) with direct bone to bone contact can be better than in open-wedge high tibial osteotomies (OWHTO) which creates a bony gap. It is well known that contact bone healing is much easier and faster than gap bone healing [20]. Therefore, CWHTO may be more advantageous than OWHTO for initial stabilization and bone healing of the osteotomy site in osteopenic patients. To the researchers' knowledge, no studies have compared CWHTO and OWHTO in osteopenic patients. The purpose was to compare the incidence of correction loss and survival rate between CW- and OWHTOs in patients with osteopenic and normal bone.

METHODS:
Retrospective review was conducted for 115 CWHTOs and 119 OWHTOs performed in osteopenic patients [-2.5<Bone mineral density (BMD) T-scores<-1] and 136 CWHTOs and 138 OWHTOs performed in normal patients (BMD T-score>-1) from 2012 to 2019. Demographics were not different between CW- and OWHTOs in osteopenic and normal patients (n.s., respectively). Radiographically, the mechanical axis (MA), medial proximal tibial angle (MPTA), and posterior tibial slope (PTS) were evaluated pre- and postoperatively (2 weeks after HTO). The occurrence of hinge fractures was investigated using radiographs taken on the operation day. The correction change was calculated as the last follow-up value minus postoperative MPTA. Correction loss was defined when the correction change was ≥3°. The survival rate (failure: correction loss) was investigated.

RESULTS:
There were no significant differences in the pre and postoperative MA, MPTA, PTS, and value changes between CW- and OWHTOs in osteopenic and normal patients (n.s., respectively); the incidence of unstable hinge fractures also did not differ significantly (CWHTO vs. OWHTO= 7 vs. 7.6% in osteopenic patients; 2.9% vs. 3.6% in normal patients; n.s., respectively). The average correction change (CWHTO=-0.6°, OWHTO=-1.3°, p=0.007), incidence of correction loss (CWHTO=1.7%, OWHTO=9.2%, p=0.019), and 5-year survival rates (CWHTO=98.3%, OWHTO=90.8%, p=0.013) differed significantly in osteopenic patients; there were no significant differences in these results in normal patients (n.s., respectively).

DISCUSSION AND CONCLUSION: CWHTO was more advantageous than OWHTO regarding the correction loss in osteopenic patients. Intra- and postoperative care that consider poor bone quality will be required when performing OWHTOs

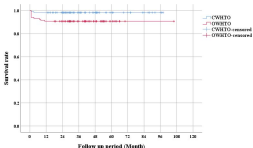


Table 3. Radiographic results

		Osteopenic patients		Normal patients	
		CW	OW	CW	OW
Mechanical axis (°)	Preop	Varus 8.1 ± 1.8	Varus 8.3 ± 4.2	Varus 8.0 ± 2.0	Varus 7.8 ± 3.1
	Postop	Valgus 2.2 ± 2.3	Valgus 2.4 ± 2.8	Valgus 2.0 ± 1.9	Valgus 2.2 ± 2.8
	Change	10.3 ± 2.4	10.7 ± 4.5	10.0 ± 2.4	10.0 ± 3.4
Medial-proximal-tibial angle (°)	Preop	84.3 ± 1.7	84.4 ± 2.2	84.3 ± 1.8	84.4 ± 2.0
	Postop	93.5 ± 2.0	93.9 ± 3.1	92.8 ± 1.5	93.3 ± 2.8
	Change	9.2 ± 2.0	9.5 ± 3.5	8.5 ± 1.8	8.9 ± 2.8
Posterior tibial slope (°)	Preop	11.5 ± 3.5	11.4 ± 3.3	10.4 ± 2.7	10.0 ± 3.3
	Postop	11.1 ± 3.9	11.6 ± 3.7	9.9 ± 2.7	10.3 ± 3.9
	Change	-0.4 ± 2.5	0.2 ± 3.3	-0.5 ± 2.6	0.3 ± 3.9

Continuous variables are presented as mean ± standard deviation.

Preop= Preoperative; Postop= Postoperative 2 weeks; CW=Closed-wedge high tibial osteotomy; OW=Open-

wedge high tibial osteotomy