

Offloading Effect in the Unoperated Contralateral Knee after Unilateral Medial Open Wedge High Tibial Osteotomy: A SPECT/CT Analysis

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INTRODUCTION: Open wedge high tibial osteotomy (OWHTO) is commonly performed for medial compartment osteoarthritis of the knee. Postoperative gait alteration may influence the mechanical load on the contralateral knee, but objective evidence of such effects has been limited. This study aimed to evaluate scintigraphic and radiographic changes in the medial compartment of the unoperated contralateral knee following OWHTO using SPECT/CT imaging.

METHODS: In this retrospective study, 72 patients with medial tibiofemoral osteoarthritis and varus malalignment $>5^\circ$ underwent OWHTO between 2013 and 2017. SPECT/CT and radiographic assessments were performed preoperatively and at 1 year postoperatively. Mechanical femorotibial angle (MFTA), medial joint gap, pelvic tilt, and scintigraphic uptake grades were evaluated. Wilcoxon signed-rank test and repeated-measures ANOVA were used for statistical analysis ($\alpha = 0.05$).

RESULTS: Average scintigraphic uptake in the contralateral medial compartment significantly decreased from 2.8 ± 0.4 to 2.1 ± 0.6 at 1 year postoperatively ($p < 0.001$). 70% of patients showed decreased uptake, 30% no change, and none showed increased uptake. Contralateral MFTA improved from $8.0^\circ \pm 2.4^\circ$ to $6.7^\circ \pm 2.6^\circ$ at 3 months ($p = 0.011$), and the improvement was sustained at 2-year follow-up. No significant changes were observed in pelvic tilt or medial joint gap.

DISCUSSION AND CONCLUSION: OWHTO not only corrects alignment and reduces mechanical load in the operated knee but also leads to an offloading effect in the contralateral knee, demonstrated by reduced SPECT/CT uptake and radiographic alignment improvements. These findings support the hypothesis of a biomechanical redistribution following unilateral correction, potentially delaying osteoarthritis progression in the contralateral knee.



Figure 1. Anteroposterior radiographs and SPECT/CT scans of the knee joint. The knee joint was centered at a 90-degree angle of the mechanical axis. Arrows demonstrate the medial compartment of the knee joint. The SPECT/CT scans were performed at 1 year postoperatively. The SPECT/CT scans were performed at 1 year postoperatively. The SPECT/CT scans were performed at 1 year postoperatively. The SPECT/CT scans were performed at 1 year postoperatively.

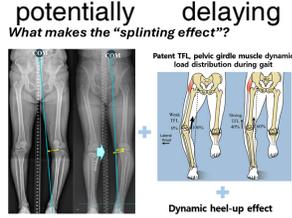


Table 1
Patient demographics and characteristics

	Mean	(SD)	Range (Min - Max)
Age	56.8	(5.2)	41.0-75.0
Sex (Male/Female)	16/56		
Height (cm)	168.6	(8.3)	148.0 - 188.0
Weight (kg)	65.7	(13.3)	48.0 - 105.0
BMI (kg/m ²)	23.4	(3.4)	20.1 - 32.4
ES (months)	28.1	(4.7)	21 - 40
Varus (°)	7.0	(2.0)	3.0 - 13.0
MFTA (°) pre op	8.0	(2.4)	4.0 - 13.0
MFTA (°) 3 mo	6.7	(2.6)	3.0 - 13.0
MFTA (°) 2 yr	6.7	(2.6)	3.0 - 13.0
M-L grade, pre op	2.0	(0.8)	1-4

Table 2
Changes in the scintigraphic parameters and radiographic variables in the medial compartment of the contralateral knee following open OWHTO

	Preop.	3 months	1 year	2 years	2 years	p
Medial joint gap (mm)	43.2	43.2	43.2	43.2	43.2	0.001
	43.2	43.2	43.2	43.2	43.2	0.001
	43.2	43.2	43.2	43.2	43.2	0.001
	43.2	43.2	43.2	43.2	43.2	0.001
Pelvic tilt angle (°)	18.0	18.0	18.0	18.0	18.0	0.001
	18.0	18.0	18.0	18.0	18.0	0.001
	18.0	18.0	18.0	18.0	18.0	0.001
	18.0	18.0	18.0	18.0	18.0	0.001