

What is the Accuracy of Intra-operative Femoral Version Estimation in THA?

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INTRODUCTION:

Femoral version (FV) is an important parameter to consider to optimize THA mechanics, impingement-free movement and outcomes. While intra-operative estimation of FV is commonly performed, its reliability, particularly in anterior approach (AA) THA, remains uncertain. This study evaluates the correlation and accuracy of intra-operative FV estimation compared to post-operative CT-based measurements, with a focus on AA.

METHODS: A prospective cohort of 100 patients undergoing primary, uncemented THA for osteoarthritis by three surgeons was analyzed. All patients had pre-operative CT and 3D planning, intra-operative manual FV estimation, and post-operative CT measurements using the posterior condylar axis. Most (78%) underwent DAA-THA in supine position, and the remaining underwent posterior or lateral approach in the lateral position. Accuracy was assessed by comparing intra-operative estimates to CT values within $\pm 5^\circ$ and $\pm 10^\circ$. Correlation was evaluated, stratified by surgical approach and positioning.

RESULTS:

FV remained unchanged pre- ($14.1^\circ \pm 7.2$) to post-THA ($16.1^\circ \pm 8.3$) ($p=0.2$). The change in FV with surgery was $1.9^\circ \pm 6.4$. The mean overall intra-operative FV estimate was $16.1^\circ \pm 4.3^\circ$, closely matching the mean post-operative CT-FV of $16.1^\circ \pm 8.3^\circ$. Estimation fell within $\pm 5^\circ$ of CT in 60% of cases and within $\pm 10^\circ$ in 84.1%. Overestimation $>10^\circ$ occurred in 12.2%, and underestimation $>10^\circ$ in 3.7%. Correlation between intra-operative and CT-measured FV was moderate in supine-positioned patients ($\rho=0.400$, $p=0.001$) and stronger in lateral-positioned cases ($\rho=0.627$, $p=0.005$). No consistent pattern of directional error (over vs underestimation) was observed in the supine group. Estimation accuracy depended on pre-op FV ($\rho=0.453$, $p=0.001$); the higher the native FV, the greater the intra-operative under-estimate.

DISCUSSION AND CONCLUSION: Intra-operative FV estimation during DAA THA demonstrated only moderate correlation with post-operative CT measurements, with just 60% of cases falling within $\pm 5^\circ$ of accuracy. These findings underscore the limitations of visual estimation, particularly with the AA, and raise important questions regarding its clinical reliability.