

Differences in Pelvic Tilt in Surgically Treated Femoroacetabular Impingement and Hip Dysplasia

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INTRODUCTION: Femoroacetabular impingement (FAI) and hip dysplasia are widely recognized as sources of hip pain which if left untreated, can result in osteoarthritis. The role of anterior pelvic tilt in the settings of FAI and hip dysplasia is controversial and there is a paucity of literature defining their relationship. Many believe that patients with FAI as well as hip dysplasia develop a compensatory reorientation of their pelvis. It is postulated that hip dysplasia patients develop increased anterior pelvic tilt to increase femoral head coverage and decrease abnormal hip contact pressure. Conversely, FAI patients may decrease their pelvic tilt to protect from impingement through abnormal contact between the proximal femur head-neck junction and acetabulum. The purpose of this study was to examine anterior pelvic tilt in FAI and hip dysplasia populations and evaluate its change postoperatively from arthroscopic osteochondroplasty and periacetabular osteotomy (PAO), respectively.

METHODS: A retrospective review was completed of patients with FAI who underwent arthroscopic osteochondroplasty and hip dysplasia patients who underwent PAO at a single institution between January 1, 2018, and January 1, 2023. Demographics including age, sex, and laterality were collected. Preoperative and postoperative x-rays were evaluated for alpha angle on a Dunn view, lateral center edge angle (LCEA) on an anterior-posterior (AP) pelvis film, and the vertical distance between the superior aspect of the pubic symphysis and the sacrococcygeal joint on an AP pelvis film. The vertical distance was utilized to estimate pelvic tilt through a validated calculation established by Tannast et al. Chi-squared statistical analysis was utilized for categorical variables while a student's t-test was utilized for continuous variables. Statistical significance was set at $p < 0.05$.

RESULTS: One-hundred patients were included. Fifty patients in the FAI cohort underwent arthroscopic osteochondroplasty and 50 patients in the hip dysplasia cohort underwent PAO. There was no statistically significant difference in percentage of female patients in the FAI and dysplasia cohorts (72% versus 78%, $p=0.488$) or laterality (62% right-sided versus 56%, $p=0.542$). The FAI cohort was statistically significantly older (24.8 years old versus 20.8, $p=0.026$). There was a statistically significant correction in alpha angle in the FAI cohort (68.5 degrees preoperative to 46.1 degrees postoperative, $p < 0.001$). There was a statistically significant correction in LCEA in the dysplasia cohort (16.4 degrees preop to 35.7 degrees postop, $p < 0.001$). The dysplasia cohort had statistically significantly higher pelvic tilt preoperatively compared to the FAI cohort (57.2 degrees versus 53.5 degrees, $p= 0.047$). There was no statistically significant difference in postoperative pelvic tilt between the FAI and dysplasia cohorts (55.1 degrees versus 54.2 degrees, $p= 0.573$) due to an increase in tilt of the FAI cohort and decrease in the hip dysplasia cohort. There was no statistically significant difference in pelvic tilt when comparing preoperative and postoperative pelvic tilt within the FAI and dysplasia cohorts ($p= 0.393$ and $p= 0.084$).

DISCUSSION AND CONCLUSION: Femoroacetabular impingement and hip dysplasia have been thought to influence pelvic tilt; however, this has not been clearly defined in the literature. Our study highlights higher anterior pelvic tilt in patients with hip dysplasia when compared to those with FAI. Additionally, this data identifies correction in pelvic tilt as the tilt in the hip dysplasia cohort decreased following PAO while tilt in the FAI cohort increased following osteochondroplasty.

		FAI	Hip Dysplasia	
Pelvic Tilt (degrees)	Pre-op	53.51	57.16	<i>P= 0.047</i>
	Post-op	55.07	54.17	<i>P= 0.573</i>
	P value	<i>P= 0.393</i>	<i>P= 0.084</i>	
Alpha Angle (degrees)	Pre-op	68.54		
	Post-op	46.13		
	P value	<i>P < 0.001</i>		
LCEA	Pre-op		16.41	
	Post-op		35.66	
	P value		<i>P < 0.001</i>	