



WiSA and WiSP: Novel Radiographic Parameters of Anterior and Posterior Acetabular Wall Intersection with the Sorcil and their Correlation with Surgical Management and Outcomes in Borderline Hip Dysplasia

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INTRODUCTION

- Borderline hip dysplasia, defined as a lateral center-edge angle (LCEA) between 18° and 25°, remains a challenging diagnosis for hip preservation surgeons.
- Some patients with borderline dysplasia may have underlying joint instability which requires a periacetabular osteotomy (PAO) to correct, whereas others do not have instability and can be treated with arthroscopy alone.
- No clinical standard exists to determine whether patients with borderline dysplasia should undergo hip arthroscopy alone, PAO alone, or a combination of PAO with arthroscopy.

PURPOSE

- To describe new measures of acetabular Wall intersection of Sorcil – Anterior (**WiSA**) and Wall intersection of Sorcil – Posterior (**WiSP**) and:
- Determine whether these measures correlated with surgical management upon retrospective review (i.e., arthroscopy versus PAO) in patients with borderline hip dysplasia.
 - Evaluate patient reported outcome (PRO) scores to determine whether these measures correlated with treatment outcomes.

METHODS

- Retrospective identification of patients with borderline hip dysplasia (LCEA between 18° and 25°) who underwent surgical treatment with hip arthroscopy and/or PAO October 2017 and June 2022.
 - Exclusion criteria: prior ipsilateral hip surgery, diagnosed connective tissue disorder, Legg-Calve-Perthes disease, avascular necrosis, or acetabular rim fractures.
- Measurements of the LCEA, WiSA, WiSP, anterior wall index (AWI), posterior wall index (PWI), and FEAR index were made on preoperative AP pelvis radiograph.^{1,2}
 - Figure 1 demonstrates the WiSA and WiSP radiographic measurements compared to the LCEA.
- Univariate analyses and receiver operating characteristic (ROC) curve models used to determine whether radiographic measurements were predictive of undergoing subsequent PAO.
- Mixed modeling was performed to determine whether radiographic measurements correlated with PRO scores at the 3-month, 6-month, 1-year, and 2-year postoperative intervals.

Table 1. Reliability outcomes for WiSA and WiSP.

Radiographic Parameter	Interobserver Reliability	Intraobserver Reliability
WiSA (degrees)	0.72	0.93
WiSP (degrees)	0.85	0.94

RESULTS

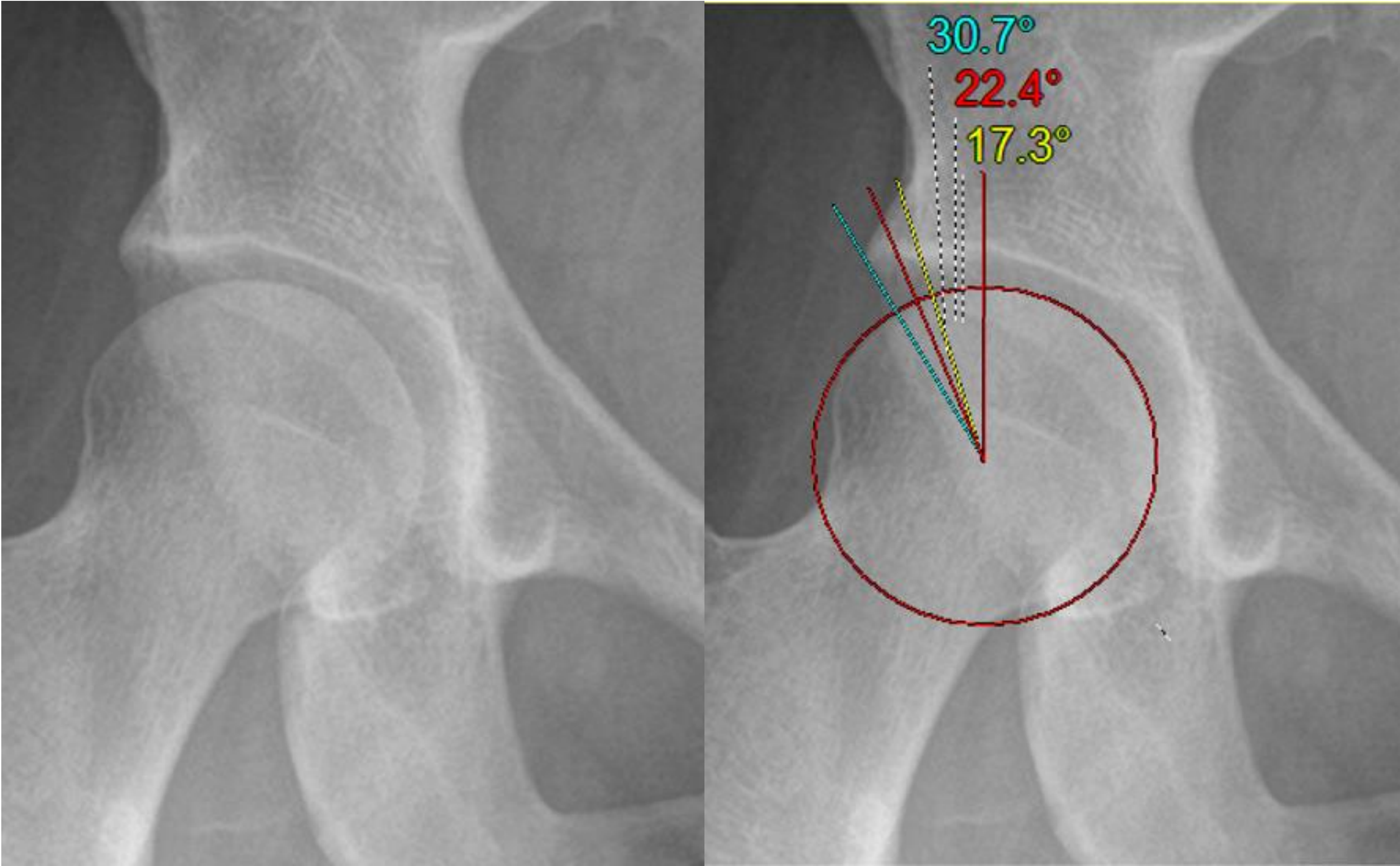


Figure 1. Unmarked AP X-ray image of the right hip on screen left. Demonstration of the LCEA in red (22.4°), WiSA in yellow (17.3°), and WiSP in cyan (30.7°) on screen right.

Radiographic Parameter	Arthroscopy Only (N=241 hips)	PAO + Arthroscopy (N=15 hips)	p value
LCEA (degrees)	24.6 ± 3.2	20.3 ± 2.3	<0.0001*
WiSA (degrees)	23.3 ± 5.1	18.5 ± 3.8	0.0004*
WiSP (degrees)	24.1 ± 5.1	20.7 ± 5.1	0.0131*
AWI	0.4 ± 0.1	0.3 ± 0.1	0.0446*
PWI	1.0 ± 0.2	0.9 ± 0.2	0.3293
FEAR Index (degrees)	-5.2 ± 6.2	-0.7 ± 5.9	0.0069*

Table 2 (above). Radiographic measurements of the treatment cohorts.

Table 3 (below). Univariate analysis of radiographic parameters expressed as odds ratio for PAO indication. LCEA, WiSA, WiSP, and FEAR index were associated with significant changes in the odds of PAO indication. Decreased LCEA, WiSA, and WiSP increased the odds of PAO.

Radiographic Parameter	Odds Ratio Point Estimate	95% Wald Lower Confidence Limit	95% Wald Upper Confidence Limit
LCEA (degrees)	0.65*	0.53	0.79
WiSA (degrees)	0.83*	0.75	0.93
WiSP (degrees)	0.90*	0.82	0.98
FEAR Index (degrees)	1.15*	1.04	1.27

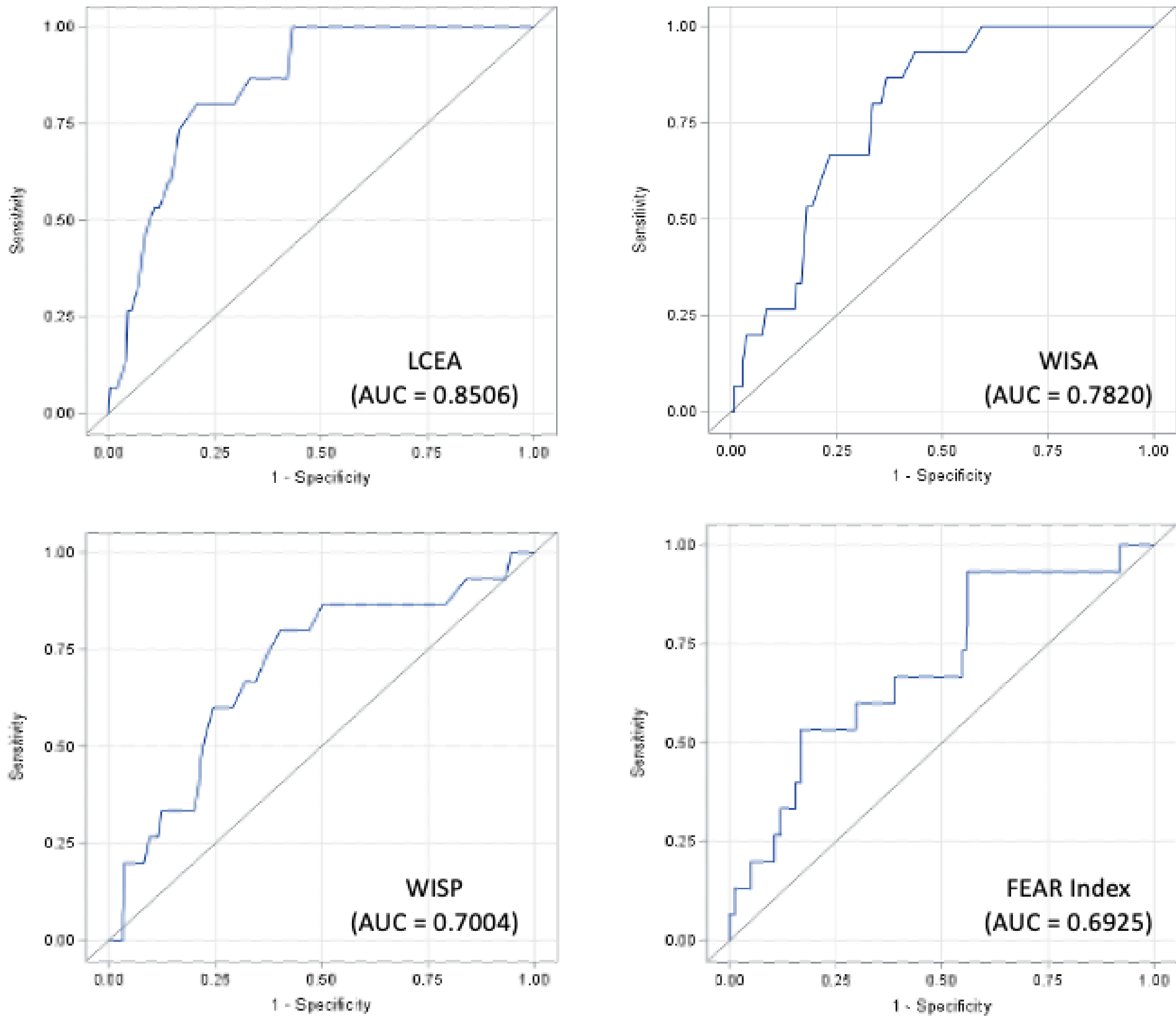


Figure 2. ROC models for LCEA, WiSA, WiSP, and FEAR index.

CONCLUSIONS

- Decreased WiSA and WiSP on pre-operative radiographs were predictive of PAO indication for surgical management of borderline hip dysplasia patients and are novel measurements that may further delineate the gray area of borderline dysplasia.
- WiSA and WiSP did not correlate with PRO scores during the 1-year postoperative period.

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