Increased Risk of Femoral Neck Stress Fractures in Patients with Femoroacetabular Impingement Syndrome

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INTRODUCTION: Previous studies suggest a relationship between femoroacetabular impingement (FAI) and femoral neck stress fractures (FNSF), due to pathologic biomechanics in the setting of femoral head abutment and/or acetabular overcoverage. The purpose of this study is to evaluate the association between FAI and FNSF, compared to a control group of patients without hip pain.

METHODS: A retrospective review of the electronic medical record at a single institution was queried for all patients diagnosed with a FNSF over a 10-year time-period from January 2011 to January 2021. These patients were compared to a control group with appropriate diagnostic radiographs and no hip pain presenting to the institution's emergency department. Bony pathology of FAI was diagnosed on anteroposterior (AP) supine and frog-leg lateral radiographs. A multivariate logistic regression model was used to investigate an association between FNSF and FAI.

RESULTS: Eighty-three patients with FNSF with a mean age 38.6 years were compared to 55 healthy controls with mean age of 35.8 years. Patients in the FNSF group were more often female (84.6% vs. 61.8%, p=0.004), white (66.7% vs. 41.8%, p=0.005), and had a lower average BMI (24.1 vs. 29.2 kg/m2, p<0.001). These patients were also more likely to have associated cam pathology (28.2% vs. 10.9%, p=0.010). Binary logistic regression demonstrated a statistically significant independent association between both cam (OR 5.2, p=0.01) and pincer (OR 4.6, p=0.022) pathology with FNSF, when controlling for female sex, age, race, and BMI. Black race and higher BMI were statistically significant protective factors for FNSF (OR 0.09, p=0.006 and OR 0.84, p=<0.001, respectively).

DISCUSSION AND CONCLUSION: Radiographic cam deformity and superolateral acetabular overcoverage are both independent risk factors for sustaining a FNSF. Additional known risk factors for FNSF supported by this study include female sex and lower BMI, while black race was found to be protective.

Table 1. Baseline characteristics of FNSF and control cohorts

	Controls	FNSF	p value
n	55	78	
Female Gender	61.8%	84.6%	**0.004**
Age (mean, years)	38.6	35.8	0.080
Race			
White	41.8%	66.7%	**0.005**
Black	25.5%	3.8%	**0.001**
Asian	3.6%	6.4%	0.464
Other	23.6%	16.7%	0.334
Unknown	5.5%	6.4%	0.819
BMI (mean, kg/m^2)	29.2	24.1	**<0.001**
Labrum Tear		44.9%	
Right Laterality		55.1%	
Alpha Angle (mean, degrees)	47.8	48.5	0.693
Cam (by angle criteria)	10.9%	28.2%	**0.010**
LCEA (mean, degrees)	36.2	34.8	0.290
Pincer (by angle criteria)	18.2%	24.4%	0.391
Crossover Sign	9.1%	15.4%	0.270
Ischial Spine Sign	25.5%	30.8%	0.504
Deficient posterior wall sign	3.6%	7.7%	0.308
Coxa Profunda	18.2%	19.2%	0.880

Table 2. Multivariate logistic regression model for FNSF and FAI

	Odds Ratio	2.5% CI	97.5% CI	p value
Female Gender	3.99	1.37	11.56	**0.011**
Age (continuous, years)	1.00	0.95	1.05	0.994
BMI (continuous, kg/m^2)	0.84	0.76	0.92	**<0.001**
Race				
White	Ref.			
Black	0.09	0.02	0.50	**0.006**
Asian	1.09	0.18	6.58	0.928
Other	0.55	0.18	1.67	0.294
Unknown	0.50	0.09	2.64	0.413
Pincer	4.57	1.25	16.72	**0.022**
Cam	5.20	1.50	18.07	**0.010**

CI, confidence interval