Risk Factors Portending a Total Hip Arthroplasty for Patients who have Osteonecrosis of the Femoral Head

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INTRODUCTION:
Osteonecrosis of the femoral head (ONFH) poses a substantial burden to orthopaedic surgeons. Progression to advanced joint collapse often requires definitive treatment with total hip arthroplasty (THA). Associated risk factors for the development of non-traumatic ONFH primarily ultimately lead to vascular disruption to the femoral head. However, the degree of risk attributed by specific patient factors who end up receiving a THA are not well-known. Therefore, the purpose of this study was to examine the risk factors for a cohort of patients who had THA after non-traumatic ONFH in comparison to a cohort with non-traumatic ONFH but did not require THA. We assessed various metrics including: 1) patient demographics (age and sex); 2) blood cell dyscrasias (sickle-cell disease and hypercoagulable states); and 3) substance use (oral corticosteroid use, tobacco use, and alcohol abuse).
METHODS:
A retrospective search examined all patients who had a primary THA (n = 715,100) between January 1, 2010 and April 30, 2020 using a national, all-payer database. Patients who had a preoperative diagnosis of non-traumatic ONFH were identified (n = 13,557) using International Classification of Diseases (ICD) codes as well as patients who had a diagnosis of non-traumatic ONFH but did not require THA (n=619). Risk factors studied for non-traumatic ONFH requiring THA included age, sex, sickle-cell, hypercoagulable state, oral corticosteroid use, tobacco use, and alcohol abuse. These were analyzed using a multivariable binomial regression model.
RESULTS:
Several risk factors were found to be significantly predictive for ONFH requiring THA: age $\leq$ 55 years (odds ratio (OR) 1.02, 95% confidence interval (CI) of 1.01 to 1.02, $p < 0.001$), male sex (OR 1.07, 95% CI of 1.04 to 1.10, $p < 0.001$), oral corticosteroid use (OR 1.21, 95% CI of 1.17 to 1.25, $p < 0.001$), tobacco use (OR 1.15, 95% CI of 1.11 to 1.18, $p < 0.001$), and alcohol abuse (OR 1.05, 95% CI of 1.01 to 1.08, $p = 0.009$).
DISCUSSION AND CONCLUSION:
Management of ONFH continues to challenge orthopaedic surgeons. Based on the results of this study, young age, male sex, oral corticosteroid use, tobacco use, and alcohol abuse are risk factors for patients who have ONFH and had a THA. The degree of risk from greatest to least were: oral corticosteroid use, tobacco use, male sex, alcohol abuse, and age $\leq$ 55 years old. These risk factors should be considered when counseling patients who have ONFH regarding their potential need for THA.

Table 1: Multivariable regression model evaluating risk factors for non-traumatic osteonecrosis of the femoral head requiring total hip arthroplasty

Variables	Odds ratio	95% CI	p value
Male sex	1.07	(1.04-1.10)	<0.001
Age $\leq$ 55 years	1.01	(1.01-1.02)	<0.001
Age $\geq$ 75 years	0.97	(0.88-1.07)	0.547
Sickle-cell	0.40	(0.37-0.43)	<0.001
Hypercoagulable state	0.82	(0.77-0.88)	<0.001
Oral corticosteroid use	1.20	(1.17-1.25)	<0.001
Tobacco use	1.15	(1.11-1.18)	<0.001
Alcohol abuse	1.05	(1.01-1.08)	<0.001

CI, Confidence interval