

Early Greater Trochanteric Avulsion Fracture as a Complication of Posterior Approach Primary Total Hip Arthroplasty

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INTRODUCTION: Perioperative greater trochanteric (GT) fracture after primary total hip arthroplasty (THA) is a devastating complication that can lead to gait issues and postoperative pain. Despite the importance of protecting the GT during THA, transosseous drill holes are often required to facilitate the repair of the capsule and external rotators in posterior approach THA. Furthermore, computer-assisted surgery often requires temporary implantation of pins or metallic checkpoints into the GT bone. The resulting cortical defects have the potential to create stress risers that can predispose to postoperative GT avulsion fractures, however, there are limited reports of this injury in the current literature. The purpose of this study is to examine the rate of GT avulsion fractures after posterior approach THA and identify associated patient- or surgery-related factors to better understand the mechanism behind this low-energy complication.

METHODS: This is a retrospective review of patients who underwent a posterior approach primary THA between Jan 2016 to Dec 2022 and subsequently presented to our institution with a GT avulsion fracture. Patient demographics, procedure details, implanted components, surgical technique, and postoperative fracture radiographs were reviewed. Descriptive statistics were calculated for all variables.

RESULTS SECTION: There were 39 GT avulsion fractures out of 18, 873 posterior approach THAs. Patient demographics and procedure details are displayed in Table 1. 38/39 (97%) GT avulsions occurred in females, with a mean age of 73 ± 8.8 years and a mean BMI of 26 ± 5.2 . All avulsion fractures were atraumatic and occurred early (<60 days) at an average of 27 days (range 1 – 53) during normal weight-bearing activities or routine physical therapy exercises. The majority (59%) of the patients that acquired avulsion fractures had low bone density; 13/39 had a diagnosis of osteoporosis and 10/39 had osteopenia. 90% of the avulsion fractures occurred in cases where 2 drill holes were used for posterior capsular repair. Computer-navigation and/or robotic assistance was used in 24/39 (62%) of cases. Regarding stem design, 23/39 (59%) used a fit-and-fill stem, and the remaining 16 used a blade stem. Offset and leg length were increased by an average of 5.4mm and 4.5mm, respectively.

DISCUSSION: Atraumatic greater trochanteric avulsion fractures after posterior approach THA may be associated with multiple factors, such as female gender, low bone density, increased femoral offset and leg length, and technique used for posterior soft tissue repair. Minimizing the creation of stress risers in the greater trochanter may reduce the risk of postoperative avulsion fracture.

SIGNIFICANCE/CLINICAL RELEVANCE: The use of THA continues to rise and with that a better understanding of risks prior to surgery is important for the patient and the surgeon. This data provides an update to potential risks for a specific type of fracture after a posterior approach THA depending on patient factors.

IMAGES AND TABLES:

Table 1. Patient demographics and procedure details

	Value	%
Demographics		
Age	73 ± 8.8	
Male	1	3
Female	38	97
BMI	26 ± 5.2	
Procedure Details		
Laterality		
Left	15	38
Right	24	62
Computer Navigation	24	62
Robotic assistance	12	31
Number of drill holes		
1	4	10
≥ 2	35	90



Figure 1. Example radiograph demonstrating a greater trochanteric avulsion fracture after posterior approach THA with a fit-and-fill stem design.