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Case Report

Laceration of the Sciatic Nerve After Closed Reduction of a Dislocated Total Hip Arthroplasty

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ABSTRACT

Sciatic nerve injury after closed reduction of a dislocated total hip arthroplasty (THA) is an exceedingly rare but tremendously devastating complication. Closed reduction is the standard of care and is typically associated with a low complication rate. There have only been seven sciatic nerve injuries after closed reduction of a dislocated THA reported in the literature, and none were secondary to nerve laceration. We report a case of sciatic nerve laceration after attempted closed reduction of a dislocated THA. This resulted in complete loss of sensory and motor sciatic nerve function. This case highlights the importance of a detailed neurologic examination before and after closed reduction of a dislocated total hip, the importance of using careful reduction maneuvers, and transitioning to open reduction when necessary.

Introduction

Dislocation after total hip arthroplasty (THA) is a recognized complication that occurs between 1% and 3.2% of the time in primary procedures and up to 7.4% in the revision setting [1–5]. Literature has shown that the prevalence of sciatic nerve injury after a dislocated THA is exceedingly rare, occurring in <0.1% of cases, and new-onset sciatic nerve injury after reduction is even more rare [4,6–8]. The standard of care in dislocated THA is closed reduction with proper muscular relaxation, a reduction maneuver dictated by the direction of dislocation, postreduction radiographs, and detailed prereduction and postreduction neurovascular examinations [9]. Complications related to reduction include recurrent dislocation, intraprosthetic dislocation, periprosthetic fracture, failed reduction, and rarely nerve palsy [2,10].

There have been seven case reports published in the literature of a sciatic nerve injury after closed reduction of a dislocated THA (Table 1). Six of these were secondary to entrapment of the sciatic nerve around the prosthetic femoral neck, and 1 was secondary to a traction injury [1,6,11–14]. To our knowledge, this is the first reported case in the literature of a lacerated sciatic nerve following an attempted closed reduction of a dislocated THA. The patient's legally authorized representative provided written consent to document the lacerated sciatic nerve in this case report.

Case history

A 75-year-old female with a past medical history of dementia and left THA presented to an outside hospital with left hip pain and inability to ambulate after leaning over in her chair. Her primary left THA was performed 5 years prior through a posterior approach. The indication for her THA was osteoarthritis, and she was free of complication or dislocation for 2 years postoperatively. Preoperative and 6-month postoperative radiographs can be seen in Figures 1-3. After 2 years, her postoperative course was complicated by three dislocations, with her most recent dislocation happening 3 years prior to presentation. Her recurrent instability appeared to stem from spinopelvic immobility when going from a standing to a seated position. Sitting and standing lateral lumbar radiographs (Figs. 4 and 5) obtained prior to this presentation revealed less than 5 degrees of pelvic accommodation despite appropriate cup inclination of 44 degrees (Fig. 2) and appropriate anteversion of 23.8 degrees (Fig. 3). Radiographs at the time of presentation revealed a posterosuperior prosthetic hip dislocation. On examination, her left leg was noted to be internally rotated and shortened. She had left

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Table 1
Cases of reported sciatic nerve palsy after closed reduction of a dislocated total hip arthroplasty.

Author	Year	Mechanism of Sciatic Nerve Injury	Primary vs Revision	Approach
Lazansky	1973	Not mentioned	Not mentioned	Not mentioned
Stockley and Bickerstaff	1988	Wrapped anteriorly around femoral neck	Revision for aseptic loosening	Trochanteric Osteotomy
Leversedge et al.	2002	Wrapped anteriorly around femoral neck	Primary	Posterior
Chan et al.	2011	Wrapped anteriorly around femoral neck	Revision for aseptic loosening	Trochanteric Osteotomy
Haque et al.	2013	Wrapped anteriorly around femoral neck	Not mentioned	Not mentioned
Ng et al.	2016	Traction Injury	Primary w/ prior dislocation	Hardinge
Maeder et al.	2019	Wrapped anteriorly around femoral neck	Revision for instability	Posterior
Jolissaint et al.[a]	2022	Sciatic Nerve laceration	Primary w/ prior dislocation	Posterior

[a] Current study.

hip pain, and a detailed neurovascular examination did not demonstrate any deficits. Closed reduction was attempted under general anesthesia and was noted to be extremely difficult even with the use of a paralytic agent. Techniques included axial traction with 90 degrees of flexion, internal rotation, and adduction as well as flexion and axial traction with alternating external rotation and internal rotation. Radiographs throughout the attempted closed reduction corroborate the difficult nature of the reduction and show the multiplanar instability of the hip as it moves posterior-superior (Fig. 5), anterior-inferior-medial (Fig. 6), and anterior-lateral (Fig. 7) in relation to the cup on subsequent attempts. The hip was not able to be closed reduced despite these numerous attempts, and a decision was made to conclude the procedure and coordinate transfer to our tertiary referral center for further management.

Immediately after these multiple failed attempts, she was noted to have a dense sciatic nerve motor injury without any motor function below the knee and decreased sensation and paresthesia in the peroneal and tibial nerve distributions. Additionally, she had a severe reaction to anesthesia with florid acute pulmonary edema and Takotsubo cardiomyopathy which required an intensive care unit admission and prevented transfer to our referral center for 3 days.

On postoperative day three after failed reduction, the patient was transferred to our tertiary referral center where closed reduction was successfully performed with a specialized traction table (Hana; Mizuho OSI, Union City, CA). The hip was noted to be inferior and medial to the cup and was reduced with axial traction, internal and external rotation, and leg adduction. Once the femoral head was centered over the cup, traction was released, and the hip reduced. Notably, after successful closed reduction on the Hana table, radiographs identified a bone fragment appearing to arise from the ischium on the medial aspect of the acetabulum which was not appreciated previously (Figs. 8 and 9). At this time, nerve exploration was considered, but the patient's tenuous medical condition prevented this option. Unfortunately, her sciatic nerve did not immediately recover after this successful attempt, and she was discharged home with an ankle foot orthosis.

The patient's course was further complicated by recurrent dislocation 3 weeks later after bending over to play with her grandchildren. Given her persistent instability, the difficulty of prior closed reduction attempts, and her ongoing sciatic nerve injury, she was indicated for revision and sciatic nerve exploration. The operation was performed through an extensile posterior approach. Intraoperatively, the patient's sciatic nerve was explored and was found to have a laceration of 60% of its entire width. The nerve was traced proximally and distally, and neurolysis was performed. She was revised from a ceramic-on-polyethylene articulation to a dual-mobility liner with retention of the primary cup and with 7 mm of added head length (Figs. 10 and 11). The implanted device was a 22 + 7-mm inner-diameter ball with a 41-mm polyethylene sphere. Given the patient's tenuous medical history including recent florid pulmonary edema and Takotsubo cardiomyopathy requiring an intensive care unit stay and the increased duration of anesthesia and open surgery required to reduce the hip, the decision was made to conclude her surgery rather than obtain an intraoperative consult by a nerve repair specialist. A peripheral nerve consult was obtained postoperatively, and due to the patient's significant medical history, the level of the injury, and the exceedingly low likelihood of successful muscle reinnervation prior to muscle death, the decision was made to forgo any attempts at sciatic nerve repair. Postoperatively, sensation continued to be

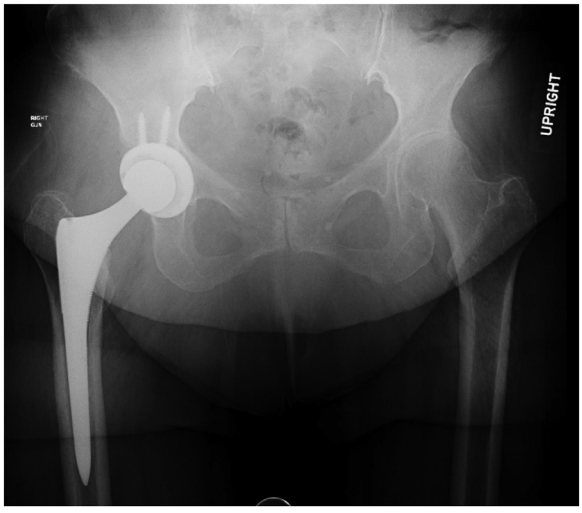

Figure 1. Preoperative anteroposterior (AP) radiograph of the pelvis revealing end-stage osteoarthritis of the left hip.

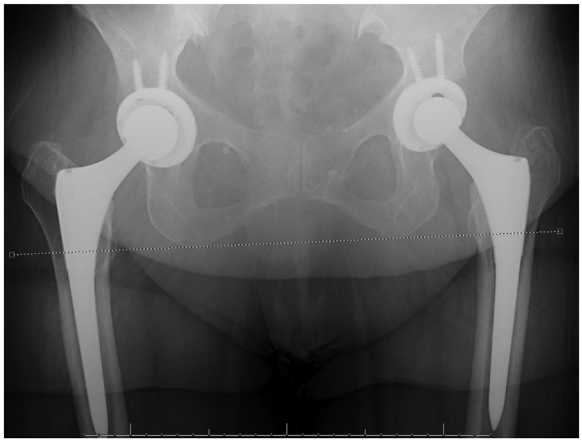

Figure 2. Six-month postoperative AP radiograph of the pelvis revealing appropriate recreation of leg lengths.

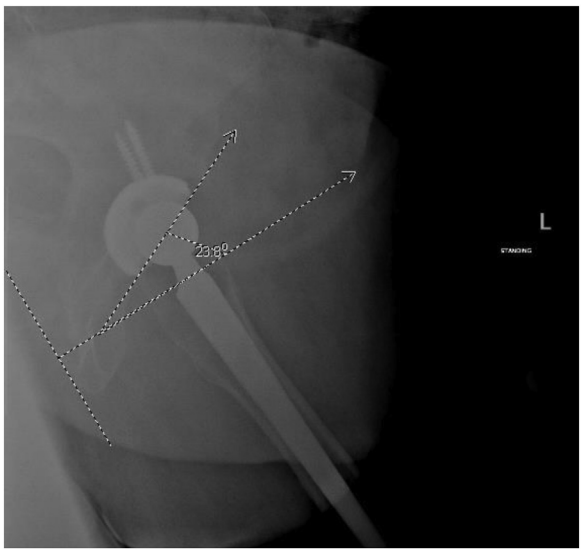

Figure 3. Six-month postoperative AP radiograph of the pelvis revealing appropriate cup anteversion of 23.8 degrees.

diminished and abnormal in the sciatic nerve distribution, and she continued to have 0/5 motor function in the sciatic nerve distribution. She had 1 dislocation event 2 weeks postoperatively from her revision due to inability to maintain posterior hip precautions combined with spinopelvic immobility. Six months postoperatively, she has remained stable with no further dislocation events. She is ambulating with a walker and a slap foot/steppage gait and has no pain. She continues to have 0/5 motor function in all muscle groups innervated by the sciatic nerve, with extremely diminished sensation. She has discontinued the use of an ankle foot orthosis secondary to a heel ulcer that likely developed secondary to her nerve injury and subsequent neuropathy.

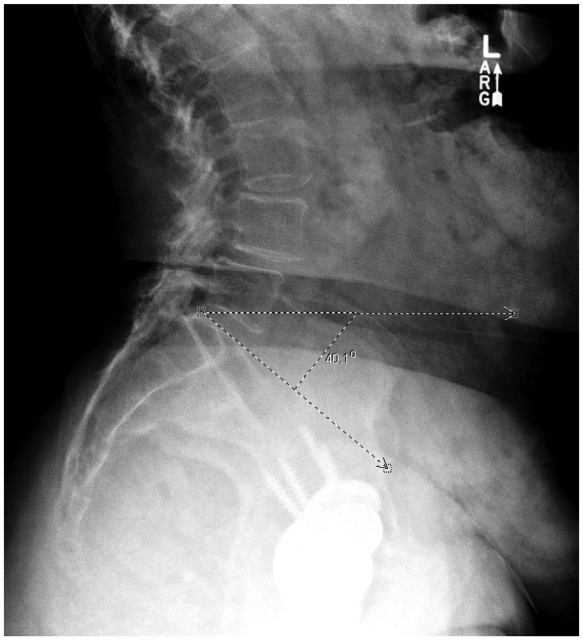

Figure 4. Postoperative standing lateral radiographs of the pelvis revealing a sacral slope of 40.1 degrees.

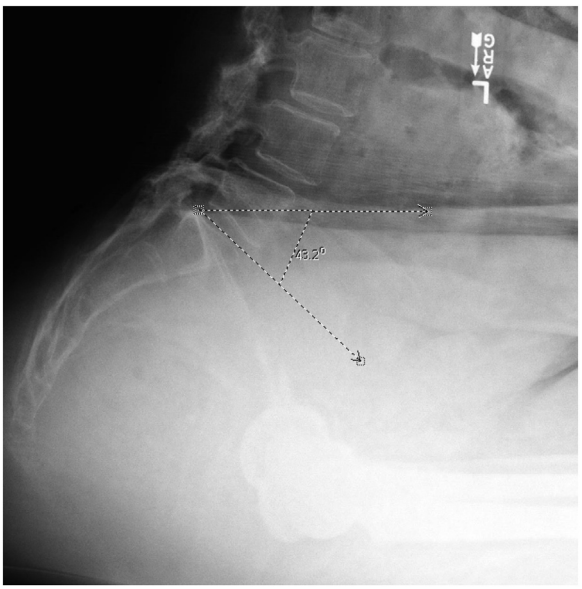

Figure 5. Postoperative sitting lateral radiographs of the pelvis revealing a sacral slope of 43.2 degrees demonstrating spinopelvic immobility.

Discussion

Sciatic nerve injuries are a known complication of hip fracture-dislocations and occur at a rate of 0.7% to 3.7% [15–17]. The prevalence of a sciatic nerve injury after a dislocated THA, however, is exceedingly rare, occurring in <0.1% of cases, and new-onset sciatic nerve injury after reduction is even more rare [4,6–8]. There are only seven case reports in the literature of sciatic nerve injury after reduction of a THA, and these are listed in Table 1. Of the cases, all but 1 were secondary to entwinement or entrapment of the sciatic nerve around the femoral neck, and no cases were secondary to nerve laceration. Stockley and Bickerstaff, Leversedge et al., Chan

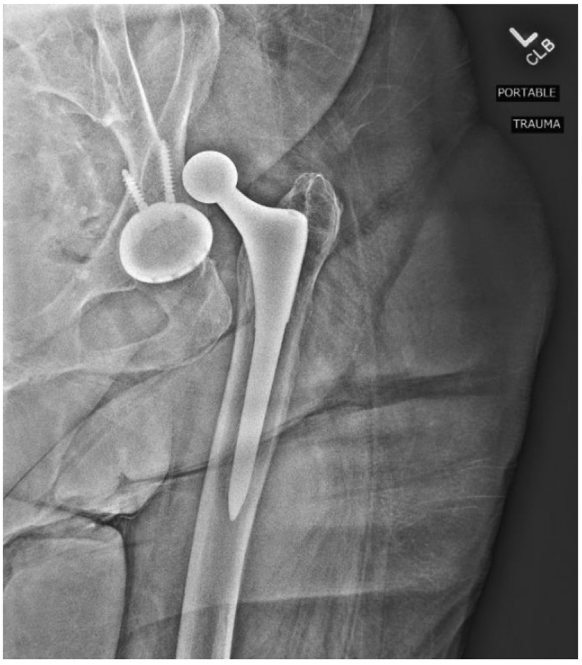

Figure 6. AP radiograph of the left hip revealing a left prosthetic hip posterior-superior dislocation.

Figure 7. AP radiograph of the left hip revealing a left prosthetic hip anterior-inferior-medial dislocation.

et al., Haque and Sundararajan, and Maeder et al. all described a sciatic nerve palsy after the nerve was entangled around the femoral prosthesis [1,11–13,18]. Of these 6 cases, only 1 had recovery of nerve function. Lazansky and Maeder et al. describe unknown or traction injuries, respectively, and patients in neither of these studies regained nerve function [6,18]. The patient reported here with a partial nerve laceration did not recover any sciatic nerve function. Overall, of the 8 reported cases known in the literature, only 1 patient had recovery of nerve function [1,6,11–14,18].

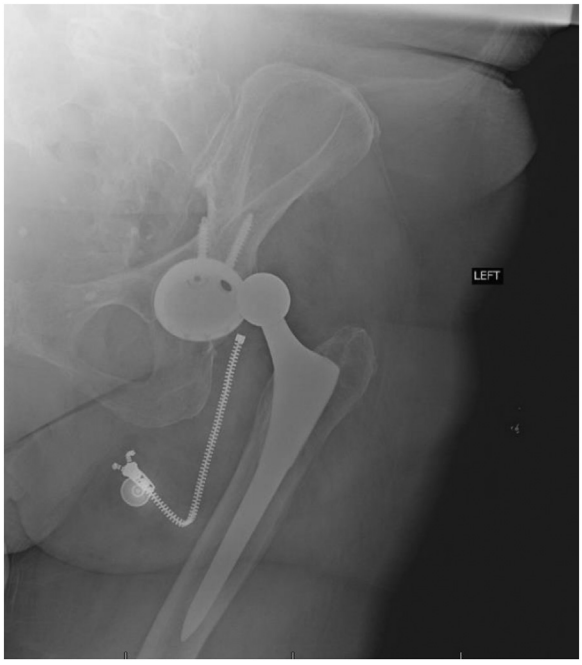

Figure 8. AP radiograph of the left hip revealing a left prosthetic hip anterior-lateral dislocation.

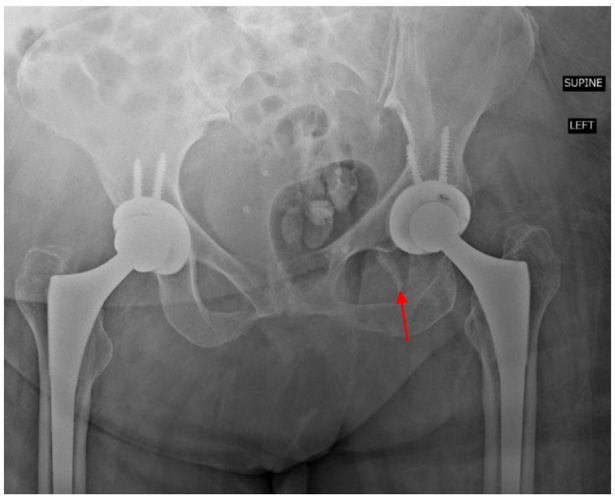

Figure 9. AP radiograph of the pelvis revealing a bony fragment arising from the left ischium (see arrow).

Based on the reported literature, sciatic nerve injury and entrapment appear to be at higher risk with closed reduction of a dislocated THA that has undergone a prior revision surgery or has a history of instability compared to primary THA. Six of the eight reported cases of sciatic nerve injury after reduction of a dislocated THA have a detailed revision and instability history. Of the six cases with a detailed history, five had a prior history of either revision or prior instability [1,11–13,18]. The higher rate of dislocation in revision THA and recurrent instability may explain the higher risk of nerve injury and entrapment around the femoral neck, as the recurrent dislocations may alter the soft tissue in such a way that puts the sciatic nerve at risk. In our case, the dislocated THA was noted to have three dislocation events prior to presentation, and the initial reduction was multiply-attempted and ultimately unsuccessful. Radiographs during the multiply-attempted reduction show the dislocation in virtually all locations with respect to the cup; anterior, posterior, superior, and inferior. We assume the repetitive reduction maneuvers caused the sciatic nerve to become entrapped during the reduction between the acetabular cup and the femoral head or lacerated on the edge of the cup during medial displacement

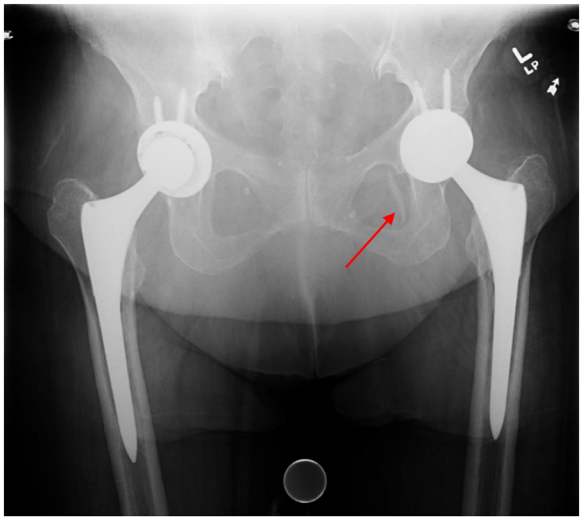

Figure 10. Postrevision AP radiograph of the pelvis revealing a bony fragment arising from the left ischium (see arrow).

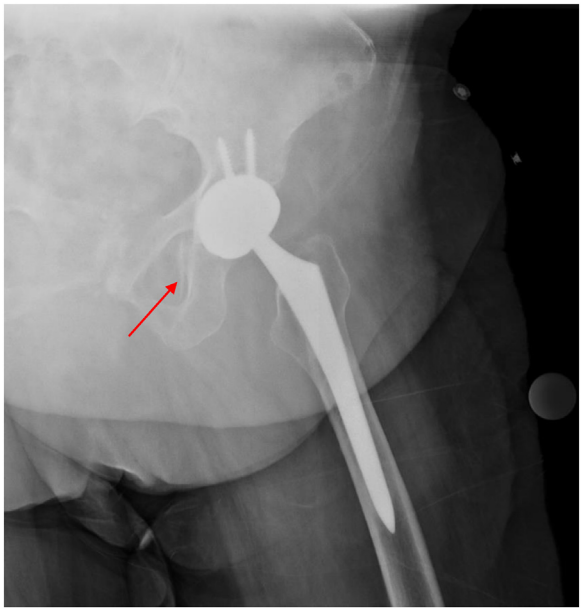

Figure 11. Lateral radiograph of the pelvis revealing a bony fragment arising from the left ischium.

of the head during reduction (Fig. 7). A forceful reduction maneuver while the sciatic nerve was at risk likely caused a direct laceration or avulsion injury and subsequent permanent neurologic deficit.

While closed reduction of a dislocated THA is the standard of care, 3% to 6% of dislocations are not reducible with closed reduction maneuvers, and in those scenarios, open reduction is recommended [3,9,19,20]. In that setting, consideration of a revision surgery should also be discussed prior to open reduction [9]. Given the previous literature, as well as this case report, a nonreducible or difficult reduction of a dislocated THA could lead to sciatic nerve impingement and the potential for significant sciatic nerve injury. The patient and/or family should be made aware of this potential complication during the consent process. Vigilance should be maintained, and a detailed and focused neurologic examination should be performed before and after every reduction attempt. Repeated attempts to reduce a dislocated THA may come with an increased risk of complications, and as such, a transition to open reduction is recommended [9]. If a patient develops a sciatic nerve palsy after attempted closed reduction of a prosthetic dislocation, recovery is not predictable, and full recovery is unlikely. Given the morbidity of a permanent sciatic nerve injury in an otherwise healthy patient, we would recommend nerve exploration along with consultation of a nerve repair specialist should this complication occur after closed reduction.

Summary

Sciatic nerve injuries after dislocation of a THA are exceedingly rare, and injuries after reduction have only been reported seven times in the English literature. To our knowledge, this is the only reported case of a patient with a dislocated THA who sustained a sciatic nerve laceration and permanent deficit after attempted closed reduction. Repeated attempts to reduce a dislocated THA comes with an increased risk of injury and complications, and in the setting of a difficult reduction, we recommend early transition to an open reduction. Should a sciatic nerve deficit occur after reduction in a patient with normal nerve function preoperatively, nerve exploration should be considered.

Conflicts of interest

Dr. T. K. Fehring receives royalties from, is in the speakers' bureau of or gave paid presentations for, is a paid consultant for, and receives research support as a principal investigator from DePuy, a Johnson & Johnson company. All other authors declare no potential conflicts of interest.

For full disclosure statements refer to https://doi.org/10.1016/j.artd.2023.101104.

Informed patient consent

The author(s) confirm that written informed consent has been obtained from the involved patient(s) or if appropriate from the parent, guardian, power of attorney of the involved patient(s); and, they have given approval for this information to be published in this case report (series).

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