



## Case Report

# Delayed Femoral Nerve Palsy Due to Femoral Artery Pseudo-Aneurysm After a Total Hip Replacement Through an Anterolateral Approach

Odysseas Paxinos, MD, MSc, PhD, FACS<sup>a, \*</sup>, Ioannis Bountouris, MD, MSc<sup>b</sup>,  
Panagiotis Grigoropoulos, MD<sup>a</sup>, Nikolaos Kouris, MD<sup>c</sup>, Konstantinos Lagios, MD, MSc<sup>d</sup>

<sup>a</sup> Department of Orthopaedic Surgery, 251 Hellenic Air Force General Hospital, Athens, Greece

<sup>b</sup> Department of Vascular Surgery, 251 Hellenic Air Force General Hospital, Athens, Greece

<sup>c</sup> Department of Anesthesiology, 251 Hellenic Air Force General Hospital, Athens, Greece

<sup>d</sup> Interventional Radiology and Neuroradiology Department, 251 Hellenic Air Force General Hospital, Athens, Greece

## ARTICLE INFO

## Article history:

Received 13 February 2024

Received in revised form

14 May 2024

Accepted 19 May 2024

## Keywords:

Hip arthroplasty

Complication

Pseudo-aneurysm

Femoral nerve palsy

## ABSTRACT

We present a rare case of delayed femoral nerve palsy resulting from a pseudo-aneurysm presenting as excruciating anterior thigh pain 2 months after an uneventful total hip arthroplasty through a Watson Jones approach. The large pseudo-aneurysm of the posterior wall of the femoral artery was treated with open exploration and artery repair since the anatomy of the lesion precluded an embolization. Although pain resolved immediately, the recovery of the femoral nerve started after 3 months, while full quadriceps function was restored by the 6th month. Positioning a Hohmann retractor along the inferior part of the anterior acetabulum rim may place the femoral artery branches under significant stretch. Preserving the capsule and keeping the retractor tension as low as possible may avoid this complication.

© 2024 The Authors. Published by Elsevier Inc. on behalf of The American Association of Hip and Knee Surgeons. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

The incidence of femoral nerve palsy following an anterolateral approach for total hip arthroplasty is very low (0.39%-0.64%) [1]. Femoral nerve injury as a result of an enlarging femoral pseudo-aneurysm after hip arthroplasty is extremely rare. There are only 3 reports in the literature of patients who presented weeks or months after a successful hip replacement surgery with femoral nerve paralysis from a slowly enlarging pseudo-aneurysm [2-4]. In this case report, we present a middle-aged patient with a delayed femoral nerve palsy due to a slowly enlarging pseudo-aneurysm of the femoral artery treated with open repair with a good final outcome. The study has been approved by the 251 Hellenic Air Force Hospital Ethical and Research Committee of the Research Department after written informed consent from the patient.

## Case history

A 56-year-old male presented with severe hip pain and functional loss as a result of end-stage osteoarthritis of his right hip (Fig. 1). The patient was offered a noncemented total hip arthroplasty through a minimally invasive Watson-Jones approach. After written informed consent was obtained, the patient was operated on under general anesthesia in the supine position on a regular table. An 8-cm oblique incision was made, and the plane between the tensor fasciae latae and gluteus medius muscles was developed, exposing the capsule. The lateral circumflex vessels were identified and ligated. An inverted T-shaped capsulotomy was performed, and the flaps were preserved for later closure. A femoral neck osteotomy was then performed, and the head was removed, exposing the acetabulum by distracting the capsule flaps with 2 Gelpi retractors. Under fluoroscopic control, the acetabulum was reamed to allow for a 58-mm press-fit cup. A large osteophyte that was protruding over 2 cm over the cup rim at the medial-lower part of the acetabulum was evaluated and considered to be at high risk for femoral neck impingement and subsequent dislocation risk. A Hohmann retractor was inserted in the inferior part of the anterior

\* Corresponding author. Director Orthopaedic Department, Henry Dunant Hospital Center, 107 Mesogeion Ave, 115 26, Athens, Greece.

E-mail address: [odypax@yahoo.com](mailto:odypax@yahoo.com)



**Figure 1.** X-ray of hips showing end-stage osteoarthritis of the right hip.

acetabulum rim under the capsule to allow visualization and removal. The osteophyte was removed in 1 piece (Fig. 2). The operation then proceeded with hip capsule releases around the neck saddle toward the medial aspect of the greater trochanter to allow for femur mobilization and canal reaming. The nonoperated leg was placed on a padded mayo stand and the operative leg was extended 30 degrees and placed in a figure of 4 position under the other (external rotation and adduction). A straight stem was inserted, and the hip was reduced with a 36-mm ceramic head on an ultra-high-molecular-weight polyethylene liner. The wound was closed with absorbable sutures over a drain. The operative time was 70 minutes, and blood loss was approximately 200 cc. The patient was mobilized the next day on crutches without pain or limp. Drain blood loss was 150 cc. The patient was discharged the 2nd post-operative day with normal vital signs and a hemoglobin of 13.5 mg % with instructions to walk as tolerated under low molecular weight heparin thrombo-prophylaxis. Three weeks after the



**Figure 2.** Picture of the large medial osteophyte that was removed en block with an osteotome after drilling guiding holes.

operation, the patient was symptom-free and had resumed all activities of daily living including driving to his work. On the second follow-up at 6 weeks, the patient was very happy with his surgery, and an X-ray confirmed good position and stability of the implants (Fig. 3).

Nine weeks postsurgery, the patient presented to the emergency department complaining of sudden excruciating pain radiating to the anterior part of his right thigh. The patient was in obvious agony with weak quadriceps function (M2 on the Medical Research Council [MRC] Manual Muscle Testing scale), but clinical evaluation was limited by pain. Although the clinical picture was suggestive of an acute L3-L4 radiculopathy, an urgent magnetic resonance imaging of his spine was negative for spinal canal or nerve root impingement. Attention was then focused on the femoral nerve. An ultrasound scan confirmed the presence of a pulsating pseudo-aneurysm near the femoral artery, and the patient underwent an emergency angiography in order to investigate the origin of the hemorrhage. Digital subtraction angiography performed through a left femoral artery puncture revealed a large right common femoral artery pseudo-aneurysm originating from the posterior wall requiring open repair (Fig. 4).

After informed consent, the patient underwent an exploration and repair of the right femoral artery by an anterior approach. The defect of the posterior wall of the common femoral artery was sutured, and the aneurysm sac was evacuated from blood and thrombi (Fig. 5). The patient recovered uneventfully and was mobilized the 3rd day after the vascular repair, but the femoral nerve had a complete palsy with loss of quadriceps function (M0 on the MRC scale). The knee was braced in extension, and it was referred for physiotherapy with instructions to walk full-weight bearing with crutches. The femoral nerve recovered partial function (M3 on the MRC scale) after 3 months, while complete recovery (M5) was noted 6 months after the vascular repair. At 12 months follow-up from the hip arthroplasty, the patient is fully active without any symptoms, happy with his final result, and has consented to have his case published to improve medical awareness of this rare complication.

## Discussion

Vascular injuries after total hip arthroplasty are rare. Reported incidence varies between 0.2% and 0.67% [5,6]. Almost 50 years ago, Nachbur et al. [7] described 4 possible vascular injury mechanisms: perforation by a Hohmann retractor, thrombosis by overextension of an atherosclerotic area, thrombosis by excessive heat during cement polymerization, and laceration of a major artery during revision total hip arthroplasty.

Nerve injuries after hip arthroplasty are relatively rare (0.39%–2.8%) and have been reported to involve various nerves during all types of hip approaches [1,8]. In 55% of the cases, the injury mechanism to the nerve could not be detected. Although most femoral nerve injuries recover fully over time, injuries to the sciatic or peroneal nerve tend to have poor outcomes [1,2,8–11].

Placement of a Hohmann retractor in the anterior rim of the acetabulum has been shown by an anatomical study to increase the risk for neurovascular injury in a relatively safer zone, the superior (12 o'clock) position [12].

In our patient, the femoral nerve was compressed by a delayed pseudo-aneurysm of the common femoral artery, and symptoms presented as increasing anterior thigh pain 2 months after the index operation while the patient was already fully functional. The mechanism of injury during the arthroplasty could not be identified since no active hemorrhage was noted at any point and total blood loss during surgery was minimal. A possible explanation may be the indirect avulsion of a posterior branch from the main femoral artery



**Figure 3.** Postoperative X-ray of the right hip with the implants in proper position and no periprosthetic fracture.

trunk by stretching from the Hohmann retractor placed in the inferior part of the anterior acetabulum rim. The distance anterior to the medial acetabulum wall and femoral neurovascular structures has been shown to be significantly shorter in osteoarthritis [13], and this may increase the risk of injury when a Hohmann retractor is inserted in the inferior part of the anterior acetabulum rim [12]. In our patient, the insertion of a Hohmann retractor to facilitate the removal of the large inferior-medial osteophyte may



**Figure 4.** Angiography of the right femoral artery with an attached large pseudo-aneurysm sac over the hip arthroplasty area.



**Figure 5.** Intraoperative picture of the femoral artery with the right forceps pointing the defect on the posterior artery wall and the left forceps pointing toward the corresponding entrance to the pseudo-aneurysm sac.

have contributed to vascular stretching, creating a valve-like lesion of the posterior wall of the femoral artery that started leaking only when the patient was fully mobilized in accordance with the mechanism suggested by Ratliff [14].

Although several authors were able to control the hemorrhage by endovascular techniques [15-20], open repair was still a preferred option [2,3,16,21]. In our patient, the absence of a discrete vascular stem did not allow for coil embolization, while the young age, the location of the lesion near the mobile hip joint, and the large extent of the aneurysm sac excluded the use of an endovascular covered stent.

Clinicians should have a high level of suspicion when evaluating a patient presenting with anterior thigh pain after a recent total hip arthroplasty with an anterior or anterolateral approach in order to prevent a delayed femoral nerve palsy. Clinical examination should be supplemented by an ultrasound examination of the groin area. In the case of a pseudo-aneurysm, the patient must be further evaluated with angiography, and if possible, the leaking vessel must be treated endovascularly.

**Summary**

Delayed femoral nerve palsy presenting as anterior thigh pain as a result of a slowly enlarging pseudo-aneurysm is a rare complication of total hip replacement through an anterolateral approach. Clinicians should have a great level of suspicion when patients present with uncommon symptoms after a hip arthroplasty.

**Conflicts of interest**

The authors declare there are no conflicts of interest. For full disclosure statements refer to <https://doi.org/10.1016/j.artd.2024.101445>.

## Informed patient consent

The authors 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).

## CRedit authorship contribution statement

**Odysseas Paxinos:** Writing – original draft, Supervision, Methodology, Conceptualization. **Ioannis Bountouris:** Writing – review & editing, Supervision. **Panagiotis Grigoropoulos:** Writing – review & editing. **Nikolaos Kouris:** Resources. **Konstantinos Lagios:** Resources.

## References

- [1] Shoenfeld NA, Stuchin SA, Pearl R, Haveson S. The management of vascular injuries associated with total hip arthroplasty. *J Vasc Surg* 1990;11:549–55.
- [2] Slullitel PA, Llano L, García-Ávila C, et al. Unaddressed arterial injuries in revision total hip arthroplasty: mortality outcomes of a low-prevalence complication. *Int Orthop* 2020;44:23–9. <https://doi.org/10.1007/s00264-019-04358-2>.
- [3] Nachbar B, Meyer RP, Verkkala K, Zürcher R. The mechanisms of severe arterial injury in surgery of the hip joint. *Clin Orthop Relat Res* 1979;122–33.
- [4] Fleischman AN, Rothman RH, Parvizi J. Femoral nerve palsy following total hip arthroplasty: incidence and course of recovery. *J Arthroplasty* 2018;33:1194–9. <https://doi.org/10.1016/j.arth.2017.10.050>.
- [5] Hoshino C, Koga D, Koyano G, et al. Femoral nerve palsy following primary total hip arthroplasty with the direct anterior approach. *PLoS One* 2019;14:e0217068. <https://doi.org/10.1371/journal.pone.0217068>.
- [6] Kawano S, Sonohata M, Kitajima M, Mawatari M. Risk factors for the development of nerve palsy following primary total hip arthroplasty. *Open Orthop J* 2018;12:164–72. <https://doi.org/10.2174/1874325001812010164>.
- [7] Nakamura Y, Mitsui H, Toh S, Hayashi Y. Femoral nerve palsy associated with iliacus hematoma following pseudoaneurysm after revision hip arthroplasty. *J Arthroplasty* 2008;23:1240.e1–4. <https://doi.org/10.1016/j.arth.2007.10.018>.
- [8] Salandra J, Deliso M, Tang A, Robbins CJ, Rao JP. Nerve palsy following total hip arthroplasty: a review of the current literature. *J Hip Surg* 2022;06:149–53. <https://doi.org/10.1055/s-0042-1757326>.
- [9] Zappe B, Glauser PM, Majewski M, Stöckli HR, Ochsner PE. Long-term prognosis of nerve palsy after total hip arthroplasty: results of two-year-follow-ups and long-term results after a mean time of 8 years. *Arch Orthop Trauma Surg* 2014;134:1477–82. <https://doi.org/10.1007/s00402-014-2038-0>.
- [10] Dholakia M, Kupfer M, Sher L, Dimuzio P, Freedman MK. Retroperitoneal false aneurysm presenting as anterior thigh pain and weakness: a case report. *Arch Phys Med Rehabil* 2006;87:583–4. <https://doi.org/10.1016/j.apmr.2005.12.039>.
- [11] Kumar S, Pflueger G. Delayed femoral nerve palsy associated with iliopsoas hematoma after primary total hip arthroplasty. *Case Rep Orthop* 2016;2016:1–3. <https://doi.org/10.1155/2016/6963542>.
- [12] Yoshino K, Hagiwara S, Nakamura J, et al. The distance between the femoral nerve and anterior acetabulum is significantly shorter in hip osteoarthritis than in non-osteoarthritis hip. *BMC Musculoskel Disord* 2021;22:416. <https://doi.org/10.1186/s12891-021-04295-5>.
- [13] Ratliff AH. Arterial injuries after total hip replacement. *J Bone Joint Surg Br* 1985;67-B:517–8. <https://doi.org/10.1302/0301-620x.67b4.4030843>.
- [14] Bowden S, Jaber A, Roche-Nagle G. Large pseudoaneurysm arising from the deep femoral artery after hip fracture fixation. *J Surg Case Rep* 2020;2020:rjaa408. <https://doi.org/10.1093/jscr/rjaa408>.
- [15] Harper K, Iorio J, Balasubramanian E. Profunda femoris pseudoaneurysm following total hip arthroplasty revision. *Case Rep Orthop* 2015;2015:1–5. <https://doi.org/10.1155/2015/301949>.
- [16] Karmakar B, Horsley M, et al. Profunda femoris artery branch pseudoaneurysm following total hip arthroplasty. *Int J Orthop* 2015;2:379–82. <https://doi.org/10.17554/j.issn.2311-5106.2015.02.95>.
- [17] Lund JM, Clarke JMF, Cockburn JF. Medial circumflex femoral artery pseudoaneurysm following total hip replacement treated by coil embolisation. *Eur J Vasc Endovasc Surg* 2002;24:182–3. <https://doi.org/10.1053/ejvs.2002.1696>.
- [18] Mutlu S. An unusual complication following total hip arthroplasty: median circumflex femoral artery pseudoaneurysm. *Acta Orthop Traumatol Turc* 2014;48:106–8. <https://doi.org/10.3944/AOTT.2014.3000>.
- [19] Nabhani S, Cheysson E, Sabbah P, Baaklini G. Endovascular management of a deep femoral artery perforating branch pseudoaneurysm after total hip arthroplasty: a case study. *Case Rep Med* 2022;2022:1–4. <https://doi.org/10.1155/2022/5925839>.
- [20] Baker S, Huddleston MK, Goodwin TM, Voskuil R, Sanders C. Left profunda femoral artery pseudoaneurysm after revision total hip arthroplasty. *Arthroplasty Today* 2020;6:906–10. <https://doi.org/10.1016/j.artd.2020.09.004>.
- [21] Mallory TH, Jaffe SL, Eberle RW. False aneurysm of the common femoral artery after total hip arthroplasty. A case report. *Clin Orthop Relat Res* 1997;338:105–8. <https://doi.org/10.1097/00003086-199705000-0001610>.