

Perioperative Pain Management in a Patient on Buprenorphine with a Continuous Pericapsular Nerve Group Block Catheter

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Introduction

Pain management in patients undergoing hip open reduction and internal fixation (ORIF) procedures is a critical aspect of their perioperative care. Effective analgesia not only ensures patient comfort but also promotes early mobilization and rehabilitation [1].

Buprenorphine/naloxone is often used for opioid use disorder (OUD) maintenance therapy, as it offers a long half-life and high affinity for opioid receptors [2]. Challenges arise when managing pain in patients with chronic pain who are on maintenance opioid therapy with suboxone due to concerns regarding opioid tolerance and the potential for opioid withdrawal.

The PERicapsular Nerve Group (PENG) block technique provides targeted analgesia for hip and femoral surgery while minimizing systemic opioid use [3].

A single-injection PENG block is only effective for a limited time, and there has been minimal evidence thus far supporting the effectiveness of continuous PENG block for postoperative analgesia [4,5]. Continuous PENG catheter placement is a novel procedure that allows for a prolonged duration of analgesia, reducing the risk of breakthrough pain and enhancing patient comfort during the perioperative period.

Background

The PENG block technique involves administering local anesthetic into the fascial plane located between the psoas muscle and the superior pubic ramus, targeting the articular branches supplied by the femoral, obturator, and accessory obturator nerves.

The lateral femoral cutaneous nerve (LFCN) block is often performed alongside the PENG block to cover dermatomal pain of the lateral thigh [6].

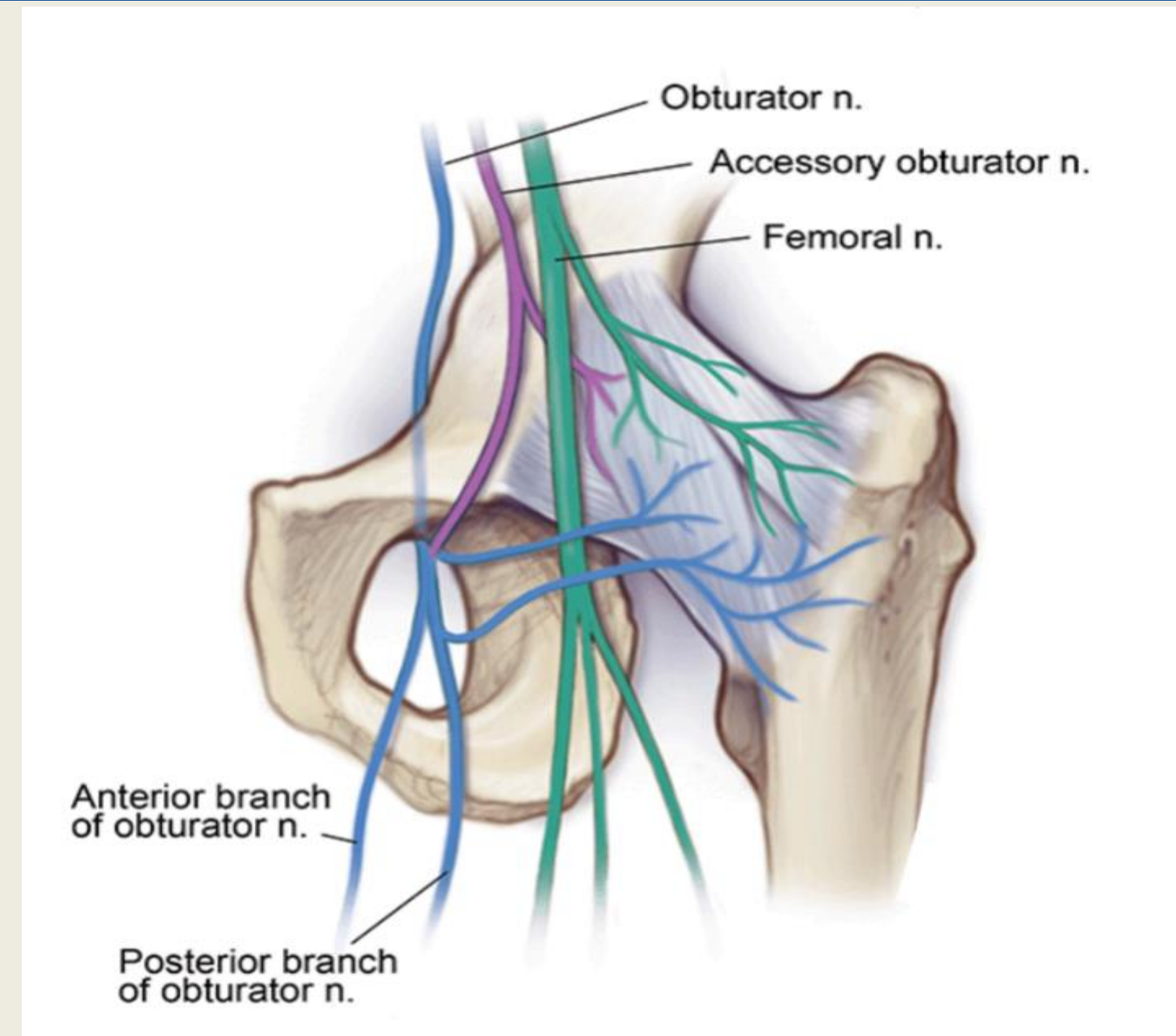


Figure 1. Innervation of the Anterior Capsule of the Hip Joint [7]

Case Presentation

66-year-old female with past medical history of hypertension, migraines, chronic hepatitis C, opioid use disorder on buprenorphine/ naloxone 8mg/2mg two tabs qAM, chronic steroid use (prednisone 10mg qd) for chronic pain, osteoporosis with multiple prior fragility fractures. *The patient presented from home and was found to have acute left femur intertrochanteric fracture. She underwent left hip open reduction internal fixation.*

Interoperative course:

- Fentanyl 100 mcg IV and midazolam 2 mg IV given prior to endotracheal intubation. No further opioid administered.
- Continuous PENG block/LFCN single shot placed after intubation.
- PENG: 20cc 0.375% ropivacaine; catheter 21g left at 11cm
- Lateral femoral cutaneous nerve: 10cc 0.5% ropivacaine
- Ketamine 25 mg IV given after incision. Remainder of intraoperative course was uneventful.

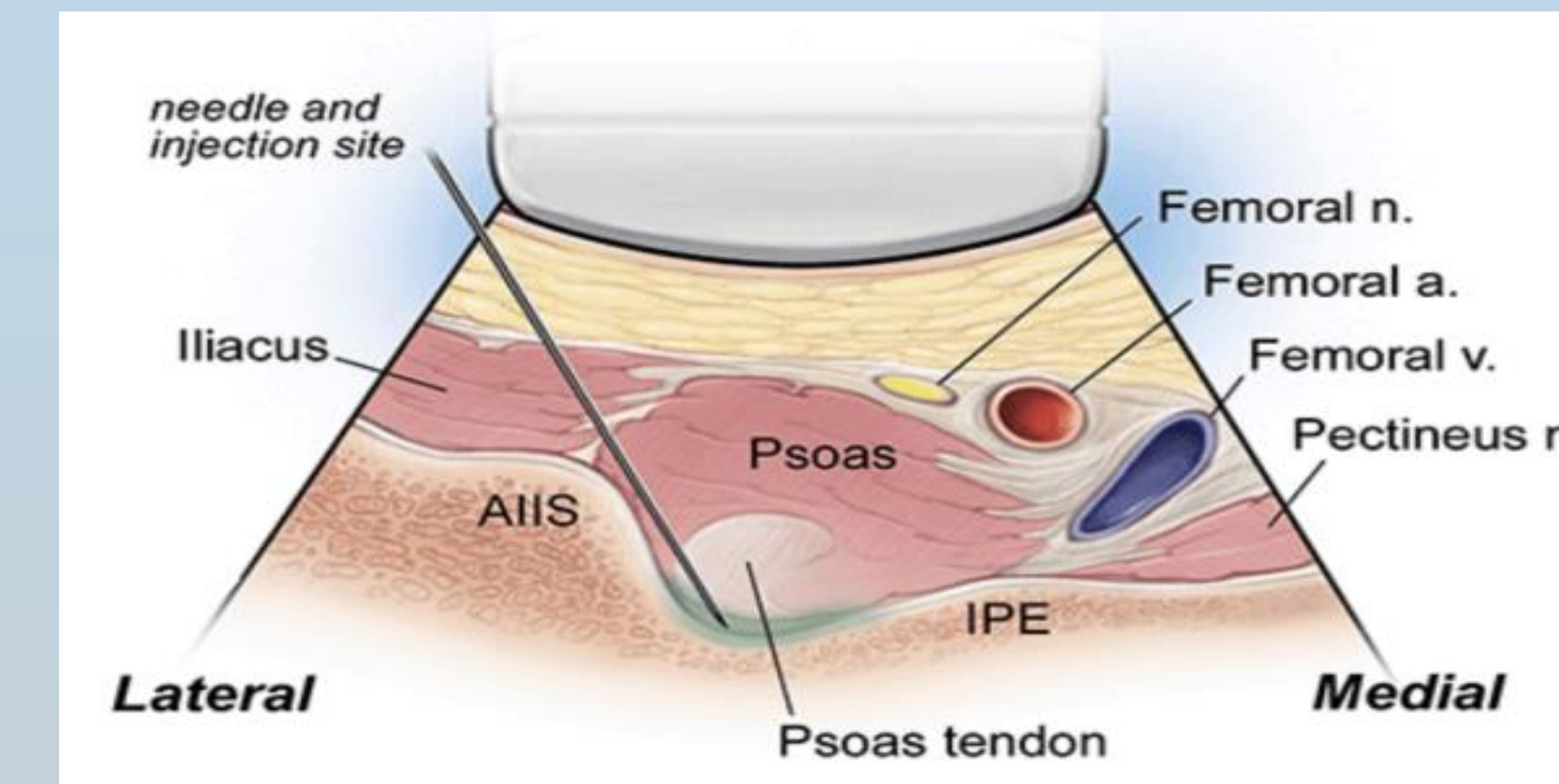
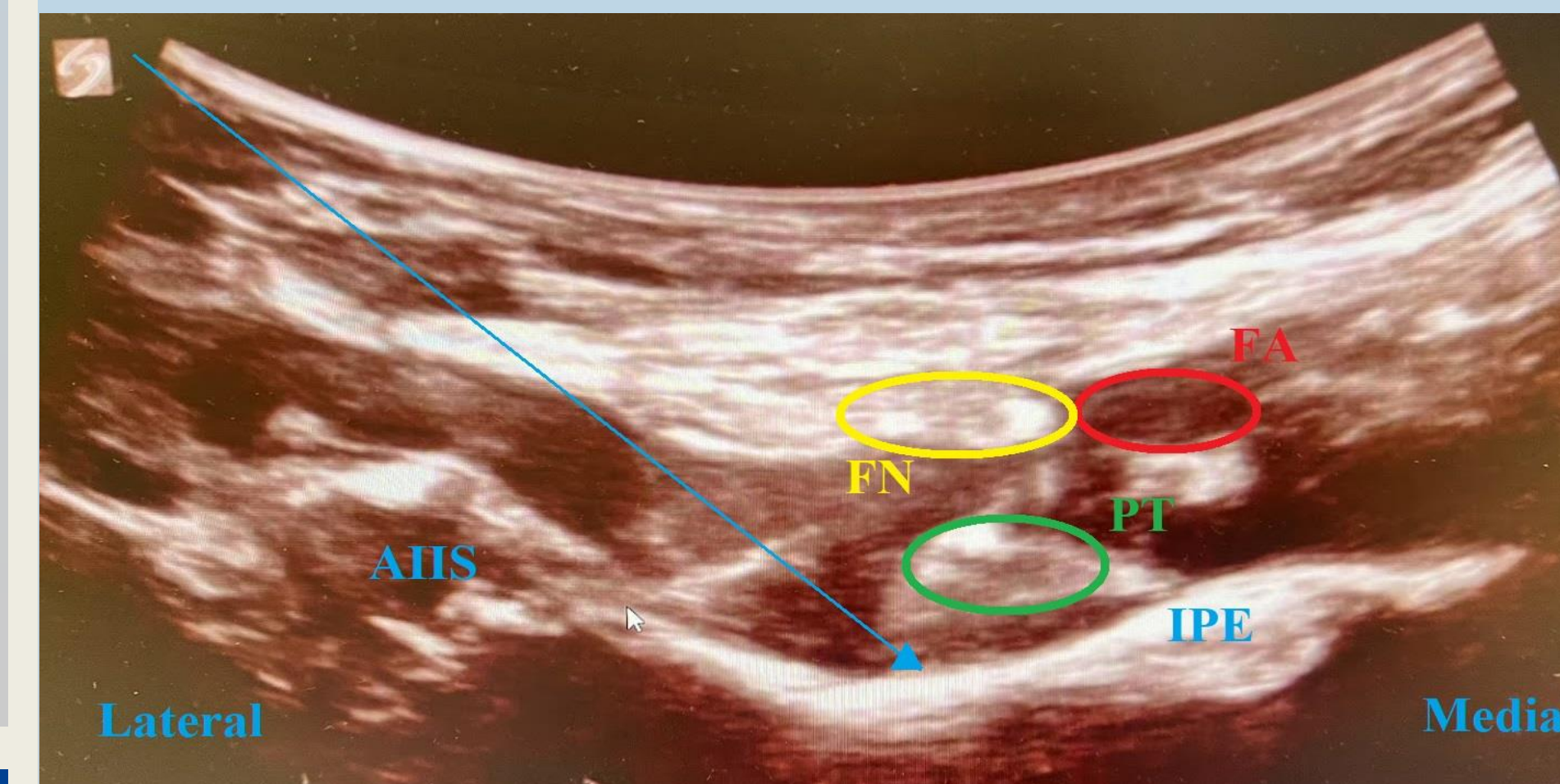


Figure 2 (left). Labeled photo obtained from case; Figure 3 (right). Diagram of PENG block [7]; AIIS: anterior inferior iliac spine, IPE: iliopubic eminence, FN: femoral nerve, FA: femoral artery, PT: psoas tendon

Postoperative course:

- Patient reported pain scores remained 0/10 in the post-anesthesia care unit.
- Initially in her recovery course, was managed with hydromorphone IV PCA and PENG catheter infusing 0.2% ropivacaine @10ml/hr. Buprenorphine/ naloxone was held per patient's request.
- On POD#2, patient was switched from IV PCA to titratable PO hydromorphone for analgesia. The patient then reported a pain score of 5/10. Per protocol removal of the PENG catheter was planned on POD#2, however the patient felt the catheter was necessary for her recovery and the decision was made to continue the catheter.
- The patient was able to work with PT every day and was titrated down on her PO hydromorphone. The PENG catheter was continued until discharge on POD#5, with the patient having an uneventful remainder of hospital stay.

Discussion

- With the opioid epidemic and the increase of patients taking buprenorphine, finding optimal strategies to manage postoperative pain while minimizing opioid use is paramount.
- The novel PENG block has been shown to offer superior analgesia to conventional peripheral nerve blocks for hip surgeries due to sensory nerves being most abundant in the anterior hip capsule [5].
- We demonstrated that a continuous PENG catheter is an effective way to manage post-operative pain after hip ORIF. The patient's pain scores remained low, enabling her to engage in physical therapy and make progress in her recovery as she did not experience motor blockade.
- With the continuous PENG catheter, the patient with OUD was able to reduce overall opioid use and have an overall shorter length of hospital stay [8].

Conclusion

The successful use of this novel regional anesthetic technique not only provided effective analgesia but also offers a potential strategy to be considered for future cases of hip open reduction internal fixation, leading to improved outcomes.

References

- [1] Khosrojerdi H, Tajabadi A, Amadani M, Akrami R, Tadayonfar M. The Effect of Isometric Exercise on Pain Severity and Muscle Strength of Patients with Lower Limb Fractures: A Randomized Clinical Trial Study. Med Surg Nurs J. 2018;7(1):e68104. <https://doi.org/10.5812/msnj.68104>.
- [2] Barrett, W.F., Brewbaker, C. (2023). Buprenorphine, Buprenorphine/Naloxone (Suboxone). In: Li, J., Jiang, W., Vadivelu, N. (eds) First Aid Perioperative Ultrasound. Springer, Cham. https://doi.org/10.1007/978-3-031-21291-8_15
- [3] Girón-Arango L, Peng PW, Chin KJ, et al Pericapsular Nerve Group (PENG) Block for Hip Fracture Regional Anesthesia & Pain Medicine 2018;43:859-863.
- [4] Lin D, Morrison C, Brown B, et al Pericapsular nerve group (PENG) block provides improved short-term analgesia compared with the femoral nerve block in hip fracture surgery: a single-center double-blinded randomized comparative trial Regional Anesthesia & Pain Medicine 2021;46:398-403.
- [5] Fujino, T., Odo, M., Okada, H. et al. Continuous pericapsular nerve group block for postoperative pain management in total hip arthroplasty: report of two cases. JA Clin Rep 7, 22 (2021). <https://doi.org/10.1186/s40981-021-00423-1>
- [6] Wiseman, Patrick, and Michael O’Riordan. “Pericapsular Nerve Group Block: An Evidence-Based Discussion.” WFSA, 16 Aug. 2022, resources.wfsahq.org/wp-content/uploads/atow-478-00.pdf.
- [7] Husain, Abbas, et al. “Peng Block.” SIUH Emergency Residency Program, 29 Dec. 2021,
- [8] Dreyfuss, Anne. “Study: Shorter Hospital Stay for Hip Fracture Associated with Increased Odds of Survival.” VCU News, 3 Feb. 2016.