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INTRODUCTION

The popliteal artery is the most common peripheral site for aneurysm formation. Complication rates are 61%, with the most feared complication being acute limb ischemia secondary to thromboemboli. Poplital artery aneurysm (PAA) is also a risk factor in the development of arterial complications during total knee arthroplasty (TKA), with reports of arterial occlusion and other thromboembolic events occurring in the operative period.

Several studies show the superiority of an iPACK block integrated with an adductor canal block (ACB) in both postoperative pain control and hospital length of stay with no significant difference in postoperative motor function versus an ACB alone in patients undergoing TKA. Discovery of a PAA in this setting has not been described before. This case may highlight the role of ultrasound-guided nerve blocks as an opportunity to screen for PAA in high-risk patients before TKA and other surgeries in this anatomical region.

CASE PRESENTATION

The patient is a 77-year-old female with a past medical history of PAD, AAA s/p endovascular repair, aortic stenosis s/p biologic valve replacement, CAD s/p CABG, and breast cancer s/p partial mastectomy, hormonal therapy, and chemotherapy. She presented to our joint replacement center for TKA for severe right knee osteoarthritis unresponsive to conservative management.

The regional anesthesia plan was to perform a preoperative ultrasound-guided saphenous nerve block, a superolateral genicular nerve block, and infiltration between popliteal artery and capsule of knee (iPACK). Lumbar spinal anesthesia was to be performed in the operating room.

An intravenous line was obtained and ASA monitors were placed, along with 2L of Intranasal oxygen given. 2 mg Midazolam and 100 mcg Fentanyl were given for sedation. The adductor canal block and superolateral genicular nerve block were completed with no complications. The linear probe was placed in the popliteal fossa to identify the space between the popliteal artery and capsule of the knee.

CASE PRESENTATION (continued)

Upon scanning, the typically well-delineated popliteal artery was noted to be circumferentially surrounded by a hazy structure. Upon tracing the ultrasound probe along the course of the artery, the hazy structure continued to envelope it. The interspace was still well visualized, and the iPACK block was performed with 10 mL of 0.25% ropivacaine with care to avoid the structure surrounding the popliteal artery.

Given the anatomic anomaly, vascular surgery was consulted. Physical exam by the vascular surgery team revealed a prominent right popliteal pulse. After a bedside ultrasound study, the patient was determined to have a PAA. The hazy structure was consistent with a mural thrombus.

A joint meeting between regional anesthesia, vascular surgery, orthopedic surgery, and the operating room anesthesiologist was held. Due to the risks of excessive hemorrhage and embolism, the case was canceled and postponed until the patient could have definitive treatment of her aneurysm.

Further chart review revealed that the patient was previously diagnosed with a right PAA in 2021 by her outpatient vascular surgeon whose records were not visible in our electronic medical record system. She was informed of the reason for cancellation and given instructions to follow up with her vascular surgeon for further treatment of the aneurysm before proceeding with knee arthroplasty. In the interim, she underwent a viscosupplementation injection for temporary symptomatic relief of her knee pain in the outpatient orthopedics clinic.



Popliteal Aneurysm

DISCUSSION

A link between AAA and PAA has been well-established. One theory that could explain this proposes that the popliteal artery has wall characteristics similar to central elastic arteries, such as the abdominal aorta, making it more prone to pathologic dilatation.

There are serious implications of PAA, whether or not the patient also has a concomitant AAA. Thrombus formation in the popliteal artery is limb-threatening as the embolization of distal run-off arteries may lead to critical limb ischemia, even in the setting of revascularization. The amputation rate in the setting of acute limb ischemia secondary to popliteal artery occlusion approaches 14.1%.

TKA raises the baseline risk of thrombus formation through intravascular stasis, from tourniquet application, lumbar spinal anesthesia, bandaging, and endothelial damage from hypertension, local compression, and trauma during surgery. In patients with PAA undergoing TKA, this risk is compounded by the potential for the embolization of an existing mural thrombus during surgical manipulation or the formation of a new thrombus within the aneurysm during this high-risk period. Acute vascular occlusion has been reported in a patient with known PAA undergoing a TKA in which tourniquet use was avoided and continuous doppler ultrasonography was used to minimize risk of thromboembolic events and monitor arterial blood flow.

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