

An Uncommon Complication of Arteriovenous Fistula Following Intramedullary Nail Distal Locking – A Case Report

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Learning Point of the Article:

Surgical technique, and strict post-operative follow-up, may allow early diagnosis unnecessary essential for treatment.

Abstract

Introduction: An arterial pseudo aneurysm formation is an unusual complication following intramedullary nail distal locking screw insertion. During such surgical procedure, arterial laceration might damage the wall, allowing blood leakage into the soft-tissue surrounding. Only few records are available regarding such injuries.

Case Report: A 19-year-old male diagnosed with femoral shaft fracture after a trauma event, was treated using Antegrade Long Intra-Medullary Nail with distal locking screw. Following post-operative serial blood count indicating a consistent decrease in his Haemoglobin levels, a Computed Tomography angiogram was performed and showed an arteriovenous fistula of the lateral superior geniculate artery. The artery was coiled, and haemoglobin levels were stabilized again.

Conclusion: A distal interlocking screw should be carefully placed, including blunt dissection before the drilling and screw placement. In addition, blood counts were proved essential in routine.

Keywords: Arteriovenous fistula, intramedullary nail distal locking, antegrade long intra-medullary nail.

Introduction

Arterial pseudoaneurysm formation is a rare consequence of orthopedic surgery. A pseudoaneurysm occurs when a blood vessel wall is breached, and the blood leaking through it is contained by hematoma, perivascular soft tissue, and the adventitia surroundings [1]. Clinically, such injury does not present with common signs of ischemia, and therefore may be overlooked. Pseudoaneurysms might result from Total Knee Arthroplasties (TKA), but may also follow other knee surgeries in the popliteal artery, such as superolateral, inferolateral, or inferomedial geniculate arteries [2].

Diaphyseal femoral fractures are common, and in adults often treated with interlocked intramedullary nailing. Vascular injuries, however, are uncommon and usually occur when the

drill bit or screws have over penetrated - particularly during the distal interlocking procedure [3].

Case Report

A 19-year-old male, normally healthy and with no medical issues, arrived to the emergency room (ER) after being involved in a motor vehicle accident. He was presented with multiple injuries including swelling, deformity with tenderness of middle thigh, sensation, and distal pulse intact. In the ER, the patient was stable with 16.1 hemoglobin (Hb). A diagnosis of diaphyseal femoral fracture was determined, and a splint was applied.

Under anesthesia, the patient underwent Closed Reduction with Internal Fixation using Antegrade Long Intra-Medullary Nail (IMN) with distal locking screw (Fig. 1 and 2). The screw was

Author's Photo Gallery



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Figure 1: Fluoroscopy images of femur from the surgery, demonstrating antegrade intra medullary nail with proximal and distal locking screws.

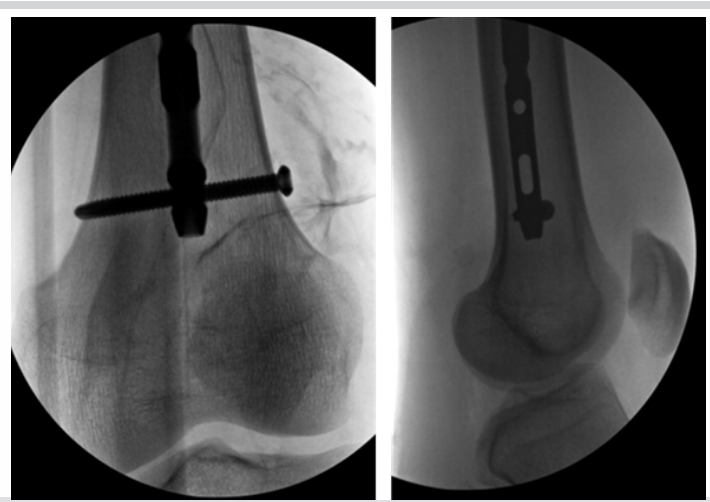


Figure 2: Fluoroscopy images of distal femur from the surgery, demonstrating anterior-posterior and lateral views of distal locking screws.

ed from lateral to medial after a stab-wound skin cut, using a mosquito for blunt dissection before drilling. Postoperatively, the patient felt well, was stable with normal blood pressure and had no tachycardia. Blood was collected during 3 days post-operation and the Hb levels were: 11.8, 8.7, and 6.8. After blood transfusion, Hb levels were improved.

A computed tomography angiography was performed, presenting an arteriovenous fistula of the lateral superior geniculate artery (Fig. 3). The artery was closed with a coil (Fig. 4) and Hb levels were recovered once more (Table 1).

Discussion

Vascular injury after IMN distal interlocking, is rare and has scarce evidence in the literature. As a possible cause for this complication, Yang et al. suggested that the involved limb adducted and internally rotated, which may cause abutment of the femoral vessels to the femur, endangering the superficial femoral artery. Therefore, they suggested that during preparation of the interlocking hole, the limb will be placed in a neutral position [2].

Mounasamy et al. (Table 1) reported a pseudoaneurysm case of

lateral geniculate artery at the distal screw insertion site of interlocked IMN, diagnosed after Doppler examination was done to exclude a recurrent abscess associated with the trauma a year before [4].

In a case reported by Bose et al. (Table 1), 4 years post the initial femoral nailing; a pulsatile swelling was noticed on the medial aspect of the left distal thigh. US and MRI showed a penetration of the distal locking screws tips to the mass, which was suspected to be an arterial pseudoaneurysm [5].

In most reported cases of post-TKA, pseudoaneurysms were also described. Pai et al. reported a false aneurysm of the inferior lateral geniculate artery, following a total knee replacement as a pulsatile mass with compressive neuropathy of the posterior tibia nerve [6]. Dennis et al. described a traumatic arteriovenous fistula with false aneurysm as a TKA complication [7]. Langkamer et al. presented a case report in which an A-V fistula was confirmed 6 weeks after TKA [8]. Another case of pseudoaneurysm, 3 weeks after anterior cruciate ligament repair, was presented by Oversier et al. [9]. Scoles et al. described a patient with hemophilic arthroplasty following synovectomy. In this case, the descending genicular artery evolved as a complication of suction drainage from a knee [10].



Figure 3: Images from angiography of distal femur 3 days after the surgery, demonstrating arteriovenous fistula of the lateral superior geniculate artery.



Figure 4: Images from angiography of distal femur 3 days after the surgery, demonstrating coiling and embolization of the fistula.



Table 1: Literature review for pseudoaneurysm after distal locking of femoral nailing

Author and year	Patient	Symptoms	Etiological agent	Radiological features	MRI	Management
Bose et al. [5] 2006	11 years old male	Pulsatile swelling on the medial aspect of left distal thigh, 4 years after the initial femoral nailing	Distal locking screws of the femoral nail	Distal locking screws of the left femoral nail were noted to be longer than was necessary	Tips of the distal locking screws penetrating a mass were deemed to be an arterial pseudoaneurysm	A catheter was passed from lateral to medial through the screw holes and aspiration was attempted
Mounasamy et al. [4] 2008	45 years old male	Persistent pain and progressive increase in swelling over the lateral aspect of the distal thigh	Prior cross-locking screw insertion site	A Doppler study revealed a 2 cm×1.7 cm pseudoaneurysm from the lateral geniculate artery at the level of prior cross-locking screw insertion site		Ablation using percutaneous Doppler guided intralesional injection of thrombin
Our case, 2021	19 years male	Decreased Hb levels	Presumed IMN distal locking screw	CTA - arteriovenous fistula of the lateral superior geniculate artery		Coiling and embolization

However, most reported cases of distal locking related lateral geniculate artery pseudoaneurysm, are delayed post-operative complications. The injury case presented here differs in timing, with immediate post-operative acute bleeding up to dangerously decreasing hemoglobin levels.

Conclusion

Our case report joins to rare evidences of pseudoaneurysm related to distal IMN interlocking. We conclude that distal interlocking screws should be carefully placed, including blunt dissection before drilling and screw placement. In addition, post-operative physical examination as well as blood count,

should be performed as part of the routine.

Clinical Message

Although hemoglobin level frequently decreases post-operation, if continuing, it might indicate a rare arteriovenous fistula as was described here. This case proves the importance of blunt dissection before drilling, as well as post-operative serial blood count as follow-up.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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