

# Femur Lengthening in a Patient with a Pseudoaneurysm of the Superficial Femoral Artery Treated with Covered Stent

## Abstract

This case report presents a 29-year-old male patient who presented an articular distal femoral fracture sustained in a road traffic accident in Benin. After the different surgical procedures, the patient presents a knee stiffness and a shortening of the left leg of 7 cm. An ablation of osteosynthesis material and a Judet procedure was done. After this surgical intervention, the patient developed pain, pulsatile swelling of the left knee. A false aneurysm of the superficial femoral artery was evidenced, and a percutaneous endovascular procedure was performed. As a result of the important leg-length discrepancy, a femoral lengthening of 6 cm was performed using intramedullary skeletal kinetic distractor nail. We show that a 6 cm femur lengthening in a patient with a femur stent is possible using intramedullary nails provided that orthopedic and vascular surgeons monitor the patient in strict clinical and paraclinical followup conditions.

**Keywords:** Aneurysm, femur, intramedullary nail, limb lengthening, stent

## Introduction

Pseudoaneurysms of the superficial femoral artery have been described as a rare complication of femoral fractures.<sup>1-3</sup> They can be directly linked to the trauma at the origin of the fracture<sup>4,5</sup> and have a serious impact on the patient's quality of life. They can also appear after osteosynthesis surgery<sup>6</sup> or during removal of the osteosynthesis materials. These fractures are often associated with significant shortening of the injured limb,<sup>7</sup> This case report presents an original description of a femur lengthening performed on a patient, who has been previously stented for false aneurysm at the femoral artery.

## Case Report

A 29-year-old European man with no medical history was injured in a motorcycle accident in March 2010, which caused a complex open (Cauchoix I) fracture of the left distal femur (Type C3 Müller AO Classification) initially treated with transtibial traction for 2 months. The patient then underwent, in Tunisia in November 2010, external osteosynthesis surgery using screws and plates to compress and lift the anterior tibial tuberosity. This

surgery was followed by a pseudarthrosis which led to supplementary osteosynthesis surgery requiring an internal plate and polymethylmethacrylate cement filling in November 2011 [Figure 1].

The patient was examined in September 2014 in Poitiers university hospital due to knee stiffness associated with a 7 cm length discrepancy between the lower limbs. Removal of the osteosynthesis material and Judet's quadricepsplasty was performed in December 2014.

Three weeks postoperatively, a large, painful, and throbbing hematoma appeared in the left knee, revealing a false aneurysm in the distal third of the left superficial femoral artery, confirmed by a Doppler ultrasonography of the arteries and a computed tomography (CT) scan. Two 6 mm × 50 mm femoropopliteal covered stents (GORE® VIABAHN®) were placed during an endovascular surgery; the hematoma was drained [Figure 2].

Having taken into consideration, the 7 cm limb-length discrepancy [Figure 3], the consolidation of the bones, the satisfactory permeability of the stents, and the wishes of the patient, left femur-lengthening surgery was performed using an intramedullary skeletal kinetic distractor (ISKD; Orthofix) in November 2015.

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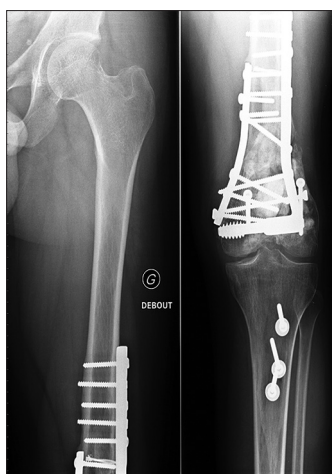


Figure 1: Revision surgery using an internal plate and polymethylmethacrylate cement filling



Figure 2: False aneurysm as observed on arteriography



Figure 3: Lower limb imaging showing the 7 cm limb-length discrepancy

To our knowledge, there exists no similar case in the literature of femoral lengthening in a patient showing a pseudoaneurysm treated by covered stent.

The risks to limb and the vessel were prevented by a close surveillance (radiological and clinical).

The rate of elongation was very progressive, and the lengthening was stopped if signs such as paresis, paresthesia, or hyperalgesia were reported by the patient.

An ISKD nail set at 320 mm (total length 380 mm) was inserted through the greater trochanter, followed by osteotomy at the proximal level of the femoral diaphysis. The surgery was followed by the initial positioning of two cotter pins outside of the nail due to a defect in the ancillary system, which led to the positioning of two proximal cotter pins and two distal cotter pins.

The patient was able to stand 2 days after surgery and could walk without support by the end of the 1<sup>st</sup> week. Partial weight bearing – 50% and 23 kg maximum stress – in compliance with the manufacturer’s instructions were carried out after 7 days and throughout the lengthening phase. The patient was allowed to go home 7 days after the surgery and started physical therapy to maintain the joint’s range of motion and avoid stiffness. Stent permeability was validated by a postsurgical Doppler ultrasonography.

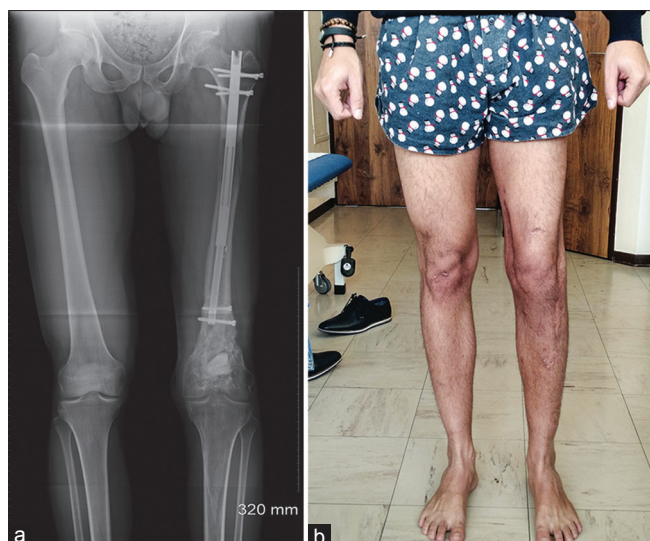
The patient was followed up every week for a radiological and clinical checkup and underwent Doppler ultrasonography twice, 45 days and 3 months after the surgery. Radiographs carried out 3 months after the surgery showed satisfactory limb lengthening of 6 cm with the development of a callus [Figure 4]. Doppler ultrasonography showed acceptable permeability of the femoropopliteal stent. The examination carried out in January 2016 [Figure 5] showed that the stent had remained permeable with no sign of stent fracture.

Finally, after 6 months, the patient’s residual pain was evaluated on a visual analog scale at 1; the patient’s walking distance was unlimited.

## Discussion

Intramedullary limb-lengthening nails have been used for several years as a solution to lengthen the femur in adults affected by limb shortening caused by injuries and have yielded satisfactory results.<sup>8,9</sup> Performing a femur lengthening on a untreated pseudoaneurysm increases the risk of rupture or thrombosis due to the histological changes caused by elongation.

In this case report, we show that a 6 cm femur lengthening in a patient with a femur stent is possible using intramedullary nails provided that orthopedic and vascular surgeons monitor the patient in strict clinical and paraclinical followup conditions: Doppler ultrasonography



**Figure 4:** Lower limb X-ray performed 3 months after the surgery showing callus formation and the stent (a). Front view of the patient (b)

after the surgery, after 45 days, and after 3 months and a CT-scan after the surgery and after 3 months.

These examinations show that the presence of a pseudoaneurysm does not necessarily contraindicate femur-lengthening surgery. A phenomenon of vascular endoprosthesis “creep” can be observed when limb lengthening is performed progressively.

For the surgeons who will face the same problem, we believe that close monitoring between orthopedic and vascular surgeon is the reason for the success of this intervention.

#### Declaration of patient’s consent

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

#### Acknowledgment

TV and CD did the preoperative planning, the lengthening surgery, and the postoperative followup. MD did the covered stent surgery. CD, PB, PR, and TV wrote the manuscript.

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**Figure 5:** Three-dimensional reconstruction showing the lengthening of the bone and the covered stent

#### Conflicts of interest

There are no conflicts of interest.

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