Progress towards understanding anterior knee pain after total knee arthroplasty

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Chapter 9

Recurrent hemarthrosis after total knee arthroplasty due to pseudoaneurysm

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Abstract

Arterial complications caused by a hemarthrosis are often seen after total knee arthroplasty and can carry a significant morbidity risk. We present a rare case report presents an 81 year old Caucasian male with recurrent hemarthrosis after secondary resurfacing of the patella. The secondary procedure was performed one year after the primary TKA (Total Knee Arthroplasty), because of persistent anterior knee pain. Post operative Ultrasound and CT angiography revealed a 1 cm diameter pseudoneurysm of the superior lateral geniculate artery as the cause of recurrent hemarthrosis. The pseudoaneurysm was diagnosed using a CT angiography and was treated by thrombosing the lesion employing ultrasound guided percutaneous puncture and thrombin injection. At five months follow up the patient is functioning well with a pain free TKA, without recurrence of hemarthrosis and pseudoaneurysm blood-flow. A review of the literature and aspects of hemarthrosis after a TKA are discussed.
Introduction

Total Knee Arthroplasty (TKA) has become the generally accepted treatment for osteoarthritis of the knee, relieving pain and improving knee function\textsuperscript{[1-9]}. Although successful, TKA complications remain a concern \textsuperscript{[1-9]}. Vascular complications after TKA have been reported, but are very rare (0.03 - 1.6\% \textsuperscript{[1-9]}; venous thrombosis remains the most common vascular complication\textsuperscript{[1-9]}. Some case reports have been published on direct arterial injuries, acute ischaemia, aneurysm formation and arteriovenous fistula's \textsuperscript{[1-9]}. In this case report aspects of haemarthrosis after a TKA are discussed.

Case report

We present a case of an 81-year-old male suffering of osteoarthritis of the knees. He was treated, July 2008, for his right knee with a cemented TKA (type Innex Mobile Bearing, Zimmer, Warsaw, Indiana, USA). At our hospital, we only perform a retinacular release and resurfacing of the patella when indicated, and we never perform a peripatellar cauterization. Because of persistent anterior knee pain a secondary patella resurfacing was planned. Four weeks before the second operation, a spontaneous hemarthrosis occurred while the patient was climbing stairs. We performed needle aspiration and removed the hematoma. The haemarthrosis subsided and the knee was painful but not swollen. The secondary resurfacing of the patella was performed in September 2009. A tourniquet was inflated to 350 mmHg and used for the whole procedure. While performing a standard medial arthrotomy a minimal amount of old blood was found. A cemented, patella button was inserted and a retinacular release was not needed (Innex, Zimmer, Warsaw, Indiana, USA) (figure ). The first four days of rehabilitation were uneventful and the patient was planning to go home. On the fifth day, after training, the right knee developed an acute swelling. Our patient had no known cardiovascular risk factors or arterial disease. A routine blood investigation, coagulation profile and bleeding time were performed. The standard post-operative anticoagulant therapy, Arixtra (Fondaparinux, Sanofi-Synthelabo, Maassluis, The Netherlands) was temporarily stopped. Our patient was first treated conservatively, but with an increase in swelling and pain, we decided to perform an arthrotomy and puls-lavage (Pulsavac, Zimmer, Warsaw, Indiana, USA). The haematoma that was found was washed out, but no reason for the haemarthrosis was found.
Two days later the knee swelling reoccurred, and an ultrasound and a CT angiography were then performed. The CT angiography revealed a patent 1 cm diameter pseudoaneurysm in the superior patellar fossa, originating from a branch of the superior lateral geniculate artery (figures 2 and 3).

Figure 1: Anteroposterior and lateral radiographs
The pseudoaneurysm was treated by thrombosing the lesion using ultrasound guided percutaneous puncture of the pseudoaneurysm lumen and thrombin injection (Tissucol DUO 500, Baxter AG, Vienna, Austria; we only used the thrombin part of the Tissucol package). After thrombin injection the pseudoaneurysm showed complete thrombosis without flow using Color and Power Doppler Ultrasonography (Philips (ATL), HDI 5000, Best, the Netherlands) (figure 4). There were no peripheral vascular complications due to the local thrombin injection.

Figure 2: CT axial view of pseudoaneurysm in the right knee (hematoma and pseudoaneurysm visible)

Figure 3: sagittal view of pseudoaneurysm in the right knee (haematoma and pseudoaneurysm visible)
Figure 4: pseudoaneurysm before and after injection of tissuecol
Ultrasound at five months of the right knee revealed size reduction of the pseudoaneurysm without flow and marked reduction of intra-articular fluid. At 12 months follow up the patient is functioning well with a pain free TKA.

Discussion

Though rare, vascular complications are reported between 0.03% and 1.6% of patients undergoing a TKA\[1-9\]. Early causes are direct arterial injuries, which can occur during the resection of the proximal tibia, distal femur, but also with pin fixation and while performing the necessary releases or the removal of the menisci \[3,7,8,9\]. Arterial aneurysm, pseudoaneurysm and arteriovenous fistula tend to occur in the first few months after the operation, but can also present in a much later stage\[3,7,8\]. Arterial aneurysm and pseudoaneurysm can present with a painful pulsatile mass, often posterior in the knee \[8\]. However, presence of a thrombus can prevent the pulsatile feature to be present and therefore make the diagnosis difficult \[8\]. Hemarthrosis can cause a delay in the rehabilitation period and cause joint stiffness, poor range of motion and occasionally lead to a deep joint infection \[3,7,8\]. Late complications include synovial impingement, Hoffa impingement, synovitis and hypertrophic tissue due to mal-alignment or instability\[3,7,8\]. Predisposing factors for hemarthrosis after TKA include Hypertension, Diabetes Mellitus, Pigmented Villonodular Synovitis (PVNS), Haemophilia, other bleeding disorders or anticoagulation medication\[3,8\]. Most often will hemarthrosis after TKA be treated conservatively with the RICE method (Rest, Ice, Compression and Elevation) \[7,8\]. The cause of hemarthrosis is often difficult to detect, but routine blood investigation, coagulation profile and bleeding time is advised \[3,8\]. After standard radiographs of the knee, ultrasound with diagnostic puncture would be the next advised investigation \[3,8\]. If this is ineffective, joint aspiration may be performed or even arthrotomy and pulsed lavage \[7,8\]. For therapeutic planning CT angiography is as sensitive but less invasive compared to catheter guided angiography. In this case the cause of the hemarthrosis of the right knee was detected by CT angiography and treated by ultrasound guided percutaneous thrombin injection. An open surgical repair is an option; however, image-guided intervention is less invasive, has a smaller risk of infection and a faster rehabilitation.
Conclusion

Hemarthrosis caused by a patent pseudoaneurysm is fortunately a rare complication after TKA. We advise the use of CT angiography and image guided therapy.
Recurrent hemarthrosis after TKA

References