

Profunda Femoris Artery Avulsion Injury After A Primary Hip Arthroplasty. A Rare Complication and Literature Review

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Abstract

Total Hip Replacement (THR) is one of the most successful medical procedures used, due to the increasing need for orthopaedic reconstructive surgery of an aging population. Iatrogenic arterial complication during total hip replacement is extremely rare but when appeared, leads to a serious cause of morbidity and mortality. We present a case of 83 year-old female patient who was selected for a primary total hip arthroplasty and on the second postoperative day the hemoglobin level started to decrease without evidence of obvious bleeding, pulsatile mass or lower limb ischemia. The CT/Angiography revealed an injury of Profunda Femoris artery and the hemorrhage stopped after arterial embolization. This case displays the necessity of suspicion and prompt diagnosis of vascular complication after a THR which is a limb threatening injury and leads to ischemia with all that entails.

Keywords: Total Hip Replacement; Profunda Femoris Artery; Vascular Complication

Introduction

Total Hip Replacement (THR) is one of the most clinical successful medical reconstructive procedures which in 2007 called “the operation of the century” [1]. From 1960, when Sir John Charnley developed the basic principles of the hip replacement, until today an increased number of this procedure is performed each year. In United States approximately 370.000, while in United Kingdom over 60.000 total hip replacements (primary and revision), are performed each year [2,3].

The incidence of vascular injury complication during hip surgery or in postoperative period (immediate or later days) is very rare with a percentage of 02,-0,3% [4,5]. The most common patterns of vascular injuries after THR which were reported in literature are: thrombosis, vessels lacerations, pseudoaneurysms and arteriovenous fistulas [6,7]. Iatrogenic arterial injury is a rare complication after a total hip replacement but potentially is a limb threatening injury which may cause morbidity and even mortality [4].

The purpose of this study is to present an iatrogenic injury of Profunda Femoris artery after a total hip replacement of the right femoroacetabular joint in a 83 year-old female who developed symptoms of arterial injury 48 hours postoperatively and to arise a sense of suspicion of this kind of lesions in physicians with scope to prevent vascular complications after a THR with early diagnosis.

Case Report

A female 83 year-old patient was admitted to our department for an elective primary total hip replacement due to secondary osteoarthritis degenerative changes of the right femoroacetabular joint. Body mass index was (BMI) 30 and the clinical history was diabetes mellitus type II. The procedure was performed with posterior approach (Moore or Southern) and after hip exposure the hip dislocated without complications. Standard Hohmann retractors were performed first in acetabular rim and after reaming an uncemented acetabulum component was placed. The next step was followed by placement of the Hohmann retractors in anterior

and posterior area of proximal femur to recognize the border of femoral canal. After reaming, the uncemented femoral component was applied. There were no intraoperative complications and no significant loss of blood. Time of surgery was 65 minutes and a blood suction drain was applied. Postoperative x-ray of the right hip disclosed any abnormalities. Six hours postoperatively, the hemoglobin (Hgb) level was 8,6mg/dl, expected value after a THA. She was transfused with one unit of blood.

On the first postoperative day the Hgb level was 9,2 mg/dl, the drain was taken off, the trauma was with no sign of bleeding, and the patient started the mobilization rehabilitation protocol. On the second postoperative day the patient complained for intermittent pain on her right thigh progressively worsened and associated with numbness of her toes. The right thigh was swollen, the incision area was with no sign of bleeding, there was no evidence of pulsatile mass and distal pulses existed. Her hemoglobin value was 8,2mg/dl and the patient was transfused with two units of blood. Assessing the low Hgb value and the symptoms of the patient, an emergency Computed Tomography (CT) Angiography was performed. The CT Angiography revealed an injury at Profunda Femoris artery with an ongoing hemorrhage (Figure 1a, 1b). The patient was treated by Interventional Radiology coil embolization and was referred again to the Orthopaedic Department for further treatment and rehabilitation (Figure 2a, 2b). The patient recovered after embolization and was mobilized and discharged 10 days after the initial surgery of THR.

Figure 2: CT angiography revealing damage of profunda femoris artery (white arrow a, b).

Figure 2: CT angiography after arterial embolization with coils at the medial side of the right femur (white arrow a, b).

Discussion

Significance of anatomy of the upper part of lower extremity is substantial in understanding the various vascular complications during a total hip replacement. The femoral artery courses into lower limb through femoral triangle and bifurcate in the superficial and Profunda Femoris artery. The superficial femoral artery is terminated with five branches: the superficial circumflex iliac, superficial epigastric, superficial external pudendal, deep external pudendal, and descending genicular artery [8]. The Profunda Femoris artery originates from the common femoral artery at 0 cm -8 cm below the midpoint of the inguinal ligament in the medial thigh and terminates giving several branches from which the most clinical considerable ones are the medial and lateral femoral circumflex arteries which are part of the vascurarity of the femoral head [9,16].

Vascular complication after total hip replacement is very rare appeared usually in the external iliac artery, in common femoral artery and in external iliac vein [10]. Shoenfeld., *et al.* (1990) in 68 patients with THR (primary or revision) presented four types of vascular complication: thromboembolic (46%), laceration (18%), pseudoaneurysm (25%) and arteriovenous fistula (3%) [10]. The main cause of arterial damage lesion is: cement reaction (44%), retractor injuries(12%), extensive traction on vessels(7%), intra-pelvic cup migration (7%), reaming injury (3%) [10].

Lesions of the Profunda Femoris artery (PFA) are very seldom and appear later [12]. Usually appear as pseudoaneurysm and the patients present pain, hematoma, swelling of the thigh, fever, unexplained anemia or thigh compartment syndrome [14]. The eventual cause of pseudoaneurysm of PFA is: iatrogenic, trauma (blunt or penetrate), intertrochanteric fractures, potentially inflammation or

infection and anticoagulation therapy [9,11,15]. Profunda Femoris artery damaged as a result of orthopaedic surgery is reported in international literature, but the exact cause of traumatic pseudoaneurysm of PFA remain ambiguous. Unay, *et al.* (2008) presented that iatrogenic pseudoaneurysm of PFA can result from: bone retractors, screws tips, drills, displacement implants and of course of scalpel itself [13].

During total hip arthroplasty damage of PFA is an extremely rare lesion because the artery is not near to operative field, but anatomical variation can occur. Wilson, *et al.* (2003) reported one case of PFA damage in over 4000 elective procedures of THR (primary or revision) [17]. Huynh, *et al.* presented a traumatic lesion of PFA and suggested that inappropriate use of Hohmann retractor was the cause of injury [18]. Another case with traumatic damage of PFA reported by Karmakar and Horsley who suggested that excessive retraction was the cause of injury [19]. Harper, *et al.* suggested a more complex etiology like these injuries come from a stretch injury to the vasculature of the region, while Hall, *et al.* suggested that avulsed vessel can be damaged directly from manipulation during operation when dislocating the femur from the joint [3,8]. Shoenfeld, *et al.* (1990) first and Hall, *et al.* (2009) after, referred a theory that the presence of atherosclerotic plaque in elderly patients may increase the risk of vascular damage during procedure of THA [3,10]. In our patient, we believe that Hohmann retractors were the cause of arterial damage because the BMI was 30 and several retractors were used in order to address the acetabulum and the proximal femur.

Diagnosis of vascular damage after a total hip replacement, is initially based on clinical suspicion. Clinical signs of this severe condition are often intermittent pain of the thigh, swelling of the thigh, bleeding in surgical incision, palpable pulsatile mass along surgical incision, often painful, while the Hgb level is decreased [13]. The clinical findings could be often hidden, depending on the location of vascular damage and thrombus formation and could lead to incorrect diagnosis of this urgent complication [9]. Our patient presented an intermittent pain in thigh, progressively worsened and associated with numbness of the toes which in combination with swelling of the thigh and sudden decrease of Hgb values, led to the suspicion of the vascular injury.

Finally, the clinical suspicion of vascular injury should be accompanied by an additional imaging examination to confirm the diagnosis. Dillon, *et al.* (2004) suggested an examination with

duplex ultrasonography which could confirm the diagnosis with accuracy over 90%. In literature, the first choice of examination is CT Angiography for better visualization and to assist preoperative planning [12,17,18]. In our case the clinical suspicion of vascular injury confirmed with CT Angiography.

Treatment of Profunda Femoris pseudoaneurysm depends on the size of the pseudoaneurysm [15]. Interventional Radiology coil embolization is generally the method of treatment when the size of pseudoaneurysm varies from small to moderate [20]. In cases in which the embolization has not therapeutic effects or the size of pseudoaneurysm is very large, the treatment of choice is surgical intervention [20]. Other treatment modalities referred to literature is ultrasonic guided oblitative compression and direct thrombin injection [21].

Conclusion

An iatrogenic arterial lesion during total hip replacement is an extremely rare complication but when appeared leads to life or limb threatening injury. Prevention of vascular injury is the most significant point to avoid this kind of complication during procedure of THR. A correct vascular history should accompany the preoperative control of each patient especially in elderly. Because vascular complication may be presented initially only with the clinical symptoms of patient (pain, swelling, hemodynamic instability) a great suspicion should be given to them. The diagnosis should be confirmed by computed tomography angiography which also determines the type of therapeutic management.

Conflict of Interest

The authors declare that have no conflict of interest.

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Ethical Approval

Our institution does not require ethical approval for reporting individual cases or case series.

Consent Form

Verbal informed consent was obtained from the patient for their anonymized information to be published in this article.

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