Massive Preperitoneal Hemorrhage from Unknown Source After Revision Total Hip Arthroplasty, Case Report

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1. Abstract

Vascular injuries are rare but serious complications of total hip arthroplasty. Many mechanisms have been described, which include: joint manipulation and dislocation, intra-joint protrusion of cement or screws, excessive retraction, direct damage by sharp instruments and heat injury from cement polymerization. One of the most important risk factors is revision surgery and surgery on the left hip. We represent a case of superficial epigastric artery injury with abdominal wall hematoma during hip arthroplasty revision surgery. Arterial injury was most probably the consequence of an excessive traction during hip reposition. The source of bleeding could not be located and treated until the second postoperative day.

2. Key words

Hip Arthroplasty, Revision surgery, Superficial epigastric artery injury, Preperitoneal hematoma

3. Introduction

Vascular injuries are rare complications of total joint arthroplasties but can be devastating. They include thromboembolism, direct vessel laceration, pseudo aneurysm and arteriovenous fistula formation. Etiologies of these injuries include joint manipulation and dislocation, intra-joint protrusion of cement or screws, excessive retraction, direct damage by sharp instruments, over reaming of the acetabulum and heat injury from cement polymerization [1,2]. An incidence of 0.1% - 0.2% in primary total hip arthroplasty (THA) [3] increases in revision THA, where it is between 0.3% and 0.5%. Revision THA brings higher risk due to more difficult anatomical orientation and previous-operation-related scarring. The most commonly affected are external iliac artery, femoral artery and femoral vein [4]. In elderly, external iliac artery and vein are more curved and tortuous and usually lie closer to the pelvic bone. We present a case of superficial epigastric artery injury that could not be located and treated until several days after surgery.

4. Patient Case

A 74-year-old woman, ASA [3], with bilateral hip osteoarthritis, was electively admitted to the hospital for revision hip arthroplasty because of aseptic loosening of both implant components. Her medical history was significant for lumbar spondylosis, bilateral femoral neuralgia, arterial hypertension, urinary incontinence and obesity. She has already had three hip arthroplasties; two left (2000 and 2010) and one right (2004). The patient was otherwise in good health and had no known history of preoperative complications, coagulopathy or vascular disorders. Preoperative hemoglobin value was 133 g/L.

General anesthesia was induced with intravenous fentanyl and propofol and maintained with a mixture of sevoflurane and nitrous oxide. Spinal block was attempted before induction of general anesthesia, however it was not successful. A revision arthroplasty with direct transgluteal approach was performed with the insertion of a revision acetabulum (Zimmer), which was fixated with two transacetabular screws. Blood loss was assessed at 1000 ml. During the surgical procedure 1000ml of colloids, 1000 ml of crystalloids and 2 units of Red Blood Cells (RBC) in total amount of 565ml were given, hemodynamic instability was treated with ephedrine, phentylephrine and atropine.

Ten minutes before the wound closure (after hip reposition), the patient’s blood pressure dropped to 60/30mmHg. Blood sample was taken and hemoglobin value was 86g/L. She responded transiently to 500ml of colloids and 1 unit of RBC. The patient woke up normally at the end of the surgery. Immediately after the transfer to post-anesthesia care unit, swelling in the lower part of the abdomen was noticed. Pelvic X-ray was performed and showed correct position of the implant (Figure 1). The swelling was increasing, so an injury to iliac artery or its branches was suspected, therefore an urgent Computer Tomography (CT) angiography was performed. It showed a large fresh extra peritoneal hematoma under the front inferior abdominal wall with suspected venous bleeding in the left par central abdominal region. Hematoma (4cm in diameter) was also noticed around iliac vessels with additional small amount of free intraperitoneal fluid around the liver. Selective pelvic angiography showed a large arterial bleeding from superficial epigastric artery with localized hematoma.


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ography (including a.iliaca communis dex, a.iliaca communis sin, a.iliaca externa sin and a.iliaca interna sin) was performed. Unfortunately, the source of bleeding was not found.

![Figure 1: Anteroposterior pelvic radiograph showing a correct position of the implant.](image)

Six hours after first angiography another drop in hemoglobin (from 98 g/L to 85 g/L) and blood pressure was observed, despite a transfusion of RBC. Computer tomography with angiography showed increased amount of free fluid around the liver and in anterior and posterior pararenal space. Hematoma under the left lower abdominal wall was of the same size as at the previous exam, active bleeding was not found. After administering 8 units of RBC and 7 units of Fresh Frozen Plasma (FFP), she stabilized and was transferred to a hospital ward, where she began with mobilization.

On the second postoperative day, another drop in hemoglobin (to 78 g/L) was seen. Computer tomography with contrast showed a small amount of contrast in arterial phase in the left lower para-central abdominal region again, it was seen even better in venous phase. The amount of hematoma remained constant. Selective catheterization of 2 small branches from a. femoral is communis on the left was performed and an extravasation from superficial epigastric artery was identified. The extravasations was treated with 3 coils. Altogether, she received 15 unit of RBC and 7 units of FFP.

After the coiling no further drop in hemoglobin value was seen and she started with rehabilitation. Oral anticoagulant therapy was initiated. We noticed transient rise in creatinine and urea levels which normalized by the end of hospitalization. Rehabilitation was slower than expected and she was discharged from the hospital 12 days after the surgery.

A patient consent was obtained for publication of an article.

5. Discussion

Perioperative vascular injury during hip arthroplasty is a rare but life-threatening complication. In majority of cases in literature injury to external and internal iliac artery, also to common femoral and deep femoral artery was described. Therefore, at the time of a decrease in blood pressure and hemoglobin values, our first thought was that there could be injury to external iliac artery: the tip of one of the screws was namely pointing about 1 cm into the pelvis. It has been shown that tortuous external iliac artery could be close to the pelvic bones especially in aged subjects and more commonly on the left side. Besides this, external iliac veins could lay directly on the osseous surface of the pelvis. Pelvic angiography showed close proximity of the vessel to the screw in our patient, however there was no injury to the artery. As our patient had preperitoneal hematoma in the lower abdomen, a superficial epigastric artery was identified as a possible source. It arises from the femoral artery 1 cm below the inguinal ligament and ascends upwards between the two layers of the superficial fascia of the abdominal wall. After coiling of this artery, no further drop in hemoglobin value was seen. It has been published before that a revision surgery represents an increased risk for arterial injury due to local scar tissue formation entrapping an artery during joint manipulation, which could be the mechanism in our patient. Nachbur et al.6 described the possible mechanisms of vascular injuries in hip arthroplasty, among them also laceration of an artery during replacement of a total hip prosthesis because of excessive traction. According to Shoenfeld et al. [7] excessive traction on vessels (especially atherosclerotic) was the cause of complications in 10% of the cases. Neurovascular injuries are described after the use of traction table in anterior approach for hip arthroplasty [8]. However, to the best of our knowledge there is no published case of superficial epigastric artery injury during hip arthroplasty. There are only cases of the above-mentioned artery injury during laparoscopic surgery.

Our patient had no risk factors associated with arterial injury after hip arthroplasty, except for a revision procedure [1]. Another risk factor described by Shoenfeld et al. [7] could be the left side.

Clinical presentation of arterial injury is usually an internal bleeding with growing hematoma, drop in hemoglobin levels and bleeding through the drains. Depending on the vessel involved, it could also lead to limb ischemia. Pseudo aneurysms are late complications which present as a pulsatile mass. The diagnosis of vascular injuries can be difficult after THA because patients present with nonspecific symptoms, so a significant hidden retroperitoneal hematoma can develop before it is diagnosed. Early recognition is possible using CT angiography or digital subtraction angiography, however the results of CT angiography and MR angiography in patients with hip prostheses are difficult to evaluate because of the presence of metal implants. In apparent bleeding, it is sometimes difficult to locate the source [9]. Preoperative angiography is advised in revision THA in the presence of marked acetabular medial protrusion [10].

There are many ways to treat injured vessels (suture repair, bypass, stenting, embolization and coiling), [7] but all of them demand localization of the bleeding vessel. In our case, on the third postoperative CT angiography, the source of bleeding was identified and coil inserted into the bleeding vessel. If it were unsuccessful, the only possibility left would be to treat the bleeding surgically.
6. Conclusions
Vascular injuries are rare in hip arthroplasty surgery; however, many maneuvers can lead into vascular injury, especially in revision procedures. We represented the case of superficial epigastric artery injury as a consequence of excessive traction during hip reposition. It was diagnosed and successfully treated only on the second day after the surgery.

References