

Rupture of External Iliac Artery during Total Hip Arthroplasty after Rotational Acetabular Osteotomy: A Case Report

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Learning Point of the Article:

To avoid arterial injury during THA, surgeons should preoperatively assess the location of the intrapelvic vessels around the acetabulum by three-dimensional CT angiography in cases with complicated hip anatomy.

Abstract

Introduction: Total hip arthroplasty (THA) is widely accepted as a safe and effective procedure to relieve hip pain and restore function, but complications can lead to a poor outcome. Although major vascular injuries during THA are rare, when they do occur, massive bleeding may threaten life.

Case Report: We describe a case of a 72-year-old woman who underwent THA after rotational acetabular osteotomy (RAO). When the soft tissue in the acetabular fossa was dissected with electrocautery, massive pulsatile bleeding suddenly occurred. A blood transfusion and metal stent graft repair saved her life. We assume that the cause of the arterial injury was a bone defect of the acetabulum and relocation of the external iliac artery after RAO.

Conclusion: To avoid arterial injury during THA, pre-operative three-dimensional computed tomographic angiography to locate the intrapelvic vessels around the acetabulum is recommended in cases with complex hip anatomy.

Keywords: Major vascular injury, total hip arthroplasty, periacetabular osteotomy.

Introduction

Total hip arthroplasty (THA) is widely accepted as a safe and effective treatment for patients with advanced osteoarthritic hips to relieve hip pain and restore function. However, serious complications that sometimes threaten life do occur. Of these, major vascular injury is the most devastating. Recent large studies have reported that the incidence of vascular injury during primary THA is 0.03–0.12% [1, 2, 3, 4]. Particular attention should be paid to cases with developmental hip dysplasia and/or previous pelvic surgery.

Here, we describe a case of external iliac artery injury due to a bone defect in the acetabulum during THA after rotational

acetabular osteotomy (RAO) [5]. To the best of our knowledge, there have been no prior reports of external iliac artery injury caused by this mechanism.

Case Report

A 72-year-old woman first presented to us with severe pain in the left hip. She had received a right shelf procedure 33 years earlier and a left RAO 25 years earlier for developmental dysplasia of the hip at another hospital. For the past 7 years, the patient had complained of increasing pain with activity limitation, which had recently severely affected her daily life. An anteroposterior radiograph revealed severe osteoarthritic changes in the left hip

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Figure 1: Pre-operative anteroposterior radiograph of the hip.

joint with irregular narrowing of the joint space (Fig. 1), and we diagnosed advanced osteoarthritis of the hip. Computed tomography (CT) revealed a large bone defect from the medial side to the anterior aspect of the acetabulum (Fig. 2). Therefore, we planned a THA with a bulk bone graft.

After lumbar anesthesia, the patient was placed in the right lateral position. The surgery was performed using a posterolateral approach. After incision of the pisiform tendon, external rotators, and posterior capsule, the femoral head was dislocated and the neck was osteotomized. When the soft tissue in the acetabular fossa was dissected with electrocautery, massive pulsatile bleeding was suddenly encountered. Attempts to stop the bleeding such as tight packing with gauze, using microfibrillar collagen in sheet form, and intravenous tranexamic acid were unsuccessful. The bleeding gradually diminished, but the patient went into shock. The wound was closed without implanting the components and the patient was sent to the emergency hospital 4 h after the incident. Angiography was performed with the femoral artery by an expert interventional radiologist. The definitive diagnosis was

achieved by selective digital subtraction angiography of the left external iliac artery, and active contrast extravasation was depicted near the inner wall of the acetabulum (Fig. 3). The lacerated portion of the artery was small and it was repaired with metal stent grafting (Fig. 4). Due to the massive blood loss, 16 units of red blood cell transfusion, 18 units of fresh frozen plasma transfusion, and 20 units of platelet concentrate were required. Three-dimensional computed tomographic angiography after stent grafting showed that the left external iliac artery was extremely close to the acetabulum (Fig. 5). The patient recovered well after the stent graft and was readmitted to our hospital 4 days later. THA was performed 2 weeks after the stent graft, and the post-operative course was uneventful.

Discussion

Although major vascular injuries during THA are rare, they may pose a serious threat to the involved limb and the patient's life. Causes of direct intraoperative major vessel injury include improper placement of retractors, inadvertent screw insertion for fixation of acetabular components or bone grafts, and excessive acetabular reaming [2, 6, 7]. Previous surgery to the hip is also a risk factor for direct vascular injury during THA [2, 8]. In this case, direct injury to the external iliac artery occurred during dissection of the soft tissue in the acetabular fossa in THA after RAO.

Several types of periacetabular osteotomy (PAO) have been developed to treat symptomatic acetabular dysplasia, including RAO, transposition osteotomy of the acetabulum, Bernese PAO, curved PAO, and University of Colorado PAO. There are several reports that THA after PAO demonstrates the following characteristics: large osteophytes, acetabular sclerosis, and acetabular wall defects [9, 10, 11, 12]. The cause of bone defect in this case was considered to be due to the chisel cutting into the cartilage around the acetabular fossa during the initial RAO and further abduction and retroversion of the osteotomized

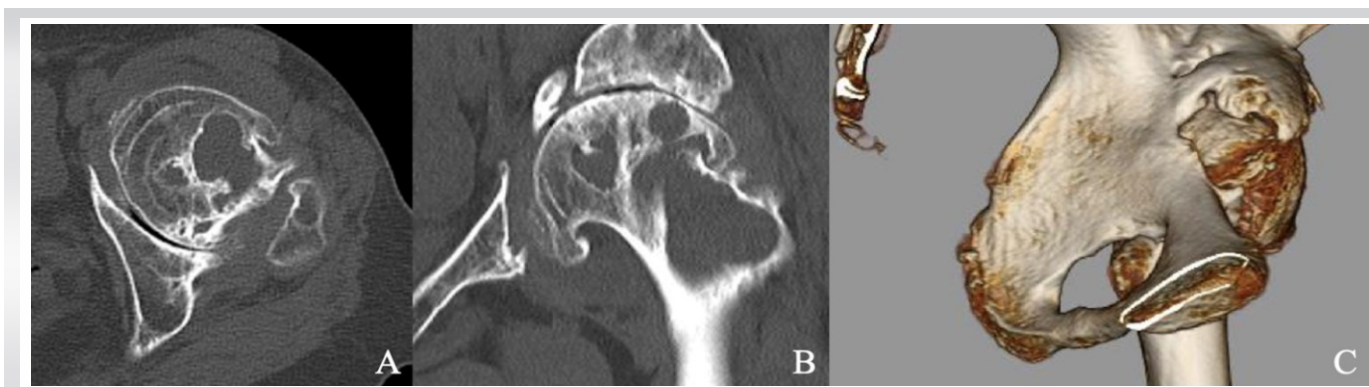


Figure 2: Pre-operative computed tomography showing the axial view (A) and coronal view (B) through the center of the femoral head. Medial view of three-dimensional computed tomography of the pelvis showing the bone defect in the acetabulum (C.)



Figure 3: Selective digital subtraction angiography showing the active contrast extravasation at the left external iliac artery (white arrow).

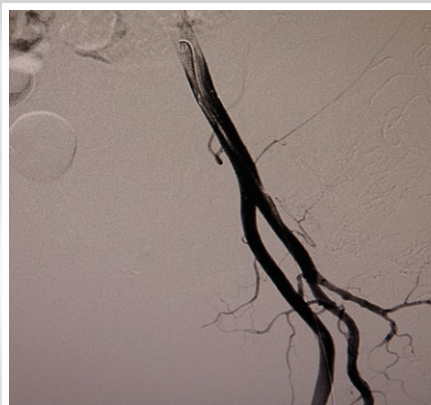


Figure 4: Angiogram of the stent placement over the left external iliac artery.

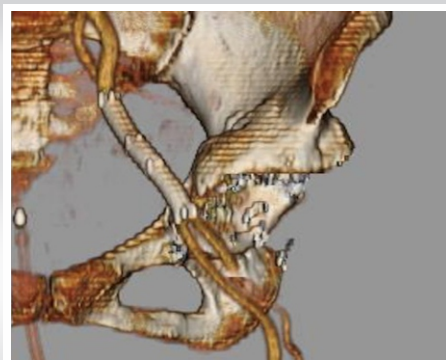


Figure 5: Three-dimensional computed tomographic angiography showing the repaired left external iliac artery running near the site of the bone defect in the acetabulum.

acetabulum. Therefore, it is important that surgeons understand the precise hip anatomy of each case. In our case, the bony morphology of the acetabulum was abnormal, with a medial bony defect.

A previous study based on three-dimensional CT angiography of the normal hip joint reported that the mean shortest distance between the external iliac artery and the osseous surface of the pelvis was at least 10 mm at any level of the acetabulum [13]. In contrast, in the present case, the distance from the bone defect to the external iliac artery was 3.4 mm. Considering that the external iliac artery runs along the iliacus muscle, the course of the external iliac artery may change with acetabular rotation in RAO.

Conclusion

To avoid arterial injury during THA, careful attention should be paid to patients with previous RAO, which may have resulted in distortion of the acetabular anatomy. It is advisable to preoperatively assess the location of the intrapelvic vessels around the acetabulum by three-dimensional CT angiography in cases with complicated hip anatomy.

Clinical Message

The acetabulum after PAO, including RAO, has a significantly altered anatomic morphology compared to pre-operative. To avoid arterial injury during THA, surgeons should preoperatively assess the location of the intrapelvic vessels around the acetabulum by three-dimensional CT angiography in cases with complicated hip anatomy.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her 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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