Iliac artery perforation and treatment during lumbar disc surgery by simple balloon tamponade

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Abstract

Introduction Although vascular injury during lumbar disc surgery is quite rare, it may be life threatening if not recognized and treated immediately.

Case We report the case of a woman who had a left common iliac artery laceration during spinal surgery and was treated by endovascular therapy. In the past, open surgery was the only way to repair a vascular injury, but thanks to the advance of new endovascular techniques and devices, endovascular therapy has become a strong alternative.

Conclusion This case differs from those published in the literature as we used a single balloon inflation and subtotal occlusion without the need for a covered stent.

Keywords Iliac artery laceration · Lumbar disk surgery · Balloon occlusion · Endovascular repair

Introduction

Accidental vascular laceration is a rare, but devastating, complication of spinal surgery. The reported prevalence is 1–5 per 10,000 cases, but the actual prevalence may be higher since some of the complications are not realized until later [1]. Commonly seen complications are pseudoaneurysms and arteriovenous fistulas. Early identification and treatment are vital since the mortality rate is between 40 and 100 % for major vascular injury [2]. Traditionally

the treatment is open surgery, but with the advancement of endovascular devices and techniques, endovascular intervention has become an effective alternative to surgery. In our case, we performed balloon inflation without using a graft stent, for the treatment of vascular damage caused during spinal surgery.

Case

A 50-year-old woman, with no prior disease, was admitted to our unit for lumbar disc hernia surgery. The operation was performed as a minimally invasive microdiscectomy. Following retraction of the right paravertebral muscles, a right L4 hemilaminectomy was performed using a high-speed drill. After that, the subligamentous free fragment that was compressing the L5 nerve root was extracted. Both L4 and L5 discectomy and foraminectomy were performed. Toward the end of the discectomy procedure, after several blind, deep curettes of the L5–S1 disc space, there was severe intervertebral bleeding and the patient became hemodynamically compromised. Since there was suspicion of vascular damage, the intubated patient was immediately transferred to the computed tomography (CT) laboratory. CT angiography was performed, and active extravasation of contrast was detected in the left common iliac artery into the retroperitoneal space (Fig. 1). In order to stop the leak, an urgent endovascular intervention was planned.

The femoral artery was accessed via the left groin. An angiogram was performed, and the perforation was clearly seen arising from the left common iliac artery (Fig. 2). We then performed a balloon occlusion of the target vessel (Fig. 3). A 7 × 40 mm Cordis Powerflex balloon was inflated at the perforation site for 5 min. The Iliac artery was 9–10 mm in diameter, but the only available balloon was 7 mm. During

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Fig. 1 Contrast CT showing left common iliac artery bleeding

Fig. 3 Peripheral angiography showing balloon occlusion

Fig. 2 Peripheral angiography showing left common iliac artery perforation

Fig. 4 Peripheral angiography after balloon occlusion showing that the leak is controlled

inflation of the balloon, blood pressure proximal to the balloon was 110/60 mmHg, and distal to the balloon was 50/20 mmHg. After 5 min, the balloon was deflated to restore blood flow to the extremity. After deflation another attempt was made, and no leak was seen (Fig. 4). We decided to perform the inflation three more times, for approximately 5 min, to secure the perforation site. We then waited for 1 h to see if there was any residual extravasation of the contrast. Fortunately, no further extravasation was detected and the procedure ended. No heparin or other anticoagulants were used during the case, and the sheath was frequently flushed to prevent thrombus accumulation. To prevent thrombus accumulation in the aorta, we withdrew the 0.035 in. guidewire from the balloon and thus only the balloon was left inside the

left common iliac artery. The patient was transferred to the intensive care unit. She was hemodynamically stable, and her hematocrit levels also remained stable. After 12 h, we performed a second angiogram, and there was no sign of perforation (Fig. 5). Since there was no further haemorrhage, we decided not to stent the vessel in order to avoid anticoagulant and antiplatelet therapy. The patient was discharged 3 days later without any further complication.

Discussion

The incidence of serious vascular injuries, such as arteriovenous fistulas, lacerations and pseudoaneurysms during

Fig. 5 Control angiography performed 12 h later showing no leak or vessel wall defect

disc surgery is 1–5 per 10,000 [1]. Arterial lacerations usually present immediately, and represent 30 % of vascular injuries [3]. The most commonly injured artery reported in the literature is the left common iliac artery, which lies anterior to the L4–L5 vertebral disc [4]. Today, endovascular approaches provide alternatives to open surgical repair. Endovascular approaches are associated with shorter hospital stay and are less invasive than open surgery, which is especially important for high-risk surgical patients. Endovascular therapy is well tolerated by patients, and can be performed under local anesthesia.

In our case, after the balloon inflation there was an immediate cessation of bleeding from the injured artery. After waiting for 1 h, there was no longer any haemorrhage. To avoid the complications of antiaggregant therapy, we did not place a covered stent.

There may be several reasons for our success with just balloon inflation. One of them is the anatomical feature of the laceration. The laceration flap was in the same direction as the blood flow. This made the laceration easier to close

after applying the balloon tamponade. The second reason may be the balloon size that we used. We used a 7 mm balloon to cover the perforation. However, the actual size of the vessel was 9–10 mm. This meant there was an inadequate occlusion, which allowed some blood flow along the length of the balloon to protect the extremity, and also to create more shear stress in the vessel wall, which may have been a contributing factor for clotting and fast occlusion of the laceration in the vessel wall. Subtotal occlusion of the vessel, by the balloon, allowed some blood flow, and disturbance of the laminar shear stress may have been a contributing factor for the successful treatment of this iliac artery perforation.

In conclusion, this case confirms that simple balloon tamponade may be sufficient to treat a limited injury to the iliac artery. Although there are some case reports showing that temporary balloon occlusion is not enough, we believe that the decision to implant a covered stent should be based on individual cases [5].

Conflict of interest None of the authors has any potential conflict of interest.

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