

Rupture of external iliac artery during microscopic lumbar disc surgery

-A case report-

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Iatrogenic vascular injury during lumbar disc surgery is a rare but serious complication. This paper reports a patient who sustained an injury to the iliac artery while undergoing intervertebral disc surgery at the lumbar region. He suffered from massive bleeding and shock. An urgent laparotomy was performed under cardiopulmonary bypass, and the vascular injuries were repaired successfully. This case shows that a rapid diagnosis and immediate intervention can result in a favorable outcome. (Korean J Anesthesiol 2010; 59: S176-S178)

Key Words: Discectomy, Iatrogenic, Vascular injury.

Iatrogenic major vascular injury during a discectomy is a rare complication of the most common surgical procedures performed in orthopedic and neurosurgical units [1,2]. Its occurrence might be associated with high morbidity and mortality, particularly if not diagnosed and treated immediately [3,4].

We experienced a rare case of an external iliac artery injury in a patient undergoing intervertebral disc surgery at lumbar region. It was treated successfully by open repair under cardiopulmonary bypass. A rapid diagnosis and prompt management resulted in a favorable outcome for this patient.

Case Report

A 57-year-old male patient presented with a sudden onset

of low back pain radiating to the left lower leg after running on a treadmill. The patient visited the emergency room and was diagnosed with a herniated lumbar disc. He had been diagnosed with hypertension 1 month earlier, but received no medication. Magnetic resonance imaging revealed a posterior herniated ruptured disc between the fourth and fifth vertebrae in the lumbar spine. A neurosurgeon evaluated the patient's condition, which indicated the need for a microdiscectomy of the left L4-L5 intervertebral disc. An emergency operation was decided because the patient complained of severe pain and numbness.

Inside the operating room, the non-invasive blood pressure (NIBP), electrocardiography (ECG) and pulse oximeter (SpO₂) were connected to the patient. His weight and height was 70 kg and 1.75 m, respectively. The patient was injected

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intravenously with glycopyrrolate 0.2 mg. General anesthesia was induced with propofol 120 mg and endotracheal intubation was facilitated using rocuronium 60 mg as a muscle relaxant. Anesthesia was maintained with desflurane in a 50% N₂O and O₂ mixture, and rocuronium. The lungs were ventilated mechanically with a semiclosed circuit system to maintain the end-tidal CO₂ (EtCO₂) at approximately 35 mmHg. Intraoperative monitoring included the heart rate, NIBP, ECG, SpO₂, EtCO₂, anesthetic gases analysis and the airway pressures.

The patient was placed in a prone position. A sudden spurt of blood occurred when the disc was almost completely removed. As the blood continued to gush out, the systolic BP decreased to 50 mmHg, the NIBP was not detectable and patient began to have tachycardia (156 bpm). Three 16 G cannulas were quickly secured on the dorsum of the other hand and both external jugular veins. Arterial cannulation was achieved with a 20 G cannula on the left radial artery. Under the suspicion of a large vessel injury, the laminectomy wound was closed immediately and the patient was turned to the supine position for a laparotomy. At that time, the patient showed an inflating abdomen. A 16 G double lumen central line was placed in the right internal jugular vein and fluids were infused. Dopamine and dobutamine infusions were started but they had no effect, so a norepinephrine infusion was also started.

The neurosurgeons, anesthesiologists and cardiothoracic surgeons agreed about the necessity of cardiopulmonary bypass (CPB) due to the suspicion of severe bleeding from an iatrogenic large vessel injury. A right iliac artery injury was suspected so the left femoral artery and vein were used for cannulation. Heparin (150 units/kg) was administered. After 5 minutes, the activated coagulation time was 600 seconds. An arterial cannula was cannulated into the left femoral artery, with a flow of 2,000 ml/m²/min, and partial CPB was started. Normothermia was maintained. On an intra-abdominal exploration, a wedge-shaped rent was found in the right external iliac artery around the L4-5 level. During the operation, the patient lost another 5 liters of blood. The intravascular volume was replaced with 9 liters of crystalloid, 0.5 liters of colloid, 18 units of packed red blood cells, 14 units of fresh frozen plasma and 8 units of platelet concentrates. As soon as the external iliac artery injury had been repaired, the hemodynamic parameters of the patient began to improve. After the bleeding was controlled, and the CPB was stopped, and protamine (185 mg) was administered. The pump time was 58 minutes. The remaining course of surgery was uneventful.

Postoperatively, the patient was sent intubated and ventilated to the intensive care unit (ICU). In the ICU, the vasopressors were withdrawn gradually as the patient became hemodynamically stable. The patient was extubated on the fourth postoperative day. Under the appropriate treatment for seven days, the patient

was transferred from the ICU to the surgical ward. Four weeks later, the patient was discharged from hospital neurologically intact and with a healthy laparotomy wound.

Discussion

The spinal cord is bound to the vertebral bodies, pedicles, and laminae. The aorta is ventral to the vertebral column, which transverses the diaphragm at the level of the L1 intervertebral space and bifurcates at the level of the L4 intervertebral space into the common iliacs. The inferior vena cava is located to the right of the aorta in these segments, and is divided further into left and right common iliac veins, also at the level of the L4 intervertebral space [5]. Injury to the vessels due to surgery might be encountered at any segment.

The incidence of major vascular injury during lumbar disc operations is 0.01–0.05% [2,5] with an overall mortality of 10–65% [2–4]. The broad range of the mortality is associated with the diameter of the injured vessels, size of the tear, speed of diagnosis, laparotomy and control of bleeding [3].

Many factors predisposing the patients to vascular injury during lumbar surgery have been reported, including anterior disc rupture, preexisting defects in the anterior annulus fibrosus and anterior longitudinal ligaments, vertebral anomalies, body habitus, patient positioning, use of different techniques, use of a surgical microscope, prior intraabdominal surgery, surgery for recurrent disc herniation, and the surgeon's experience [2,6,7].

Major vascular injuries can manifest as acute life-threatening hemorrhage, chronic arteriovenous fistula or pseudoaneurysm formation. Acute blood loss can lead to an intractable and progressive decrease in blood pressure due to hypovolemia, wide pulse pressure, tachycardia, a decrease in haematocrit, pallidness, and a decrease in skin temperature. An arteriovenous fistula and aneurysms may often be undetected initially and patients may present with symptoms months or years later [8]. The mortality rate for lacerations, arteriovenous fistula and pseudoaneurysm was 20%, 5% and 0%, respectively [2]. The most common injury among them is on the right common iliac artery, which is located immediately anterior to the L4-L5 lumbar disc space [2,9]. Next in order of frequency is an arteriovenous fistula between the right common iliac artery and left common iliac vein [5].

The most common surgical techniques for repair of these complications include the following techniques: primary suturing, interposition grafting, excision with end-to-end anastomosis, suturing from within the vessel, patch angioplasty, ligation and endovascular embolisation or stent-graft placement [2,8,10].

Laceration of a major artery or vein will result in life-threatening bleeding complications that should be treated by

rapid fluid resuscitation and immediate vascular surgical intervention. The surgical decision and repair of the arterial wall injury in patients presenting with an acute and rapid course of deterioration should be made as early as possible. The mortality rate approaches 100% when surgery is not performed immediately in arterial injuries. During lumbar disc surgery, ureteral and intestinal injuries can also occur but, the diagnosis can be more difficult due to a lack of specific diagnostic signs [7,11].

Generally, CPB with the femoral artery and vein is indicated for an aneurysm of the ascending aorta, or severe atherosclerosis or difficult cannulation in the ascending aorta during cardiac surgery due to the complex surgical technique. In addition, it can be used when difficult airway management is predicted or, like this case, when severe bleeding caused by a major vessel injury occurs.

In summary, a large vessel injury during a discectomy is quite rare but very dangerous. Correct crisis resolution protocols, such as proper massive transfusion algorithms and successful surgical intervention, are quite effective during the critical period. A high index of suspicion, prompt diagnosis and action will result in improved patient salvage.

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