

Vascular Injury during a Lumbar Laminectomy

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A lumbar laminectomy is a common and routine operation. Damage to abdominal vascular structures during surgery is a relatively infrequent complication; however, when it does occur, it is sudden and life-threatening. We herein report on 2 cases of abdominal vascular injury which occurred during lumbar microdiscectomies. The first case was a 34-year-old man. A bloody surgical field was noted 45 min into the operation along with an increase in heart rate and a decrease in blood pressure. After fluid resuscitation and an ephedrine injection, his vital signs stabilized. The patient was then sent to the surgical intensive care unit for observation. An emergent abdominal computer tomography scan revealed right retroperitoneal hematoma, and an urgent exploratory laparotomy was performed to check for bleeding and to remove the hematoma. The second case was a 61-year-old woman with recurrent disc herniation. The operation was proceeding smoothly for 90 min, when a large amount of fresh blood suddenly gushed out. Her blood pressure immediately dropped to that of a state of shock. The patient was turned back to a supine position, and an emergent laparotomy was done to repair the injured vessels. Both patients had uneventful recoveries. (*Chang Gung Med J* 2003;26:189-92)

Key words: spinal surgery, vascular injury.

In 1934, Mixer⁽¹⁾ described an operation for rupture of an intervertebral disk. The first vascular injury following this lumbar disk surgery was reported 11 years later by Linton and White.⁽²⁾ Since then, other reports of vascular injuries associated with lumbar disk surgery have appeared sporadically in the literature.⁽³⁻⁸⁾ Nowadays, a lumbar laminectomy is a common and routine surgery in daily practice, but it can result in sudden, life-threatening though infrequent vascular complications with a 50% mortality.⁽³⁾ Such events usually require rapid therapy, so it is essential that anesthesiologists be aware of this potential complication, its manifestation, and treatment.

CASE REPORT

Case 1

A 34-year-old healthy man complained of low back pain for 1 year, and sudden onset of numbness with radiation to the left leg for 1 week. Lumbar spine magnetic resonance imaging study showed left-side posterolateral disc herniation and interspace narrowing at the level of L5-S1. A microdiscectomy was arranged under the impression of a herniated intervertebral disc (HIVD). Anesthesia was induced with 100 ug fentanyl, 250 mg thiopental, and 30 mg atracurium, and was then maintained with 1.5% isoflurane administered in 50% oxygen and 50%

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nitrous oxide with a fresh gas flow of 1 l/min. The surgery was commenced in a routine prone position. About 45 min after skin incision, sudden changes were noted when the neurosurgeon was removing the herniated disc with a pituitary rongeur: end-tidal CO₂ decreased from 28 to 23 mmHg, the heart rate increased from 70 to 120 beats/min, the blood pressure dropped from 100/60 to 70/40 mmHg, and blood filled up the operative field. The surgeon immediately compressed the wound with packs, while the anesthesiologist gave 20 mg ephedrine and 1000 ml lactated Ringer's solution intravenously. The blood pressure returned to 100/60 mmHg after supportive therapy. After 20 min of compression, the packs were removed, and no further bleeding ensued. Since the hemodynamic condition of the patient remained stable, the neurosurgeon decided to close the wound and sent the patient to the surgical intensive care unit for close observation with an order for an emergent abdominal computer tomography (CT). Intra-abdominal hemorrhage was noted on the CT, but an emergent laparotomy was not performed as the vital signs were stable. However, the next morning, the patient complained of lower abdominal pain. Mild fever with peritoneal sign developed. An urgent exploratory laparotomy was performed. A small 0.5×0.5-cm perforation was noted in the posterior wall of the right common iliac artery with active bleeding. Massive retroperitoneal hematoma extending to the serosa of the large intestine was also found during the operation. Primary repair of the right common iliac artery was done with Prolene sutures. The patient recovered well and was discharged from the hospital 8 days after surgery.

Case 2

This case was a 61-year-old woman with recurrent HIVD who underwent a lumbar spine discectomy with anesthesia and surgery as usual. About 90 min after the skin incision, massive bleeding suddenly occurred when the orthopedic surgeon was removing the herniated disc with a pituitary rongeur. Her arterial blood pressure dropped from 110/65 to 70/30 mmHg, the heart rate slowed to 50 beats/min, and oxygen saturation declined from 100% to 85% according to the pulse oximeter. Immediate fluid resuscitation, a blood transfusion, and vasopressor were administered but in vain. After 20 min of resuscitation, the patient was still in a state of shock.

Therefore, the orthopedic surgeon decided to perform an emergent laparotomy. In the abdominal cavity, 2100 ml of blood was found. Bleeding from the right common iliac artery was noted, and the tear was sutured. The patient had an uneventful recovery and was discharged from the hospital 7 days after the operation.

DISCUSSION

A lumbar laminectomy is a standard procedure which can be performed at medical centers and community hospitals. Vascular injury during a lumbar laminectomy is not an everyday occurrence. The incidence of vascular injury complications in lumbar spinal surgery was reported to be 2.4%.⁽⁴⁾ Although reported cases are few, there are far more unrecognized events than expected. However, when such an event does occur, it can cause a fatality in an otherwise healthy patient.⁽⁵⁻¹⁰⁾

By an overwhelming majority, the pituitary rongeur is the cause of injury.^(3,9-13) The injury is caused when, in removing disc fragments, the anterior longitudinal ligament is penetrated by the rongeur. The intra-abdominal pressure in the prone position presses the abdominal viscera against the vertebral bodies and the vessels in the retroperitoneal, rendering the vessels relatively immobile. Therefore, they have no chance to roll out of harm's way as the rongeur impinges upon them, especially when the surgeon is unaware of the exact location of the instrument. This may occur even for experienced surgeons with a gentle technique.

The L4-5 disc space is the most common site for a herniated intervertebral disc.⁽⁸⁾ Bifurcation of the aorta and inferior vena cava lies just anterior to this disc space, separated from it only by the anterior spinal ligament. Chronic disc disease may weaken this ligament, and prior disc surgery may alter the relationship between the ligament and the disc space. Our first patient had had chronic low back pain for 1 year, while the second patient had had repeated back operations. Both were at high risk for a weakened or distorted anterior spinal ligament. Unfortunately in both cases, aggressive exploration of the spinal disc resulted in injury to the right common iliac artery, which is the most frequently injured vessel.⁽¹⁴⁾

In a hemodynamically stable patient with uncertain clinical circumstances and possible vascular

injury, an angiogram should be considered as a diagnostic adjunct.^(7,12) As in our first case, although an abdominal computed tomography scan showed retroperitoneal hematoma, the surgeon thought that most of the bleeding from the vascular injury would spontaneously stop after compression. Therefore an urgent laparotomy was postponed until the following day when a peritoneal sign developed. However, posterior compression is definitely not helpful in prevertebral vascular injury. It is dangerous to wait for the bleeding to stop by compressing the artery.

In most reported cases in a prone position, the early signs of blood loss are hypotension, hypovolemia, and a decrease in oxygen saturation. In our case, the first sign was a decrease in end-tidal carbon dioxide probably related to decreased blood flow to the lungs and a rapid fall in arterial blood pressure. Therefore, routine monitoring while a patient is anesthetized for spinal surgery should include an electrocardiogram, end-tidal carbon dioxide, arterial blood pressure, and a pulse oximeter.

Vascular injury can occur as a result of laceration, compression, or traction during a laminectomy or discectomy, because the vascular structure is so close to the spine. If hypotension persists despite vigorous blood and fluid administration, the anesthesiologist should suspect bleeding into the retroperitoneal space or abdomen. He should alert the surgeon to this possibility and be prepared for immediate exploration of the abdomen. With prompt recognition and aggressive treatment, the outcome can be excellent.

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腰椎板切開術所引起的血管傷害

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腰椎板切開術是一種很普遍，而且又是常規的手術，但有時卻會發生不可預料而且是危及生命的併發症，這些意外需要迅速有效的治療，麻醉醫師不可輕忽，要時時謹慎注意。在此報告我們所遇到的2個病例。一個34歲男病人，因為HIVD來住院，要作L5-S1 Disectomy，麻醉與手術準備和一般情形一樣。在手術開始45分鐘後，突然發現end-tidal CO₂逐漸下降，心跳加快，血壓由100/60下降到70/40，而且血由手術地方湧出，外科醫師馬上停止手術，用紗布壓住傷口，麻醉醫師加速補充大量點滴，同時靜脈注射麻黃素，15分鐘後血壓回到100/60 mmHg，傷口的血也不再流，趕快縫合傷口，將病人送加護病房觀察。第二天因為發現有內出血現象，作開腹探查，發現是right common iliac artery拉裂傷，約有700 ml的血，經縫合後病人很快就恢復出院。另一個61歲的女性病人，曾開過laminectomy，現在是腰椎間板突出復發要做腰椎間切除，麻醉與手術和一般情形一樣。在手術進行了90分鐘後，突然發現有鮮血由傷口噴出，血壓馬上下降，心跳變慢，Pulse oximeter的含氧量由100下降到85，馬上停止手術立即灌血及補充水份，同時緊急開腹探查，發現是右邊common iliac artery裂傷，有2100的血在腹腔，經縫合後，病人很快就恢復。(長庚醫誌 2003;26:189-92)

關鍵字：腰椎板切開，血管傷害。

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