

# Abdominal vascular injury during lumbar disc surgery: report of three cases

## Lomber disk cerrahisi esnasında gelişen abdominal vasküler yaralanma

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Anterior longitudinal ligament perforation and abdominal vascular injury is one of the most critical complications that may develop during lumbar disc surgery. The vascular injury-related symptoms that warns the surgeon may be late to appear; they usually turn out to be mortal. The hypotension during the operation, tachycardia and pulsatile unstopable hemorrhage observed in the disc space are the major findings. Urgent detection of this complication and the repair of the vascular injury prevent the case from turning out to be fatal. In the present study, three patients who underwent surgical treatment of abdominal vascular injuries that had developed during lumbar disc surgery, were presented.

**Key Words:** Anterior longitudinal ligament; lumbar disc surgery; vascular perforation.

Lomber disk hernisinin cerrahi tedavisi sırasında anterior longitudinal ligamanın perforasyonu ve abdominal vasküler yaralanma, oluşabilecek en ciddi komplikasyonlardan biridir. Cerrahi uyarın vasküler hasara ait belirtiler gecikebilir ve genellikle ölümcül seyredir. Ameliyat sırasında gelişen hipotansiyon, taşikardi ve disk mesafesinde görülen pulsatile, durdurulamayan kanama belirgin bulgulardır.

Bu yazıda lomber disk cerrahisi sırasında abdominal vasküler hasar gelişen ve vasküler cerrahiyle tedavi edilmiş üç olgu sunuldu.

**Anahtar Sözcükler:** Anterior longitudinal ligaman; lomber disk cerrahisi; vasküler perforasyon.

### Case 1

A male patient at the age of 47 was hospitalized in our clinic with the complaint of pain in his waist and left leg. His straight leg raising (SLR) test was positive at 60 degrees in the left leg and at 75 degrees in the right. Blood biochemistry tests were performed. Hb was found to be 14 g/dL and the other parameters were within normal ranges. No pathology was determined on chest X-ray and electrocardiography (ECG). In the lumbosacral MR images, foraminal and extraforaminal disc herniation was detected at the left L4-5 level. Left L4 hemilaminectomy, foraminotomy, facetectomy and extraforaminal sub-capsule free fragment excision were performed. During the discectomy, a pulsatile hemorrhage was observed

from the disc space. Fluid replacement was initiated since abdominal vascular injury was predicted and the operation zone was closed immediately. A blood test was performed and Hb was found to be 8.4 g/dL. Hypovolemic shock findings (hypotension, tachycardia) were observed during the closure of the operation zone. Blood replacement was initiated to the patient without delay and vascular surgeons carried out abdominal exploration. Injury was detected in the left common iliac artery. The injury was repaired using Daflon graft with end-to-end anastomosis. Eight units of blood were administered peroperatively. Vital findings and the haemodynamic parameters were stable in the postoperative follow-up and the patient was discharged.

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## Case 2

A male patient at the age of 52 was hospitalized in our clinic with a complaint of pain in his waist and right leg. There was no abnormal finding in the systemic and physical examination of the patient. Neurological examination revealed that SLR test was positive at 45 degrees in the right leg which was corresponding with the hypoesthesia observed in the L4 and L5 dermatome. Hb was 14 g/dL, blood biochemistry examinations were normal. No pathology was determined on chest X-ray, ECG was normal. On the lumbosacral MR images, a disc herniation that has been narrowing the neural foramen at the right L4-L5 level was observed. Right L4 hemilaminectomy, foraminotomy, sub-capsule free fragment excision from the right L4-5 disc space and discectomy were performed. During the discectomy, disc material was removed from the disc space through the disc forceps, followed by pulsatile hemorrhage. Rapidly developing hypotension and tachycardia were observed. The operation area was closed and fluid and blood replacements were initiated. Hb level was measured as 7.5 g/dL. The patient was turned from prone position to supine position and abdominal exploration was carried out immediately with the vascular surgeons. Perforation was observed in the right common iliac artery; primary end-to-end anastomosis was performed. Eight units of blood were administered peroperatively. In postoperative stage, the patient was followed up in the reanimation unit by vascular surgeons and anesthesiologists, together. No complication was observed in the incision site. Vital findings and the haemodynamic parameters were stable in the postoperative follow-up and the patient was discharged. The patient was referred to our clinic for control one month later, and his neurological examination was found to be normal and no pathology was detected on abdominal ultrasonography (USG).

## Case 3

A 50 year-old male patient was hospitalized in our clinic with a complaint of pain in his waist and both legs. Neurological examination revealed that SLR test was positive at 30 degrees in the right leg; right patella reflex was hypoactive and hypoesthesia was observed in the right L4 and L5 dermatome. Hb was 13 g/dL and biochemistry tests were found to be normal. No pathology was observed on chest X-ray;

ECG was normal. Lumbosacral MR imaging revealed, right paracentral disc herniation that was narrowing the neural foramen at the right L4-L5 level. Right L4 hemilaminectomy, foraminotomy and sub-capsule free fragment excision from the right L4-5 disc space were performed. During the discectomy, disc material was removed from the disc space through the disc forceps, followed by pulsatile, epidural hemorrhage not resulting from the bone origin. The operation was stopped immediately and fluid and blood replacements were initiated. Hb level was measured as 6.7 g/dL.

Abdominal exploration was carried out immediately by vascular surgeon. Perforation was observed in the right common iliac artery. The artery was repaired using Daflon graft. Nine units of peroperative blood replacement were administered. The patient was taken to the follow-up stage in the postoperative neurosurgery intensive care unit. On the second postoperative day, the patient experienced respiration difficulty. Chest X-ray and abdominal USG were performed, the latter of which revealed hematoma in the retroperitoneal zone. Abdominal re-exploration was urgently performed, followed by hematoma drainage. At the postoperative stage, the patient was intubated and then taken to the follow-up stage in the re-animation unit. On the third postoperative day, the patient was extubated and mobilized. No complications occurred in the incision site; vital findings and the haemodynamic parameters were stable so he was discharged. On his one month follow-up, he had no complaint and his abdominal USG was normal.

## DISCUSSION

Despite the optimal surgical techniques, lumbar disc surgery is performed in a very limited area. Surgeons must focus on recognizing the vascular injury as early as possible, rather than focusing on how the complication developed.

Many authors have suggested that intra-abdominal vascular injury should be taken into consideration until proven otherwise, in the presence of unexplained hemorrhage from the disc space, tachycardia and progressive or sudden decrease in blood pressure.<sup>[1-4]</sup> In the three presented cases, hypovolemic shock and pulsatile hemorrhage were detected from the disc space.

Presence of unexplained epidural hemorrhage from the disc space not resulting from the bone origin is the first indicative finding of a possible intra-abdominal vascular injury. Particularly, the pulsatile characteristic of the hemorrhage points out to the arterial vascular damage. In the presence of hemorrhage developing before hypovolemic shock findings, blood and fluid replacement should be initiated without waiting for the development of the hypotension and tachycardia symptoms. The operation zone should be immediately closed and followed by an urgent abdominal exploration. In our cases, pulsatile hemorrhage was the first finding. After termination of the operation and closure of the operation zone, hypovolemic shock findings appeared during the fluid replacement and urgent abdominal exploration was performed. The hemorrhage was an early finding; however, it may not be observed from the disc space in all cases. DeSaussure reported arterial hemorrhage visible through the disc spacing in less than 50% of the subjects he compiled.<sup>[5]</sup> Thus, hemorrhage occurring in the retroperitoneal or peritoneal spaces and not visible from the disc space may not give a clear warning to the operator. In a young and healthy body, unless 30-40% of the total blood volume is lost hypovolemic shock findings may not appear until the patient is taken to the recovery room, which may again cause a delay in the diagnosis.<sup>[4]</sup> Hypotension and tachycardia may be encountered in myocardial infarction, pulmonary emboli and in circulatory collapse developing in connection with the anesthesia. Furthermore, information recorded during the anamnesis of the patient may mislead the surgeon and anesthesiologist as they evaluate the reason for the hypotension and tachycardia developing during the operation and may also cause a delay in the diagnosis.<sup>[6]</sup>

Many risk factors have been defined in the ventral perforation that may develop during surgery for lumbar disc disease; however, no single dominant factor has been noted. The defects existent in the anterior longitudinal ligament increase the risk of abdominal vascular injury in delayed intra-abdominal surgery, abdominal radiotherapy, peridiscal fibrosis, recurrent disc surgery and ventral disc herniations.<sup>[3,6,8]</sup> The mortality rate ranges from 25% to 61%, depending on the stage at which the injury is detected and the time of the operation performed for this purpose.<sup>[1,9]</sup> In our three cases, when the pulsatile hemorrhage was observed, it was assumed that intra-

abdominal vascular damage had occurred and thus abdominal exploration was carried out immediately by the vascular surgeons, the common iliac artery was repaired and vascular damage was resulted with no mortality. The right and left common iliac arteries are anatomically close to the front side of the vertebral body corpus. The most frequent intra-abdominal vascular damage has been reported in L4-L5 disc disease surgery, namely, left common iliac artery perforation.<sup>[3,8]</sup> Two of our patients underwent operation because of right L4-L5 disc herniation disease; the other patient was operated for left L4-L5 disc herniation disease. Perforation developed in the left common iliac artery in the one case and in the right common iliac artery in the other two cases. Evaluation of the lumbosacral MR images revealed no significant difference between the corpus front surfaces of the left and right common iliac arteries or in the space between them.

Intra-abdominal vascular damage that develops during lumbar disc disease surgery must be detected as early as possible and the necessary treatment should be administered. Treatment of the pathologies that may develop in the postoperative follow-up stage is a vital factor for the patients' successful return to their pre-operative social and professional activities.

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