Vascular complications related to lumbar disc surgery

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Object. Vascular complications related to lumbar disc operations are rare but extremely fatal conditions. The authors analyzed data retrospectively obtained in 13 patients with vascular complications that occurred during lumbar disc operations performed between January 1990 and January 2002.

Methods. One patient underwent an L5–S1 procedure and the remaining underwent L4–5 surgery. Missed injuries, which were found during the late postoperative period, included pseudoaneurysm in four cases and an arteriovenous fistula in one. In all cases except one in which complication occurred early in the postoperative period, the retroperitoneal area was reached via a transperitoneal approach. In eight patients with complications occurring early in the postoperative period, Dacron graft was placed in four with arterial injuries and saphenous vein graft in one. In three cases of arterial injury and five of venous injury, the lesion was repaired using the primer suture technique.

The most commonly affected vessels were left common iliac arteries (76.9%) and left common iliac vein (30.8%). In eight early cases, shock or preshock due to hemorrhage developed during the early phase. During the late postoperative period, graft-related infection occurred in two cases in which Dacron graft was placed, and axillofemoral extraanatomical bypass surgery was later performed. There was no surgery-related death. During a mean follow-up period of 5.6 years, none of the patients suffered any problems related to vascular injury.

Conclusions. Despite its low incidence, iatrogenic vascular injury related to lumbar disc surgery is a possible complication. During lumbar disc operations early diagnosis of vascular injuries and urgent transperitoneal surgery can save patients’ lives.

KEY WORDS • vascular surgery • complication • lumbar disc surgery • retroperitoneal approach • hemorrhage • graft

During intervertebral disc surgery, vascular injuries rarely occur. It has been reported that the incidence of symptomatic vascular complications ranges from 0.016 to 0.17%. The mortality rate has been reported to range from 15 to 61%. The great vessels, which are in proximity to the vertebral column, are at risk of injury intraoperatively because of their location. Early complications are often identified by hypotension due to severe bleeding. The most common late complications are AVF and pseudoaneurysm. Vascular complications often occur during L4–5 disc surgery.

The importance of early diagnosis and emergency surgical intervention in cases involving early-onset postoperative complication is emphasized in the literature, although therapeutic strategies, which should be well assessed in urgent surgery, and the best surgical approach (retroperitoneal or transperitoneal) remain controversial.

In this study we reported on 13 patients with vascular complications of lumbar disc surgery performed at our hospital or at other hospitals. We discuss the importance of early diagnosis, treatment techniques, and the results of two surgical approaches (retroperitoneal or transperitoneal).

Clinical Material and Methods

All patients were men with a mean age of 36 years (±11 years [standard deviation]). All vascular injury complications due to lumbar disc surgery were caused by neurosurgeons. Lumbar disc surgery was performed via the posterior approach in all cases.

Early Complications

In five of eight cases in which complications developed in the early postoperative period, vascular injuries were documented at our two military centers (three cases in Gülhane Military Medical Academy, Ankara, and two cases at Gülhane Military Medical Academy, Istanbul) (total number of patients 3614) and the other three cases occurred at another hospital (total 2309 patients). In the latter three cases, general surgeons initially controlled the
bleeding by using a vascular clamp and gauze placed on the vessel via a retroperitoneal approach and our surgeons treated the defect. Following this initial attempt, vascular surgeons from our department went to the neurosurgical operating theaters and attempted surgical repair of the vascular injuries via the retroperitoneal approach, which had already been conducted by general surgeons. In one patient, the vascular injury was treated retroperitoneally. After unsuccessful attempts in the other two cases, however, an additional transperitoneal approach was performed and vascular injuries were repaired.

In these eight cases, surgery was performed immediately in four and 2 to 5 hours after surgery in the other four. Clinical features are shown in Table 1. In addition to hypotension, symptoms of abdominal, hip, and lumbar pain were other significant signs in four cases. Femoral arterial pulse was not palpable in one case. In another case, arterial bleeding at the discectomy area was observed, the patient placed in the supine position, and general surgeons controlled the bleeding primarily.

Late Complications

Complications manifesting later in the postoperative period occurred in five patients. Two suffered hip pain and one experienced left leg edema. The remaining two patients were asymptomatic, and the diagnosis was made by coincidence during abdominal ultrasonographic examinations. All patients had history of lumbar disc surgery, which had been performed 6 months to 5 years previously. All patients had palpable femoral arterial pulses. Digital subtraction angiography revealed a pseudoaneurysm at the iliac arterial level in four and an AVF between the iliac artery and vein in one patient (who had undergone L5–S1 surgery). Three of the four pseudoaneurysms were located at the left common iliac artery just distal to the aortic bifurcation. The fourth pseudoaneurysm was located at the proximal part of left external iliac artery. Digital subtraction angiography revealed an AVF at the right common iliac artery and vein 5 cm distal to the aortic bifurcation (Fig. 1).

### Results

The most common affected vessels were the left common iliac artery (10 [76.9%]) and left common iliac vein (four [30.8%]). Surgery-related characteristics are shown in Table 2.

#### Early Onset-Postoperative Complications

Of the eight early-onset vascular injuries, three occurred at different hospitals and were in patients in whom the initial surgical approaches to repair the injuries were retroperitoneal. Injuries could not be repaired by this approach in two patients and an additional transperitoneal approach was used.

A graft composed of Dacron tubing was placed in two of the eight early-onset cases and saphenous vein graft was interposed in one. The injured vessel was closed primarily after dissecting from adjacent tissues in three patients (Table 2). Primary closure of the vein combined with use of a Dacron graft to treat the arterial injury was performed in the remaining two patients. In three of four patients in whom Dacron graft interposition was performed, bleeding was controlled by general surgeons. Blood transfusion was more often required in patients who had undergone an initial retroperitoneal approach conducted by general surgeons (11 ± 2.64 U compared with 7.2 ± 2.58 U).

In one case in which inferior caval vein, aorta, and left common iliac artery were injured, the amount of blood for the transfusion increased because of the extended total area of vascular injury.

### Late-Onset Postoperative Complications

The retroperitoneal approach was performed in all five patients in whom vascular complications following lumbar disc surgery occurred later in the postoperative period. Of the four patients with pseudoaneurysm, two underwent Dacron graft interposition, one pseudoaneurysm resection and ligation, and one pseudoaneurysm resection and end-
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The intraabdominal great vessels lie just in front of the vertebral column and are capable of little movement. Placing the patient prone during surgery increases the possibility of vascular complications because the vertebral column becomes closer to these vessels. When vascular injury occurs, if the proximity of these structures is not appreciated, the mortality rate can increase to 15 to 61%. In our retrospective study, in eight cases in which symptoms occurred early in the postoperative period and in which surgery was timely, the mortality rate was 0% during 12 years of follow up. Two important points are associated with this success. First, hypotension refractory to conservative therapy warned the surgical and anesthesia teams against vascular complication. Second, one is reminded of Hildreth’s point that “No guilt or chagrin should result from a negative retroperitoneal exploration when one suspects a vascular injury has occurred.” In our retrospective study there were three negative explorations among the 3614 lumbar disc operations performed at our hospital.

Discussion

The main findings that alerted the surgical team to the vascular injuries were local hemorrhage and refractory hypotension in early-onset complications. Despite the fact that massive hemorrhage can occur after such a complication, Harbison reported on this phenomenon in only seven of 25 cases. In only one of four cases with early-onset injury, the development of hemorrhage occurred during surgery was a positive finding leading to diagnosis of the vascular complication. Because of their retroperitoneal nature, recognition of great vessel injury is low. When observing a surgical shock of unknown origin, a careful anesthetist may help the surgeon to determine the complication by warning against the need for positive inotropic medication and volume replacement to correct hypotension that gradually deepens. Hypotension refractory to intensive medical treatment was an important sign in our cases. Bleeding in the retroperitoneal area can be stopped by buffering the injury site. When the patient is turned to the supine from the prone position intraoperatively, the bleeding may again begin because of diminished retroperitoneal buffering effect and, thus, hypotension may be an important finding in the intensive care unit.

The signs of subcutaneous hematoma or tension in lumbar region and lower-extremity ischemia related to injury or hematoma are uncommon. If the diagnosis is delayed, AVF or pseudoaneurysm may develop. The most common complication in the late period was AVF. An-
The onset injury. The patient’s hemodynamic condition should be stabilized before the retroperitoneal space is entered. The injured vessel must be recognized by thorough assessment of the hematoma site, and the vessel should be encircled at its proximal and distal injury sites before the hematoma is opened. The hematoma can then be entered and the injury site exposed easily without the need for additional blood transfusions. The first choice of surgical technique to repair vessel injury should be primary closure of the defect or end-to-end anastomosis. When the injured area is extensive, autologous graft (saphenous vein or superficial femoral artery) should be used. In patients in whom a prosthetic graft is required, covering the anastomosis line and graft with omentum may be helpful to reduce the possibility of graft infection. Important factors that decrease the possibility of these complications, however, include avoiding prosthetic graft if possible, covering the disc surgery site with sterile drapes, and using careful aseptic technique. A delay of a few minutes in treating the complication is less important than remaining calm and choosing the best approach.

Despite its low incidence, iatrogenic vascular injury related to lumbar disc surgery may occur and should be kept in mind. In this way, such a complication may be corrected after early diagnosis. After complications occurred, factors such as blood transfusion, the proper surgical team, and timely intervention may reduce mortality and morbidity rates.

If anterior spinal ligament perforation is suspected during discectomy, regardless of whether the postoperative period is uneventful, long-term follow-up examination is required. One must be alert to signs and symptoms of an AVF and pseudoaneurysm and, if required, these complications should be diagnosed using Doppler ultrasonography, digital subtraction angiography, computerized tomography, or magnetic resonance imaging methods.
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References


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