INTRODUCTION

Lumbar disc surgery is frequently performed and safe surgery. The iatrogenic vascular injury is a very rare (0.02%–0.06%) complication of this procedure. The injuries can be fatal with massive hemorrhage to those, that present late with features of leg edema and cardiac failure.[1] We describe two cases of iatrogenic arteriovenous fistulas (AVF’s), which were managed successfully by open repair and endovascular exclusion.

CASE REPORTS

Case 1

A 28-year-old man presented with the complaints of breathlessness, left leg edema, and abdominal discomfort for the past 6 months. He gave a history of undergoing an L4–L5 laminectomy 3 years before. He had features of high output cardiac failure and abdominal bruit. His echocardiogram depicted a dilated right atrium and ventricle, increased pulmonary arterial pressure and normal ejection fraction. A subsequent CTA showed an abnormal fistulous connection between the right common iliac artery (CIA) and the left common iliac vein (CIV) at the L4 level. He also had an anomalous left renal vein draining into the left CIV [Figure 1]. Since the fistula was very close to the aortic bifurcation (9 mm), we proceeded with an open approach with disconnection of the fistula and primary repair of the CIA and the CIV, as there was a limiting landing zone for an endovascular approach. Postoperatively, the pulmonary artery pressures reduced to normal immediately, and he is currently symptom-free at 2 years follow-up [Figure 2].

Case 2

A 52-year-old female presented to the medicine out patient department with the complaints of dyspnea, abdominal pain, and left leg swelling for the past 1 year. She underwent a CT abdomen for the evaluation of her abdominal complaints. It serendipitously showed an AV fistula between the right CIA and left CIV at L4–L5 level. The fistula was 22 mm distal to the aortic bifurcation [Figure 3]. She gave a history of L4–L5 laminectomy 3 years ago. On examination, she had tachycardia and was dyspneic. Her echocardiogram showed a dilated right atrium and ventricle, increased pulmonary arterial pressure and normal ejection fraction. She had an abdominal bruit and had left leg painless swelling. Since the fistula was 22 mm distal to the aortic bifurcation, she was undertaken for an endovascular approach. A 9F sheath was placed in the right common femoral artery, and the abdominal aorta was catheterized, and a 0.035-inch stiff guide wire was passed through the sheath into the left CIV at the L4 level. The fistula was confirmed by digital subtraction angiogram, and a 0.018-inch hydrophilic guide wire was passed through the fistula to the CIA. The fistula was embolized with absorbable gelatin sponge pledgets and detachable balloons. Postoperatively, the patient’s symptoms improved, and she is currently free from any symptoms at 2 years follow-up.
placed. A 12 mm × 60 mm self-expandable stent graft was deployed across the fistula. Poststenting, the angiogram was normal with no flow of contrast across the fistula into the left CIV [Figure 4]. Postoperatively, her tachycardia and dyspnea subsided and her leg swelling resolved in 2 weeks. Currently, at 1 year follow-up, she is symptom-free and doing well.

**Discussion**

Iatrogenic AVF are an unusual (0.02%–0.06%) and potentially fatal complication of lumbar spinal surgery. The presentation of these injuries is usually late, with symptoms such as leg swelling or cardiac failure.[1] The anatomic relationship between the lumbar discs and the anterior abdominal vasculature provides a potential for life-threatening complications when the anterior longitudinal ligament is penetrated during a retroperitoneal surgical approach by a pituitary rongeur.[2,3] The common iliac arteries, which are immediately anterior to the L4/5 lumbar-disc space, are the most commonly injured vessels (right CIA 43%; left CIA 29%). Other reported vascular injuries have included the aorta, the inferior vena cava, iliac veins, and branches of the iliac vessels. Preexisting degenerative disc surgery, retroperitoneal inflammatory processes, aggressive discectomy, and possibly increased intra-abdominal pressure are some of the proposed risk factors of vascular injury during lumbar disc surgery.[2,3] AV fistulas may be formed immediately when the laceration includes both arterial and venous tear. Arterial hemorrhage evacuates through the venous defect leading to small or absent trauma bleeding or retroperitoneal hematoma. This is also a reason why hypotension may be absent as very minimal blood loss is present and thus, these injuries are recognized after a long time interval.[4]

The most common clinical symptom in a patient with AVF is dyspnea on exertion and a holosystolic machinery murmur in the lower abdomen or the back. The presence of leg edema, ascites, hepatomegaly, and anuria indicate severe cardiac decompensation. The development of high-output cardiac

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**Figure 1:** Computed tomography angiogram volume-rendered image showing fistulous connection between right common iliac artery and left common iliac vein at L4 level, right common iliac artery 12 mm, left common iliac vein 30 mm, aberrant left renal vein draining in left common iliac vein

**Figure 2:** Intraoperative picture of the fistula before and after disconnection and return of the pulmonary artery pressure to normal after repair

**Figure 3:** Computed tomography angiogram volume-rendered image showing arteriovenous fistula between right common iliac artery and left common iliac vein at L4–L5 level, dilatation of left common iliac vein distal to the arteriovenous fistula, fistula 22 mm distal to right common iliac artery origin, common iliac artery 9 mm, common iliac vein 24 mm

**Figure 4:** Contrast runs before and after deployment of stent graft showing no flow of contrast across the fistula in the left common iliac vein
failure in a young patient, who has recently undergone lumbar discectomy, is almost diagnostic of traumatic AVF. Almost 25% of these cases go undetected for up to a year due to mild symptoms, treatment of congestive symptoms with diuretics, misdiagnosis, and ignorance of this condition. The diagnosis of this condition is made by imaging, usually CTA or DSA.[5,6]

Surgery is associated with high mortality and morbidity rates. In spite of recent advances, surgery of chronic fistulas is still associated with a high mortality rate of 5%–10%. In an effort to avoid the morbidity and mortality associated with an open approach to traumatic AVF, the focus has shifted to endovascular techniques wherever feasible. They are associated with shorter hospital stay, lesser mortality and morbidity and can be performed under local anesthesia, especially in high-risk patients.[2]

CONCLUSION
Iatrogenic AVFs following lumbar disc surgery usually have an insidious presentation due to their nonspecific presentation. Their presence of cardiac failure symptoms, unilateral leg edema, and past history of lumbar disc surgery should alert us to this condition. The treatment can be open surgery, although the endovascular approach is associated with excellent results with the minimum mortality and morbidity.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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