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Case Report

Intraoperative embolectomy of a left illiac artery thrombus during an anterior lumbar interbody fusion

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ABSTRACT

Background: Anterior lumbar interbody fusion (ALIF) offers direct midline access to the lumbar intervertebral discs utilizing an anterior retroperitoneal approach. Here, a 33-year-old female undergoing ALIF developed an acute intraoperative left iliac artery thrombus and underwent immediate successful embolectomy.

Case Description: A 33-year-old female was undergoing routine L5-S1 ALIF when an acute intraoperative left iliac vein injury occurred, requiring immediate repair by a vascular surgeon. Her left foot pulse oximeter showed a decreased reading, and her Doppler ultrasound confirmed reduced flow in the distal external iliac artery due to a thrombus. She required an immediate left iliac artery embolectomy, and flow was immediately restored. Postoperatively, she recovered well, and 3 months postoperatively, she remained neurologically intact without any further complications.

Conclusion: Using pulse oximeters in patients undergoing ALIF surgery can aid in facilitating the diagnosis and treatment of acute artery thrombi. When such vascular injuries arise, having immediate access to experienced vascular surgeons is critical to obtain expeditious treatment and optimize patient outcomes.

Keywords: Anterior lumbar interbody fusion embolectomy, Anterior lumbar interbody fusion embolus, Anterior lumbar interbody fusion vascular injury, Anterior lumbar interbody fusion vessel injury

INTRODUCTION

The anterior vasculature, subcutaneous tissue, and visceral organs are placed at risk with anterior lumbar interbody fusions (ALIFs).[4] Adverse events for ALIF include nerve damage, bowel, bladder, or major life-threatening arterial/venous blood vessel injuries, incisional hernia, ileus, and retrograde ejaculation.[4,7] The most frequent major vascular complications (i.e., rates varying from 1.9% to 24%) involve deep vein thrombosis, left iliac artery thrombosis, and lacerations to the inferior vena cava and iliac veins.[7] Due to the high risk for major life-threatening vascular injuries/surgical "errors" that can occur during ALIF, vascular surgeons should be readily available.[1] Here, a 33-year-old female undergoing ALIF surgery sustained an intraoperative left iliac vein laceration followed by an acute left distal external iliac artery

thrombosis, both of which warranted the immediate attention of a vascular surgeon.

CASE PRESENTATION

A 33-year-old, right-handed female presented for continued follow-up due to worsening low back pain despite two previous lumbar surgeries. X-rays, computed tomography (CT), and magnetic resonance imaging (MRI) showed evidence of her prior bilateral L5 laminectomy and L5-S1 disc space narrowing [Figures 1a-d]. In addition, the MRI with contrast showed a significant fluid collection with midline fascial dehiscence, raising suspicion of possible infection. Blood work revealed elevated inflammatory markers (erythrocyte sedimentation rate and C-reactive protein), and a CT-guided biopsy of the collection grew *Staphylococcus epidermidis*. She was recommended to undergo an L5-S1 discectomy/ALIF. Notably, a vascular surgeon was included on the surgical team for assistance with opening, exposure of the L5-S1 disc space, and closure.

Intervention

An L5-S1 discectomy and ALIF were performed. Of note, the bifurcation of the iliac vein and artery was located lower than expected, resulting in the left iliac vein lying directly over the L5-S1 disc, increasing the difficulty of the exposure. During the exposure of the L5-S1 disc space, the left iliac vein was noted to be bleeding; this was quickly stopped using Fibrillar hemostasis. This was followed by the completion of the L5-S1 discectomy/fusion that included placement of the femoral ring allograft and anterior screw-washer application in the sacrum to secure the graft.

Left iliac vein laceration and left iliac artery embolectomy by the vascular surgeon

Once the retractors were removed, the iliac vein was noted to be bleeding again, and the vascular surgeon sutured the left iliac vein laceration (i.e., without any compromise). However, physical examination demonstrated a slightly cool left foot, and after the arterial Doppler and pulse oximeter both confirmed weak pulse in the left lower extremity (i.e., likely attributed to arterial retraction injury), the vascular surgeon performed a left iliac artery embolectomy [Figure 2] using a Fogarty catheter [Figure 3]. This was accomplished by immediately administering IV heparin, followed by the performance of a transverse arteriotomy. A clot was removed from within the left iliac artery [Figure 4], and flow was quickly restored. The repeat Doppler confirmed good restoration of distal flow into the external iliac artery, a good pulse was felt in the common iliac artery, and the patient's left foot was becoming warmer and pinker.

Postoperative course

Following extubation, the patient was evaluated and demonstrated full motor function and sensation in all her toes. Close monitoring with repeated Doppler's was performed to survey for potential recurrent/residual emboli. On postoperative day (POD) 2, the patient was taken back to the operating room for placement of percutaneous screws at the L5-S1 level. The rest of her stay was uneventful, including the absence of a left lower extremity deep venous thrombosis. Her intraoperative cultures showed no bacterial growth, and she was discharged home on POD 6. Three months later, she was asymptomatic, and imaging revealed solid fusion at the L5-S1 level [Figure 5].

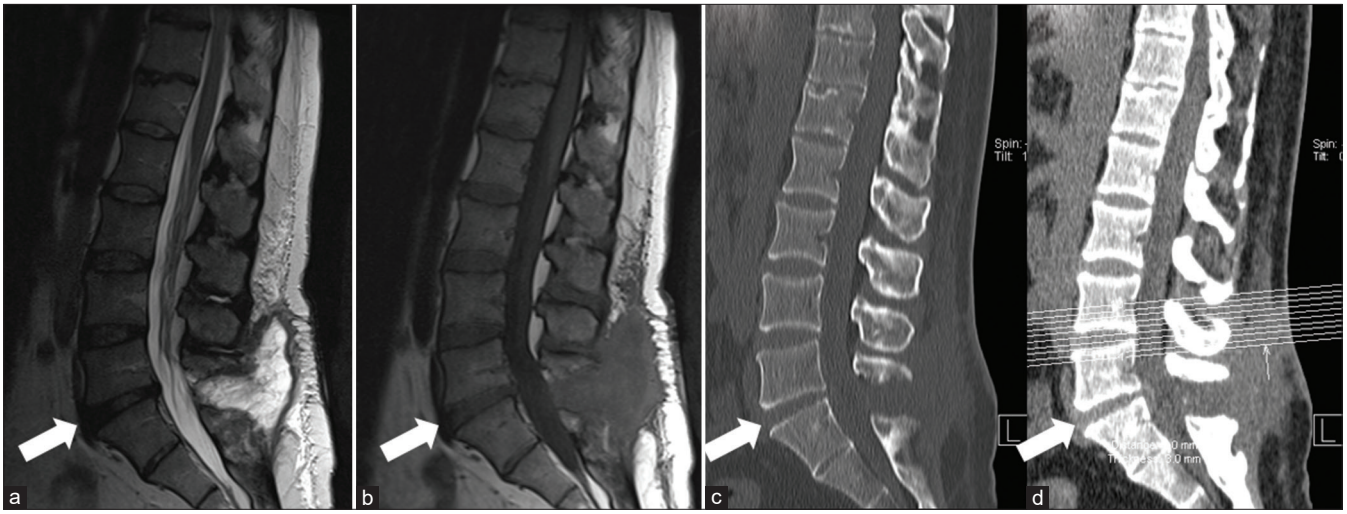

Figure 1: Preoperative imaging. Preoperative lumbar imaging demonstrating prior bilateral L5 laminectomy and L5-S1 disc space narrowing (white arrow). (a) is a sagittal T2-weighted magnetic resonance imaging (MRI) and (b) is a sagittal T1-weighted MRI. (c and d) are sagittal lumbar computed tomography images.

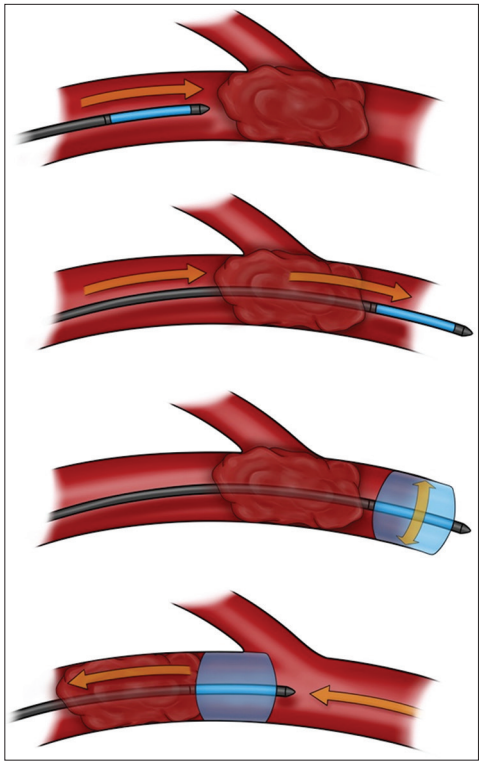

Figure 2: Embolectomy of the left iliac artery. The figure demonstrates the embolectomy performed on the left iliac artery.

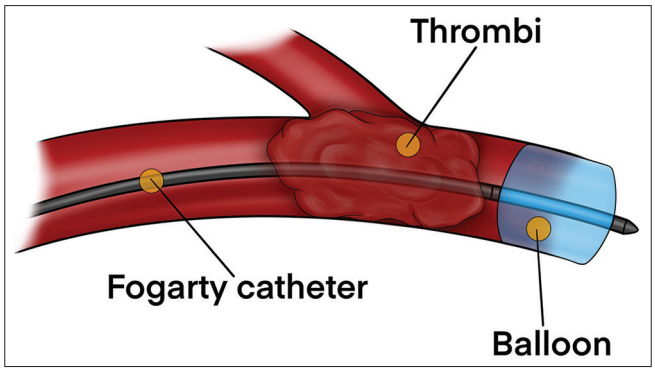

Figure 3: Fogarty catheter. The figure demonstrates the Fogarty catheter used to remove the thrombus.

DISCUSSION

Vascular injuries are the most frequent complication in ALIF and occur most often with exposure to the L4-L5 and L5-S1 disc spaces.[5] Manunga *et al*. evaluated access-related complications and outcomes in patients undergoing ALIF and reported an embolism occurring in the superior mesenteric artery during an L1-L5 ALIF, a vena cava injury occurring in a fusion revision at L3-L4, and two patients with the lower extremity embolization, requiring intraoperative embolectomies with the left groin cutdowns.[6]

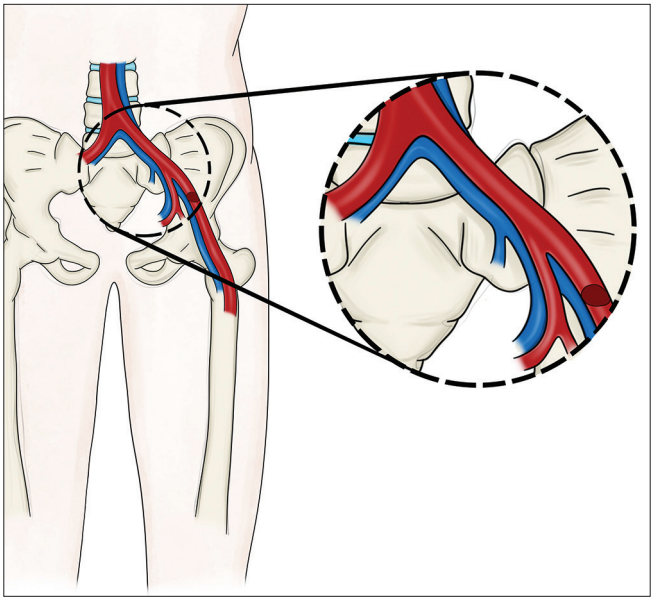

Figure 4: Thrombus located in the left iliac artery. The figure demonstrated the thrombus located in the left iliac artery, leading to decreased flow in the distal external iliac artery.

Figure 5: Postoperative imaging. (a and b) are postoperative sagittal lumbar images demonstrating solid fusion at L5-S1 (white arrow).

In a study of 1315 ALIFs from L2 to S1, Brau *et al*. found a 1.9% incidence of vascular injuries; six patients had left iliac artery thrombosis and 19 had major vein lacerations (i.e., 16 lacerations to the left common iliac vein and 10 of which occurred during exposure).[2] Moreover, 17 of the 19 venous injuries occurred at the L4-L5 level emphasizing the increased risk of vascular injuries during exposure or instrumentation at this level.[2]

Need for immediate access to vascular surgeons

Given the risk of vascular injuries associated with ALIF, adding a vascular surgeon to the surgical team is beneficial. When lacerations occur during exposure, the decision to continue the procedure should be a joint decision between the vascular and spine surgeon to determine if further mobilization might jeopardize the repair of the laceration.[2] Chiriano *et al*. concluded that vascular injuries frequently occur during exposure and instrumentation, and having a vascular surgeon present during the procedure allows for immediate and effective vascular repair.[3] Similarly, complex vascular complications are observed in Brau *et al*.'s study, requiring immediate attention.[2] Mobbs *et al*. further noted the benefits of having both vascular and spine surgeons present and that together, they could better reduce the total blood loss for single/multilevel ALIF procedures, achieve shorter operative times/hospital stays, and quicker control of intraoperative injuries.[7] Furthermore, using a pulse oximeter in ALIF surgeries proved beneficial as a decreased pulse oximetry reading could be the first sign of an intraoperative embolus.

CONCLUSION

Using pulse oximeters in patients undergoing ALIF surgery can aid in facilitating the diagnosis and treatment of acute artery thrombi. When such vascular injuries arise, having immediate access to experienced vascular surgeons is critical to obtain expeditious treatment and optimize patient outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author(s) confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Asha MJ, Choksey MS, Shad A, Roberts P, Imray C. The role of the vascular surgeon in anterior lumbar spine surgery. Br J Neurosurg 2012;26:499-503.
2. Brau S, Delamarter RB, Schiffman ML, Williams LA, Watkins RG. Vascular injury during anterior lumbar surgery. J Spine 2004;4:409-12.
3. Chiriano J, Abou-Zamzam AM Jr., Urayeneza O, Zhang WW, Cheng W. The role of the vascular surgeon in anterior retroperitoneal spine exposure: Preservation of open surgical training. J Vasc Surg 2009;50:148-51.
4. Choy W, Barrington N, Garcia RM, Kim RB, Rodriguez H, Lam S, *et al*. Risk factors for medical and surgical complications following single-level ALIF. Global Spine J 2017;7:141-7.
5. Garg J, Woo K, Hirsch J, Bruffey JD, Dilley RB. Vascular complications of exposure for anterior lumbar interbody fusion. J Vasc Surg 2010;51:946-50; discussion 950.
6. Manunga J, Alcala C, Smith J, Mirza A, Titus J, Skeik N, *et al*. Technical approach, outcomes, and exposure-related complications in patients undergoing anterior lumbar interbody fusion. J Vasc Surg 2020;73:992-8.
7. Mobbs RJ, Phan K, Daly D, Rao PJ, Lennox A. Approach-related complications of anterior lumbar interbody fusion: Results of a combined spine and vascular surgical team. Global Spine J 2016;6:147-54.

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