

Case Report

Thrombosis of Left Common Iliac Artery Following Anterior Lumbar Interbody Fusion : Case Report and Review of Literatures

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We report on a case of thrombosis of the left common iliac artery following anterior lumbar interbody fusion (ALIF) of L4-5 in a 79-year-old man with no previous medical problems, including peripheral vascular disease. After completing the ALIF procedure, the surgeon could not feel the pulsation of the left dorsalis pedis artery, and the oxygen saturation (SaO₂) had fallen below 90% from pulse oxymetry on the left great toe. Thrombectomy was successfully performed after confirming the thrombus in the left common iliac artery using Computed Tomography (CT) angiography. Thrombosis of the common iliac artery is very rare following ALIF. However, delayed diagnosis can lead to disastrous outcome. Although elderly patients have no cardio-vascular disease or vessel calcification in pre-op evaluation, the possibility of a complication involving L4-5 should be considered.

KEY WORDS : Thrombosis · Common iliac artery · Anterior lumbar interbody fusion.

INTRODUCTION

Anterior lumbar interbody fusion (ALIF) has become a popular procedure for degenerative disc disease, spondylolisthesis, failed posterior fusion, and post-laminectomy instability. The incidence of perioperative complication ranges from 5% to 14% in ALIF^{2,14}. Most of complications of ALIF associated with approach-related are ileus, hernia, retrograde ejaculation and vessel injury^{2,5,14,18,19}. The reported incidence of vascular injury is ranged from 0% to 18.1%^{6,17,18}. The rates may vary according to the patients' demographics, number and level of the lumbar spine to be fused, and surgical approach⁹. Venous laceration is the most common type of vascular injury due to vessel retraction^{1,7}. Occlusion of the common iliac artery after ALIF is a rare complication which has been noted in 0.45%³ and only a little number of literatures have been reported. We report on a case of left common iliac artery thrombosis following

ALIF with review of pertinent literatures regarding such complication.

CASE REPORT

A 79-year-old man presented severe low back pain and right leg pain. The patient had a neurogenic intermittent claudication and weakness of the right great toe dorsiflexion (G. II/V). Conservative managements did not relieve his pain. He was unemployed and lived on his own. He had hypertension without any cardiovascular problem. He was a non-smoker and not obese (Body Mass Index; 23.4). He had not experienced any surgery. His preoperative general condition was assessed at American Society of Anesthesiologists (ASA) grade 2. Sagittal T2-weighted Magnetic Resonance(MR) image showed degenerative spondylolisthesis of L4-5 with stenosis (Fig. 1). The authors planned ALIF at L4-5 and percutaneous pedicle screw fixation. There was no evidence of calcification of great vessel on preoperative Computed Tomography (CT) scans (Fig. 2).

The operation was performed using the mini-laparotomic retroperitoneal access to the lumbar spine. The peritoneal contents were placed rostrally using the robotic arm retractor,

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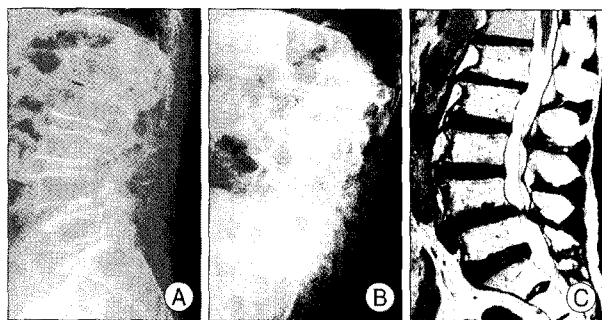


Fig. 1. Preoperative lateral lumbar radiographs of neutral (A) and extension (B) position demonstrate degenerative spondylolisthesis of L4-5 and spinal instability. T2 weighted sagittal view of magnetic resonance image (C) demonstrates spinal stenosis compressing the thecal sac.



Fig. 2. Preoperative computed tomography scan demonstrates no great vessel calcification at L4-5 level.

and meticulous vascular dissection was performed using dissecting swabs with a handheld retractor instead of Steinmann pins. After careful dissection and intermittent retraction of the common iliac artery and vein, anterior longitudinal ligament, disc material, and posterior annulus were removed consecutively. The upper and lower endplates were cleared of all the cartilage up to the bleeding cancellous bone. A Fidji lumbar cage (Abbott Spine, British Columbia, Canada) was inserted into the L4-5 level as an interbody spacer with allograft bone chips in continuous retraction for no more than 15 mins. The cage placed in the middle, slightly to right. There was no evidence of neurovascular insult. The abdominal fascia and skin incision were closed. The operative time was 165 minutes and blood loss was 60 cc. After mini-open ALIF procedure, the patient was immediately turned to the prone position. At this time we could not feel pulse of the left dorsalis pedis artery. Oxygen saturation (SaO₂) had fallen below 90% at pulse oxymetry on the left great toe. A radiologist checked the vessels using a Doppler ultrasonography in the operation room and identified a big thrombus of the left common iliac artery. The patient was transferred to a vascular center at another hospital for operative intervention. Thrombectomy was successfully performed after thrombus was confirmed using CT



Fig. 3. Computed tomography angiography showing total occlusion of left common iliac artery.

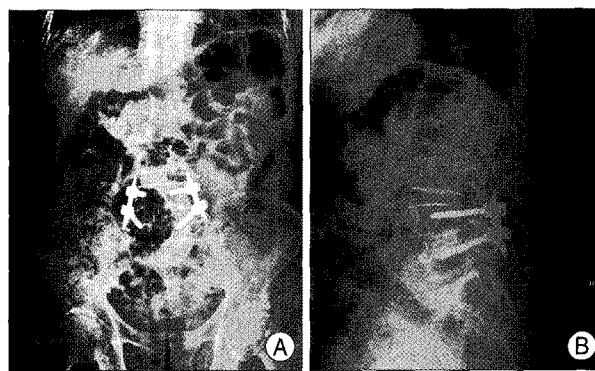


Fig. 4. Postoperative anteroposterior (A) and lateral (B) views of anterior lumbar interbody fusion with cage and pedicle screw fixation at L4-5 level.

angiography and patient's arterial pulsation was fully restored (Fig. 3). The patient was retransferred to our hospital for percutaneous pedicle screw fixation (Fig. 4). He was relieved of pain, and discharged without further complications.

DISCUSSION

A comprehensive worldwide survey of spine surgeons reveals that vascular injury occurs at a rate of 1.0% following ALIF⁵⁾. Venous laceration is the most common type of vascular injury, while the most frequently injured vessels are the left common iliac vein, inferior vena cava, and the ilio-lumbar vein^{1,7)}. Most venous injuries occur during retraction of the great vessels¹⁾. Among the vascular complications, the incidence of arterial injuries is reported from 0% to 0.9%, and the most common artery is the left common iliac artery^{4,19)}. Thrombosis of the common iliac artery following ALIF is a very rare complication. Marsicano et al.¹²⁾ were the first to report a thrombotic event and six reports have been published since 1994 comprising 18 cases^{3,8,10,11,12,16)}. Data describing the details of patients, locations, date of diagnosis, management, and prognosis are summarized in Table 1. Seventeen of the 18 cases were involved at the L4-5 level, and all but one of those occurred at the left

Table 1. Character details of arterial thrombosis following ALIF

Authors	Age	Sex	Level	Peripheral vascular disease	Location	Time to diagnosis	Management	Outcome			
Marsiacano J et al.	59	M	L2-S1	Atherosclerosis	LCIA	24 hr	Bypass op	Restoration			
Raskas DS et al.	67	F	L2-S1	Aorta, LCIA calcification	LCIA	6 hr	Thrombectomy, bypass	Restoration			
Kulkarni SS et al.	59	M	L4-S1	Yes	LCIA	12 hr	Thrombectomy, fasciotomy of lower limb	Expired-Rhabdomyolysis			
	44	M	L4-5	No	LCIA, common femoral	1 hr	Thromboembolectomy	Restoration			
	45	M	L3-5	Calcification	LCIA, common femoral	Intraop	Thrombectomy	Restoration			
	38	F	L3-S1	No	LCIA	Intraop	Vascular exploration	Restoration			
	45	M	L4-S1	No	LCIA	Intraop	Observation	Restoration			
	57	F	L4-5	Yes	LCIA	16 hr	Thrombectomy	Restoration			
	65	M	L4-S1	Yes	RCIA	1 hr	Thrombectomy and arterial stenting	Restoration			
	56	M	L4-S1	No	LCIA	Intraop	Vein patch angioplasty	Restoration			
Hackenberg L et al.	52	M	L4-S1	No	LCIA, Lt.popliteal.	13 days	Thromboendarterectomy	Restoration			
Khazim R et al.	41	F	L3-4	No	LCIA	36 hr	Thromboendarterectomy	Restoration			
Brau SA et al.*	35-56 [†]	M:F=1:5 [‡]	Containing L4-5	Unknown	LCIA	Intraop	Thrombectomy	Restoration			
									Intraop	Thrombectomy	Restoration
									Intraop	Thrombectomy	Restoration
									Intraop	Thrombectomy, repair of intimal tear, fasciotomy intraarterial	Restoration, compartment syndrome
									Intraop	papaverin, thrombectomy, bypass op	Restoration
	Post-anesthetic recoveric period	Thrombectomy, bypass, fasciotomy	Restoration, compartment syndrome								

*Contains not age, sex and involved level each case detail, [†]Ranges from 35 to 56, [‡]Consists of 1 male and 5 females. LCIA : left common iliac artery, RCIA : right common iliac artery

common iliac artery. Six out of 12 patients had peripheral vascular disease except the case in the study by Brau et al.³⁾, who did not comment about peripheral vascular disease. Five cases were diagnosed after 12 hrs, and they mistakenly interpreted between radiculopathy and vascular insufficiency in some cases. Most of the patients complained of pain, numbness, and decreased motor strength after surgery. The distinctive symptoms between thrombotic occlusion of the common iliac artery and radiculopathy were hypothermia and faint pulses⁸⁾. Brau et al.³⁾ emphasize that surgeons must check the pulse of dorsalis pedis artery perioperatively. If the pulse decreases or the SaO₂ falls on the left toe during or after the operation, the possibility of vascular insult, especially thrombosis of the common iliac artery, should be considered. These findings require diagnosis by Doppler ultrasonography and angiography^{8,11)}. Patients undergoing exposure at L4-5, especially female patients, are at greater risk, according to Brau et al.³⁾ For the L5-S1 level, however,

Steinmann pins are placed in the L5 and S1 bodies, retracting the right common iliac vessels to the right, and the left common iliac vessels to the left (laterally). For the L4-5 level or higher, a pair of pins may be placed on the right side of the vertebral body, retracting the common iliac vessels and the aorta and vena cava to the right (medially). As a consequence, vascular injury resulting from L4-5 ALIF is more frequent than L5-S1 procedure⁹⁾. Kulkarni et al.¹¹⁾ note that many patients are included in the L4-5 level, such as smokers, obese patients, and those with peripheral vascular disease. They also recommend intermittent release of retraction on the vessels if the Steinmann pins are used for vascular retraction. Seventeen of 18 cases (94%) occurred at left common iliac artery. Because most anterior lumbar procedures are performed via a left-sided approach and prolonged retraction of the common iliac arteries to the right side, stagnation of the arterial flow can be at risk, resulting in arterial thrombosis of the left side^{9,15)}. Fifteen cases (83%)

resulted in good restoration, while some patients needed bypass operations following thrombectomy. One patient died as a result of rhabdomyolysis. Delayed diagnosis probably contributed to the development of rhabdomyolysis, which was further complicated by the patient's pre-existing diabetes and cardio-vascular disease. As two patients had compartment syndrome, fasciotomy was performed. One of those patients developed acute renal failure requiring two weeks of dialysis. Although thrombosis of the common iliac artery following ALIF is very rare, delayed diagnosis may lead to disastrous outcomes. To prevent this event during ALIF procedures, intermittent release of retractors on the vessel, checking of the pedal artery pulse, and monitoring of SaO₂ are recommended.

Mini-open ALIF could be one of the minimally invasive procedures currently favored by many spine surgeons. Although a limited number of patients were enrolled in these studies comparing mini-open ALIF with conventional ALIF and a statistical analysis was not conducted, there seems to be little difference in the incidence of vascular injury between conventional and mini-open ALIF. Kulkarni et al.¹¹⁾ reported that 5 of 95 (5.2%) patients suffered from thrombosis and spasm in the left common iliac artery following mini-open ALIF, however, Mayer¹³⁾ considered that the high complication rate of the study was due to inappropriate vascular retraction. Brau et al.²⁾ reported 6 cases (0.9%) of left common iliac artery thrombosis in 684 patients who underwent mini-open ALIF. It is too uncertain to conclude that mini-open ALIF is associated with higher risk of arterial thrombosis than conventional ALIF.

ALIF has gained some popularity for the treatment of degenerative disc disease, spondylolisthesis, and failed back surgery syndrome, especially among elderly patients. However, surgeons must carefully consider thrombosis of left common iliac artery in elderly patients even if they have no preoperative risk factors. And, when a patient complains of postoperative leg pain or numbness, surgeons must distinguish between nerve root irritation and vascular insufficiency. If vascular insufficiency is suspected, a prompt investigation should be undertaken using Doppler ultrasonography and angiography.

CONCLUSION

We report a case of thrombosis of the left common iliac artery following ALIF in an elderly patient without preoperative risk factors. Although elderly patients may have no cardio-vascular disease or vessel calcification in preoperative evaluation, the possibility of vascular complications such as thrombosis, especially at the L4-5, should be considered

whenever postoperative symptoms such as leg pain or numbness are present.

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