

Lumbar Artery Pseudo-Aneurysm after Spinal Trauma and Transpedicular Fixation: A Case Report

Armel Junior Tokpo, Guelord Metre Mpambia, Fayçal Lakhdar, Hassan Amadou Ali, Oualid Mohammed Hmamouche, Mohammed Benzagmout, Khalid Chakour, Mohammed El Faiz Chaoui

Teaching Hospital of Hassan 2, Fès, Morocco

Email: armeljuniort@yahoo.com, metreguelord@gmail.com, lakhdar.faycal@gmail.com, hassanem8@gmail.com, oualid.hmamouche@usmba.ac.ma, benzagmout@hotmail.fr, chakour.khalid@yahoo.fr, fmchaoui@yahoo.fr

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Abstract

Introduction: A case of lumbar artery pseudo-aneurysm after surgery for lumbar vertebra burst fracture is presented. Only two cases secondary to spinal trauma and revealed after surgery have been described in the literature. A review of literature was conducted and a possible relationship with burst fracture or reduction maneuvers was discussed. **Case Presentation:** Here, we report a post traumatic lumbar burst fracture with incomplete motor deficit of lower limbs after a fall. Surgical reduction and stabilization via posterior approach were performed. Post-operatively, a hemorrhage through surgical wound had been noticed. Pseudo-aneurysm of the lumbar artery at L3 level was diagnosed and embolisation was performed. **Conclusion:** This is a rare case of pseudo-aneurysm occurring in the setting of surgical stabilisation after a trauma. It was revealed by a hemorrhage discovered as a late complication. We should be aware of such potential complication as a delayed post surgery event in order to adapt the care.

Keywords

Pseudo-Aneurysm, Lumbar Spine, Burst Fracture, Embolisation

1. Introduction

Lumbar arteries arise from the dorsal aspect of great vessels and are committed to supplying vertebrae, para spinal and posterior abdominal muscles. There are 5 pairs of lumbar arteries (even if this organisation can present some variations), the first four arising from abdominal aorta; the last one from medial or lateral

sacral artery or from ilio-lumbar artery [1] [2]. They divide into 3 branches: anterior, posterior and middle. These arteries can be subject to many lesions (infections, tumors or pseudo-aneurysms...).

Pseudo-aneurysms are usually met after a penetrating trauma, rarely following a blunt traumatic mechanism [1]. It can also have iatrogenic origins [3] [4] [5]. Lesions of abdomen, lower limb, pelvic bones and spinal column (as well as transverse process) may also be responsible for lumbar artery injury [6]. The diagnosis is suspected on the appearance of retro peritoneal hemorrhage requiring immediate endovascular repair [7].

The authors described the case of a 30-year-old man, attempted suicide and presented with low back and abdominal pain with paraparesis. Spinal computerized tomography revealed L4 burst fracture (TLICS A4 fracture) with retro pulsed fragment and complete central canal stenosis (**Figure 1**). Thoracolumbar-pelvic computerized tomography (CT) scan showed a right minimal hemoperitoneum without any evidence of solid organ or visceral injury. No vascular lesion was disclosed at that time. After surgery, delayed hemorrhage through the surgical wound was noticed and L3 lumbar artery pseudo-aneurysm was discovered and excluded.

2. Case

A 30 years old man suffering from L4 vertebral fracture was stabilized through a posterior approach. Distraction maneuver was necessary for reduction. Surgery went on without any undesired event. Post operative course was uneventful and a follow-up CT scan on day 4 confirmed the correct position of the screws (**Figure 2**). On the seventh post operative day, local hematoma was observed (**Figure 3**). The patient was readmitted in operating room for exploration. A significant uncontrolled left para vertebral hemorrhage was encountered after removing hematoma, from below the left transverse process of L3 (**Figure 4**). Hemostasis was achieved with gauze packing and immediately after a selective angiography was ran and showed a pseudo-aneurysm of the left lumbar artery at L3 that was immediately embolized (**Figure 5**). One day later, surgical revision of the operative field was achieved and no evident sources of bleeding were identified. The patient's proceeded well with progressive recovery.

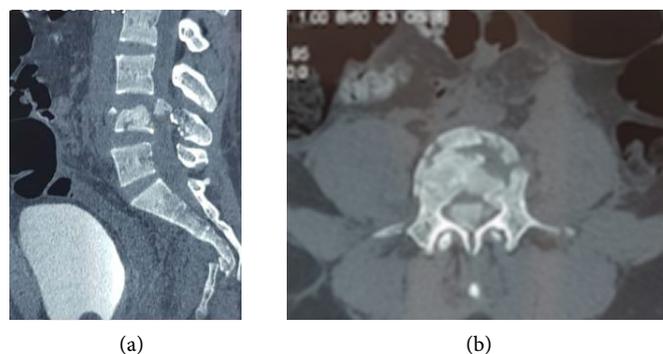


Figure 1. Sagittal (a) and axial (b) CT image showing lumbar vertebrae fractures.



Figure 2. Post-operative axial views of the lumbar spine CT showing intact posterior instrumentation at L3 level without any complications.



Figure 3. Wound swelling and dehiscence noted after 7 days of surgical procedure.



Figure 4. Significant uncontrolled left para vertebral hemorrhage was noticed after removed hematoma.

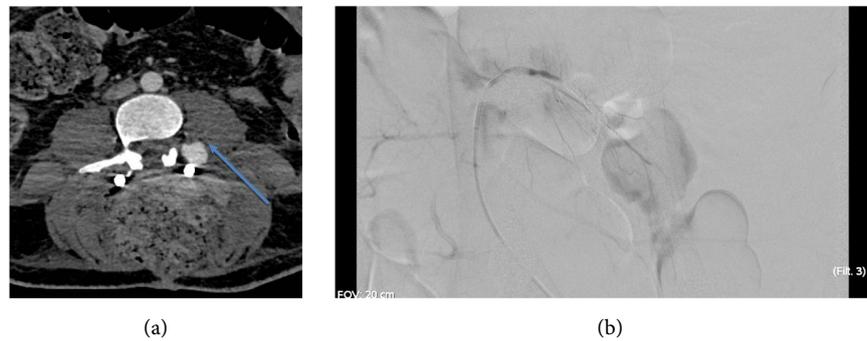


Figure 5. (a) Left L3 lumbar artery pseudo-aneurysm (blue arrow); (b) Embolisation.

3. Discussion

Traumatic injury of a lumbar artery is uncommon: some cases are reported in the literature such as, after renal biopsy [5], blunt trauma [8] or energetic retraction during operations for kidney transplant or gastrectomy [4]. Only few cases of lumbar pseudo-aneurysm after spinal surgery are described in the literature (Table 1).

According to penetrating traumas, Chan *et al.* in 2003 reported a delayed diagnosis during patient rehabilitation after a spinal cord gunshot injury [9]. Also Kessel, *et al.* reported a delayed presentation after a penetrating abdominal trauma in 2004. Interestingly, the pseudo-aneurysm was missed during the initial laparotomy [10].

More recently a hypotensive shock following a blunt trauma leads to diagnose a left L4 lumbar artery pseudo-aneurysm [1]. Lee, *et al.* reported the same clinical status concurrent with a left L2 lumbar artery pseudo-aneurysm due to a transverse process fracture at the same level [11]. So whatever the trauma blunt or penetrating, the diagnosis could be immediate or delayed according to clinical presentation.

Iatrogenic vascular complication (like pseudo-aneurysm formation) after spine surgery accounts for 0.01% to 0.22% with a high mortality rate (15% - 65%) [12].

In this setting Oh, *et al.* [13] had reported a right L3 lumbar artery pseudo-aneurysm discovered through a delayed retro peritoneal hematoma. The patient previously underwent a surgical stabilisation of L3 and L4 vertebrae. The pseudo-aneurysm appeared in the vicinity of an iatrogenic right transverse process fracture of L3.

Another study conducted by Liu *et al.* [14] had gathered informations about only iatrogenic lumbar artery injuries during spine surgery. They found 26 cases between 1991 and 2018. Clinical patterns were polymorph and various therapeutic procedures were associated (simple canal decompression, vertebral needle biopsy, percutaneous kyphoplasty or vertebroplasty, postero-lateral interbody fusion, pedicle screws...). Also, various causes were suspected. Pedicle screws and distraction maneuvers are one of them.

Table 1. Published lumbar pseudo-aneurysm arteries.

Auteurs and dates	Patient	Ages (years)	Sexes	Primary disease	Symptom	Operation	Affected LA	Outcome
Chan, <i>et al.</i> , 2003	1	24	M	L3-4	paraplegia	antibiotics	Left L3	Cured
Domenicucci, <i>et al.</i> , 2008	1	23	M	T12-L1	paraplegia	TPF	Left L1	Cured
Nijenhuis, <i>et al.</i> , 2009	1	69	M	DL	LBP L4-5	LF	Right L4	cured
Santillan, <i>et al.</i> , 2010	1	55	M	L2-L3		XLIF	Left L2	Cured
		67	F			L3-4 VP	Left L3	Cured
Puri, <i>et al.</i> , 2011	2			CF T11, L1-2-3 & L5		VP	Right L3	Cured
Young, <i>et al.</i> , 2013	1	55	F		LBP	PLF L4-5	Right L2	Cured
Giordano, <i>et al.</i> , 2016	1	73	M	RCC		VP	Left L2	Cured
Latka, <i>et al.</i> , 2019	1	58	M		LBP	TPF/PLIF		Cured
Vashisht, <i>et al.</i> , 2019				L1, 2, 3 et L4	WBL		Left L4	Cured
Eissa, <i>et al.</i> , 2020	1	30	M	L2		TPF	Left L4	Cured

LA: lumbar artery; DL: degenerative lumbar; LBP: lower back pain; TPF: Transpedicle fixation; LF: laminectomy + foraminotomy, VP: vertebroplasty, CF: compression fracture; RCC: renal cell carcinoma, WBL: weakness of bilateral lower limbs.

This study published in 2008 by Domenicucci's team [15] reported a left L1 lumbar artery pseudo-aneurysm. It had been discovered seven days after surgical reduction and stabilisation of a seat-belt fracture at T12-L1. This is somehow the case we're talking about here. Our patient also suffered a blunt trauma with complex fracture of L4 involving both transverse processes. Pedicle screws were implanted without any adverse event and distraction performed to correct the angulation. Also, the CT scan showed correct position of the screws. The left L3 pseudo-aneurysm discovered later is not probably linked to corresponding screw misplacement. We think that the distraction maneuver could somehow stretch a pre existing fragile traumatized vessel. This could probably lead to pseudo-aneurysm formation. This argument of severity of spinal trauma in the occurrence of pseudo-aneurysm is supported by the case published by Saurabh, *et al.* [1].

In 2020 Abdulah, *et al.* [16] also reported a case of post operative lumbar artery pseudo-aneurysm in the setting of trauma. The difference here is the fact that authors first ran a CT scan which aid to the diagnosis. Once the pseu-

do-aneurysm was excluded, surgical exploration took place. Criticizing ourselves, this procedure seems to be more accurate. So the lesson is to rapidly obtain a CT scan in front of a delayed hemorrhage after surgical spine instrumentation in order to rule out a possible threatening arterial pseudo-aneurysm.

Elsewhere [15] it has been postulated that “the lumbar artery may be stretched during severe vertebral dislocation”. The damage related to stretching may probably create a breach in the muscular and elastic components of the artery [15]. The probable weakening of the arterial wall associated with intra operative distraction maneuvers probably led to its rupture.

4. Conclusion

Delay swelling or hemorrhage from surgical wound after lumbar spine surgery must raise suspicion of rupture of lumbar pseudo-aneurysm. CT scan should normally be the initial investigation. Selective angiography should also be performed as diagnosis and therapeutic purposes.

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Declarations

Patient was informed and his consent was obtained before submission of this case report.

Approval of Ethic committee of Teaching hospital of Fes has been obtained.

Conflicts of Interest

No competing interest is to be declared.

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Authors' Contributions

All authors have read and approved the manuscript.

GMM: redaction, data, corresponding author;

AJT: redaction, data providing, correction;

FL: correction and consent before submission;

HHA: correction;

OMH: correction;

MB: approval of submission;

KC: approval of submission;

MEFC: approval of submission.

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List of Abbreviations

CT: Computerized tomography;
Hb: Hemoglobin;
T12: Twelfth thoracic vertebra;
TLICS A4: Thoraco-Lumbar Injury;
L1: First lumbar vertebra;
L2: Second lumbar vertebra;
L3: Third lumbar vertebra;
L4: Fourth lumbar vertebra;
L5: Fifth lumbar vertebra;
Min: Minutes.