

Recurrent Radiculopathy Caused by Epidural Gas After Percutaneous TLIF spine surgery

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Research Article

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Abstract

An epidural gas (EG) containing pseudocyst is an unusual finding after surgery[1]. We presented a case of 72 years old woman presenting with recurrent radiculopathy due to epidural gas (EG) accumulation 2 weeks after percutaneous lumbar spine surgery with posterior fixation and transforaminal lumbar interbody fusion (TLIF). After failure of Conservative treatment, the patient underwent revision spinal surgery to remove the gaseous cyst.

Introduction:

An epidural gas (EG) containing pseudocyst is an unusual finding after surgery on the lumbar spine causing radicular pain[1]. Its pathogenesis is still unclear[2]. It can be caused by the carbon dioxide and nitrogen gases released from the degenerative disc entrapped in the epidural space when the annulus fibrosus is ruptured[3], [4][2]. Mini invasive TLIF is one of the procedures that traverses annulus fibrosus to access the disk space. To the best of our knowledge, this is the first case of postoperative symptomatic EG which occurred simultaneously after percutaneous transforaminal lumbar interbody fusion (TLIF) surgery. This case was confirmed by CT scan and open procedure to release compression.

Case Report:

Presentation and examination

A 72 years old woman presented with low back pain for 10 years. The pain intensity increased during last year disabling her daily activity living. Preoperative neurologic assessment revealed hypoesthesia in the L5 dermatome without any motor deficits. CT scan showed an L4–L5 degenerative spondylolisthesis found to be unstable on sagittal dynamic X-rays.

Operation and postoperative course

Surgery was performed with percutaneous procedure by posterior stabilization via trans pedicle screw instrumentation at L4 and L5 with TLIF by phosphate tricalcic bone substitute around and inside a PEEK straight cage at the same level. Her symptoms resolved completely postoperatively and low back pain decreases intensely. Three weeks after discharge, the patient started to have radicular left L5 pain at her left leg. She received conservative treatment with pain killer class 3 (opioids) for 2 weeks, but her neurologic condition did not improve. She was readmitted at day 40 postop. Biologic report didn't find any infectious markers (C reactive protein <5mg/l, Leucocyte < 11.0 × 10⁹/L, blood culture (2) negative. CT scan showed a signal void indicating a blister-like encapsulated gas bubble, left para median, at the anterior epidural space at L5 level (fig1). A dense capsule was seen surrounding the gas bubble.

Revision surgery/postoperative course

Surgery was advised. L5 laminectomy approach was used to expose the area around the affected left L5 nerve root. A thin, blister-like membranous structure was observed on the inferior aspect of the nerve root which was partially removed and sent to pathology which shows fragmented connective tissue as well as the presence of micro calcification. The examination found fragmented connective tissue as well as the presence of L'examen a révélé un tissu conjonctif fragmenté ainsi que la présence de. The postoperative period was uneventful. The pain in the patient's left leg disappeared completely. Immediate postoperative CT revealed disappearance of gas in epidural space (fig 2). Patient discharged home at day2 postop.

Discussion:

Spinal gas may be located within intervertebral spaces or facet joints, which identified by CT scan easily[5]. In exceptional cases due to anulus rupture an epidural gas bubble may be trapped within a nonspecific fibrous cyst wall and may become compressive[4]. Other sources of EG include local structures and processes, pyogenic infections, intestinal necrosis [6].

EG after TLIF is not described in the literature. Thus we presented our case. TLIF approach traverse the annulus fibrosus making a tear enlarging the channel between intradiscal and epidural space[7]. That causes expelling of the intervertebral gas to the spinal canal in the anterior epidural space. Gas trapping leads to formation of a chronic blister-like and constraint to nerve root[1], [8]. It should be kept in mind, that infectious and more serious causes should be ruled out depending on the clinical presentation and Para clinical results They were normal in this case.

Clinical signs and symptoms are the major determinants in treatment selection[2]. Whereas, conservation treatment showed postoperative EG resorption with time by Capelle *and* Kraus[8] and Ilica *et al*[9], surgical management was the main stay of treatment by Souftas[10], Raynor *and* Saint-Louis[11] and Kaymaz *et al*[12]. While others in the literature say that needle aspiration, or surgery is needed after the failure of conservative management including absolute bed rest, steroid, nonsteroidal anti-inflammatory drug medication when EG confirmed radiologically[1], [13], [14]. In contrast Open surgery is definitely required in presence of chronic encapsulated EG[15].

We proceeded to open surgery after no response to the conservative therapy and the presence of blister like capsulated EG on Ct scan(Fig. 1). The open approach through laminectomy removes totally the chronic EG (Fig. 2).

Conclusion:

Although symptomatic EG after lumbar surgery is rare, it should be kept in mind as a possible cause of radiculopathy. Spine surgeons should be aware of this potential complication, to target their treatment accordingly. Open approach in the most efficient treatment.

Declarations:

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3. Ethics approval: Not applicable
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References:

1. Lee C-W, Yoon K-J, Ha S-S. and J.-K. Kang,[2014] "Radicular Compression by Intraspinial Epidural Gas Bubble Occurred in Distant Two Levels after Lumbar Microdiscectomy," *J. Korean Neurosurg. Soc*, doi: 10.3340/jkns.2014.56.6.521.
2. Sasani M, Ozer AF, Oktenoglu T, Cosar M, Karaarslan E. and A. C. Sarioglu,[2007] "Recurrent Radiculopathy Caused by Epidural Gas After Spinal Surgery. *Spine (Phila Pa. 1976)*. doi:10.1097/01.brs.0000261565.76537.ea.
3. Ford L, Gilula L, Murphy W, Gado M,[1977]"Analysis of gas in vacuum lumbar disc," *Am. J. Roentgenol.*, doi: 10.2214/ajr.128.6.1056.
4. Yoshida H, Shinomiya K, Nakai O, Kurosa Y, Yamaura[1997] I. Lumbar Nerve Root Compression Caused by Lumbar Intraspinial Gas. *Spine (Phila Pa. 1976)*. doi:10.1097/00007632-199702010-00021.
5. Gulati AN. and Z. R. Weinstein,[1980] "Gas in the spinal canal in association with the lumbosacral vacuum phenomenon: CT findings," *Neuroradiology*, doi: 10.1007/BF00336681.
6. CHARLES RW, MODY GM. and S. GOVENDER,[1989] "Pyogenic Infection of the Lumbar Vertebral Spine Due to Gas-Forming Organisms. *Spine (Phila Pa. 1976)*. doi:10.1097/00007632-198905000-00015.
7. Xu DS, Walker CT, Godzik J, Turner JD, Smith W, Uribe JS. [2018]"Minimally invasive anterior, lateral, and oblique lumbar interbody fusion: a literature review," *Ann. Transl. Med.*, doi: 10.21037/atm.2018.03.24.
8. Capelle H-H. and J. K. Krauss,[2006] "Recurrent sciatica due to periligamentous trapped epidural gas after spinal sequestrectomy," *J. Neurosurg. Spine*, doi: 10.3171/spi.2006.4.1.75.
9. Ilica AT, Kocaoglu M, Bulakbasi N, Kahraman S. [2006]"Symptomatic Epidural Gas after Open Discectomy: CT and MR Imaging Findings." *AJNR Am J Neuroradiol*.
10. Souftas VD. [2004]"Gas in the Epidural Space After Percutaneous Vertebroplasty: Where Does the Gas Come From?," *Am. J. Roentgenol.*, doi: 10.2214/ajr.182.3.1820818.

11. Raynor RB. and L. Saint-Louis,[1999] "Postoperative Gas Bubble Foot Drop. Spine (Phila Pa. 1976. doi:10.1097/00007632-199902010-00023.
12. Kaymaz M, Öztanir N, Emmez H, Özköse Z, Paşaoğlu A. [2005]"Epidural air entrapment after spinal surgery," *Clin. Neurol. Neurosurg.*, doi: 10.1016/j.clineuro.2004.09.016.
13. Tsitouridis I, et al.,[2005] "Disc-like herniation in association with gas collection in the spinal canal: CT evaluation," *Eur. J. Radiol.*, doi: 10.1016/j.ejrad.2005.04.003.
14. Bosser V, Dietemann JL, Warter JM, Granel M, de Solignac R, Beaujeux. and F. Buchheit,[1990]"L5 radicular pain related to lumbar extradural gas-containing pseudocyst," *Neuroradiology*, doi: 10.1007/BF00340142.
15. Giraud F, Fontana A, Mallet J, Fischer LP, Meunier PJ. [2001]"Sciatica caused by epidural gas. Four case reports," *Jt. Bone Spine*,,, doi: 10.1016/S1297-319X(01)00301-3.

Figures

Figure 1

A postoperative sagittal and coronal reconstructed computed tomography(40 days post op) image reveals an encapsulate EG.The collection was compressing the thecal sac and the left L5 nerve root . The trans pedicle screw instrumentation at L4 –L5 and the TLIF L4/L5 cage are also visible

Figure 2

A postoperative sagittal and coronal reconstructed computed tomography (day 1 after the revision surgery) reveals total disappearance of the encapsulated EG and partial disappearance of the calcified pseudo cystic layer.