

## Fatal pulmonary embolism after degenerative lumbar spine surgery under low molecular weight heparin prophylaxis: A case report

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Received - 22 March 2019

Initial Review - 27 April 2019

Accepted - 10 May 2019

### ABSTRACT

Venous thromboembolism (VTE), deep vein thrombosis (DVT) and pulmonary embolism (PE) are uncommon after spine surgery. Increasing age, obesity and prolonged anaesthesia time are considered as high-risk factors for the occurrence of VTE in spinal surgeries. To prevent this fatal complication, many surgeons adopt mechanical prophylaxis like antiembolic stockinet, sequential pneumatic compression devices and early mobilization. Golden hour management of pulmonary embolism is of paramount importance. Even though PE are less commonly described in spinal surgeries, exercising caution on high-risk patients can prevent the catastrophic events. We are reporting a fatal case of pulmonary embolism following the degenerative lumbar spine surgery who succumbed to death despite the use of mechanical and pharmacologic prophylaxis (LMWH–Clexane–Enoxaparin Sodium).

**Keywords:** *Deep Vein Thrombosis, Lumbar spine surgery, Pharmacologic Prophylaxis, Pulmonary embolism.*

Venous thromboembolism (VTE), deep vein thrombosis (DVT) and pulmonary embolism (PE) are uncommon after spine surgery. Venous stasis, endothelial injury and the hypercoagulable state contribute to the postoperative development of VTE. Measures of prophylaxis are mechanical and or pharmacological. Most surgeons prefer anti-embolic stockings and sequential mechanical compression devices for preventing the DVT [1,2], but these measures prevent the lower limb VTE and not the pelvic VTE which is even more lethal. We routinely use anti-embolism stockings in the perioperative period, flowtran during the intraoperative and early postoperative period in all our patients with additional pharmacologic agents like low molecular weight heparin (LMWH) for high-risk patients.

In this article, we report a case of fatal pulmonary embolism after spine surgery despite the usage of mechanical and pharmacologic prophylaxis.

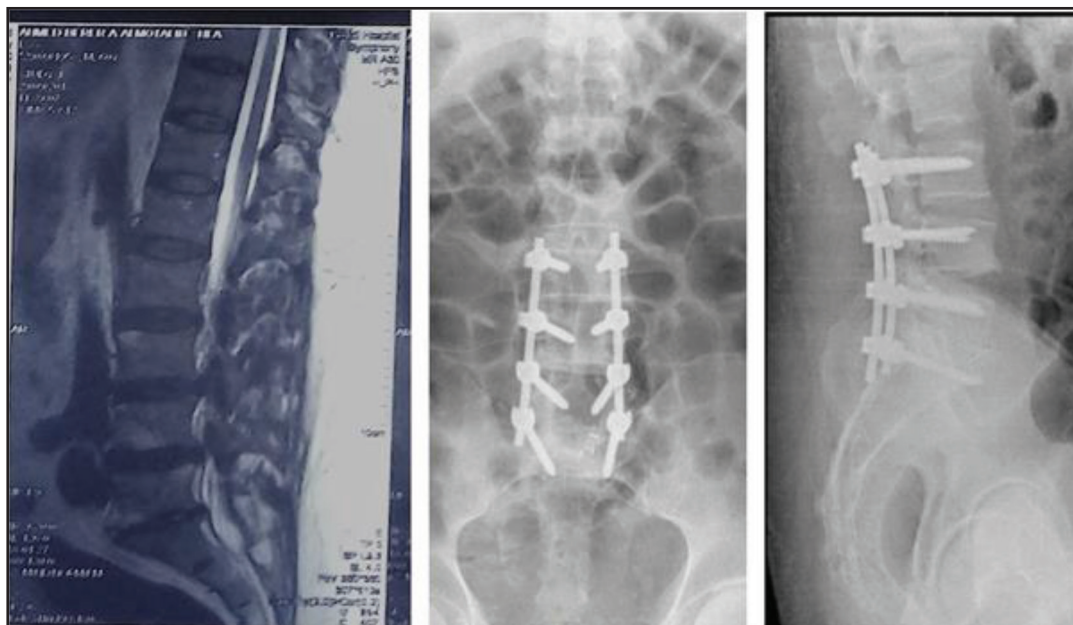
### CASE REPORT

A 64-year-old Sudanese patient admitted to the hospital with complaints of chronic low back pain, weakness of right knee and ankle for 4 weeks duration, difficulty in walking due to pain and weakness in both lower limbs. The patient was ambulant with support only to attend his nature calls, otherwise was bedridden. There was no history of bowel and bladder disturbances. The patient had a history of obstructive sleep apnoea and chronic obstructive pulmonary disease (COPD) with mild pulmonary artery hypertension. The patient had no other medical comorbidities.

On examination, the patient was obese (172 cms/120 Kg; BMI 40.6) and the vitals were stable. The patient was found to have right side foot drop due to the weakness of ankle dorsiflexor which was 2/5, right knee flexors weakness which was 1/5 and left knee flexors weakness which was 4/5 in power. The sensation was less in the right foot dorsum and plantar aspects.

Magnetic resonance imaging (MRI) revealed multilevel lumbar canal stenosis from L3 to L5 and retrolisthesis at L5-S1 level. After a complete evaluation, pre-anaesthetic fitness was obtained. Venous Doppler of both lower limb was done which showed a normal study.

The patient underwent posterior decompression L3 to S1 level, transforaminal lumbar interbody fusion in L5-S1 level and posterolateral fusion in L3-L5 levels (Fig. 1). During decompression, there was a dural tear at L3-L4 level which was sutured with 4-0 prolene. After dural closure, Valsalva maneuver was done and no cerebrospinal fluid (CSF) leak was noted. Because of dural tear anaesthesia, time was prolonged. Wound closure was watertight with complete haemostasis and a thorough lavage with a superficial drain in situ. The patient was in bed rest for two days then mobilised with support. The patient developed left ankle weakness after surgery, hence mobilization schedule was slow. Considering patient age and obesity, we started LMWH (clexane 0.6ml sc) 12 hours prior to surgery and continued to 12 hours after the surgery and extended to once daily in the postoperative period. The patient was also on mechanical prophylaxis for DVT in the lower limbs like flowtran for first two days and anti-embolic stockings in the next two days. The surgical wound was cleaned and the drain was removed on the second postoperative day.



**Figure 1: Multilevel lumbar canal stenosis treated by posterior decompression and fusion.**

The patient was made to stand with gutter walker support after two days and frequent bed to chair mobilization was done. Passive movements of both lower limbs were exercised at an hourly interval with frequent turning in the bed. The patient was under regular chest physiotherapy with incentive spirometry exercises. The patient was asymptomatic till the fifth postoperative day. On the sixth postoperative day, the patient developed breathing difficulty and became unconscious, so shifted to the intensive care unit, intubated, pulse rate dropped to 40 per minute and blood pressure was found to be non-recordable. Inotropes were started and blood pressure was raised to 86/30 mmHg but the patient was not arousable.

Echocardiography (ECHO) was done which showed dilated right atrium, right ventricle, and main pulmonary artery. Mild tricuspid regurgitation, severe right ventricle dysfunction, global hypokinesia of left ventricle, bradykinin study, ejection fraction 20%, and inferior vena cava dilated to 22mm and no respiratory collapse. ECHO was suggestive of massive pulmonary embolism and was planned for thrombolysis, but the patient developed pulseless electrical activity, so Cardio-Pulmonary Resuscitation (CPR) was started and continued for 40 minutes but the patient could not be revived.

## DISCUSSION

Pharmacologic prophylaxis agents used for reducing the incidence of VTE is well-established in arthroplasty and trauma patients [3] but in spine surgery, there is no consensus on using pharmacologic agents like Low dose unfractionated heparin (LDUH) or LMWH for reducing VTE, due to possible risk of developing an epidural haematoma which can compress the neural structures and can lead to permanent neurological deficit like paralysis [4]. Many surgeons prefer to use only mechanical prophylaxis like anti-embolism stockings and sequential compression device (flowtran) [1,2]. Inferior vena cava (IVC)

filter is commonly used in the patient who had previous history DVT or PE and routine use of IVC filter for DVT prevention in spine surgery is not recommended [5].

Incidence of VTE after spine surgery is low as compared with arthroplasty and trauma patients. In the literature, VTE incidences were reported as low as 0.29% up to 23.4% after spine surgery [6,7,8.] Incidences of symptomatic VTE and asymptomatic VTE were different. Takahashi *et al* conducted a study on 100 patients after spine surgery and reported that asymptomatic PE in 18% of the patients and DVT in 19% of the patients [9]. Hohl *et al* [10] reported in his multi-institutional study that symptomatic VTE after spine surgery accounts for 1.5%, symptomatic PE accounts for 0.88% and DVT accounts for 0.66% of the patients. Lingde *et al* in his meta-analysis reported incidences of DVT and PE as 1.22% and 0.45% [11].

In spine surgery, the incidence of VTE is more in lumbar or thoracolumbar surgeries as compared with cervical spine surgeries [12]. Schizas *et al* [13] suggested the use of LMWH for preventing VTE as an acceptable option since symptomatic PE with LMWH was 2.2% and the risk of epidural haematoma formation with LMWH was only 0.7%. Jia Qi Li *et al* [4] in his meta-analysis reported symptomatic DVT to be 1.09%, symptomatic PE as 0.06% and recommended only mechanical prophylaxis after spine surgery to avoid epidural haematoma by the pharmacologic agents. Masuda *et al* [14] quoted in his study the incidence of 0.10% PE in 47743 patients and reported the death in four patients.

In the case of symptomatic PE, temporary IVCF should be inserted within 7 days of surgery to avoid postoperative haematoma formation by giving full anti-coagulant therapy. Full anticoagulation therapy can be initiated after temporary IVCF removal and in case of symptomatic PE after 8 days of surgery; full coagulation therapy can be started even though the 8<sup>th</sup> day is arbitrary for anti-coagulation therapy [13]. Following factors are considered as high-risk factors for developing VTE after elective

spine surgery: increasing age, obesity, prolonged anaesthesia time, previous history of DVT and PE, high D Timer value, preoperative walking ability [3,11,14,15].

## CONCLUSION

Venous thromboembolic events are not common after spine surgery but well noted in the literature. The efficacy of pharmacologic agents to lower the incidence of VTE in post-spine surgery is uncertain. Without randomized controlled trials, routine use of LMWH in post-spine surgery is debatable. Though symptomatic PE is very low after spine surgery, it is better to be expectant and cautious in high-risk patients.

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*Funding: None; Conflict of Interest: None Stated.*

**How to cite this article:** Rangasamy KK. Fatal pulmonary embolism after degenerative lumbar spine surgery under low molecular weight heparin prophylaxis: A case report. *Indian J Case Reports*. 2019;5(3):242-244.

Doi: 10.32677/IJCR.2019.v05.i03.015