

# Direct Spinal Cord Injury and Pneumocephalus:

## Epidural Steroid Injection Complications

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### Introduction

- Epidural steroid injection (ESI) is a commonly used pain management treatment for lumbar and cervical radiculopathy.
- Serious complications are rare, particularly with the utilization of fluoroscopy, however, there are reports detailing the potential for significant adverse events.

### Methods

All patient-protected health information has been de-identified. The case report is devoid of patient-identifiable information and thus is exempt from IRB review requirements as per NYU policy. Informed consent was obtained for permission to use health records and imaging for this report.

### Results/Case Report

- 52-year-old female PMH obesity and chronic back pain 2/2 DDD who presented to the ER with acute right-sided numbness and weakness with ataxia.
- HPI: The day before hospital presentation the patient had a cervical ESI and PRP injection without fluoroscopy under MAC with propofol. When she awoke from anesthesia she experienced acute right-sided weakness and severe right-sided chest, abdomen, and extremity pain. She also developed a headache with nausea and emesis.
- Exam: Vital signs wnl. Mentation appropriate. Neuro exam included right-sided ptosis, miosis, extremity weakness (distal > proximal; upper > lower), and decreased sensation. Band-like dysesthesia around abdomen in T5-T9 distribution. RUE reflexes brisk. Consistent w/ central cord syndrome.
- Imaging: CT brain scattered foci of supratentorial subarachnoid pneumocephalus, scattered gas in posterior paraspinal soft tissue, a focus of gas along the central spinal canal at C5, and foci of gas along posterior epidural fat from T1-T2. MRI total spine showed signal abnormality in the right central cord from C4-T7 and C5 intramedullary air consistent with direct spinal cord injury with subsequent edema.
- Treatment: Admitted to neuro service. Started on 100% O<sub>2</sub> with head of bed flat. IV methylprednisolone 1g daily x 5 days. Pain management service started pregabalin, acetaminophen, methocarbamol, venlafaxine, lidocaine patch, capsaicin cream, and prn ketorolac.
- Outcome: Repeat MRI on hospital day 2 showed improvement of pneumocephalus, but persistent central cord edema. Despite PT and meds, her pain and neuro symptoms persisted. transferred to inpatient rehabilitation on hospital day 7. Continued functional improvement with 12 days of rehab. Follow up one month later with fixed neuro deficits unchanged from initial presentation (ptosis, right-sided weakness/sensory deficits, unrelenting neuropathic pain). She continues to undergo PT and pain management care.

### Conclusions

- Iatrogenic spinal cord injury following ESI (headache and nausea from coexistent pneumocephalus).
- Loss of resistance to air technique (LOR) was used. LOR for ESI may lead to inadvertent injection of air into the subarachnoid space and ensuing pneumocephalus. If the needle is advanced further into the cord, direct spinal cord injury can occur and propagate from medication injection. Fluoroscopy can reduce this risk.
- In consensus with the available literature, risk factors for ESI associated spinal cord injury highlighted in this case include:
  1. Deep sedation used so patient could not indicate acute symptoms when the cord was penetrated.
  2. Procedure done without fluoroscopic guidance.
  3. Patient had acute symptoms not recognized following the procedure.
- Pneumocephalus and spinal cord injury are rare complications that have only been documented in a few case reports. Continued research on complications of ESI is necessary so interventionalists can recognize risk factors and manifestations of such events.

This case emphasizes the importance of performing ESI under the safest possible conditions by utilizing **fluoroscopic guidance** and **avoiding deep sedation**.

