

Utility of Doppler in Ultrasound While Redressing a Failed Thoracic Epidural Catheter: A Case Report

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Introduction

- Thoracic epidural placement is an established technique for pain management after injury or surgery of the thorax or abdomen.
- False placement of an epidural catheter is possible due to false positive loss of resistance [1].
- Confirmation of a correctly placed and working epidural is usually accomplished by testing loss of dermatomal sensory levels, but this requires patient compliance with a reliable exam.
- Ultrasound with Doppler flow is a quick, cost-effective bedside tool to confirm appropriate epidural placement.

Case Report

- This case report is exempt from IRB review requirements as per Brown University Health policy as it is devoid of patient-identifiable information. Informed consent was obtained from the patient for submission.
- A 58-year-old male with a medical history of small cell carcinoma of the right upper lung complicated by metastases to the brain and liver was admitted to the ICU following a mechanical fall, resulting in fractures to the left 8-11 ribs, left pneumothorax requiring chest tube decompression, and moderate pericardial and right pleural effusions.
- Acute pain service placed a thoracic epidural catheter for rib-fracture-related pain management at the T8-T9 level with the loss of resistance technique.
- On hospital day 2, the patient endorsed worsening pain with no definitive sensory level, so the catheter was replaced at T9-10, achieving moderate pain relief.
- On hospital day 3, the patient again endorsed worsening pain with an unreliable sensory exam. Point-of-care ultrasound with Doppler flow was performed, which revealed that the epidural catheter was mispositioned out of the epidural space in a transverse ultrasound view.
- Doppler flow in this view confirmed the tip of the catheter outside the lamina by viewing the spread of normal saline injectate (Figures 1 and 2).

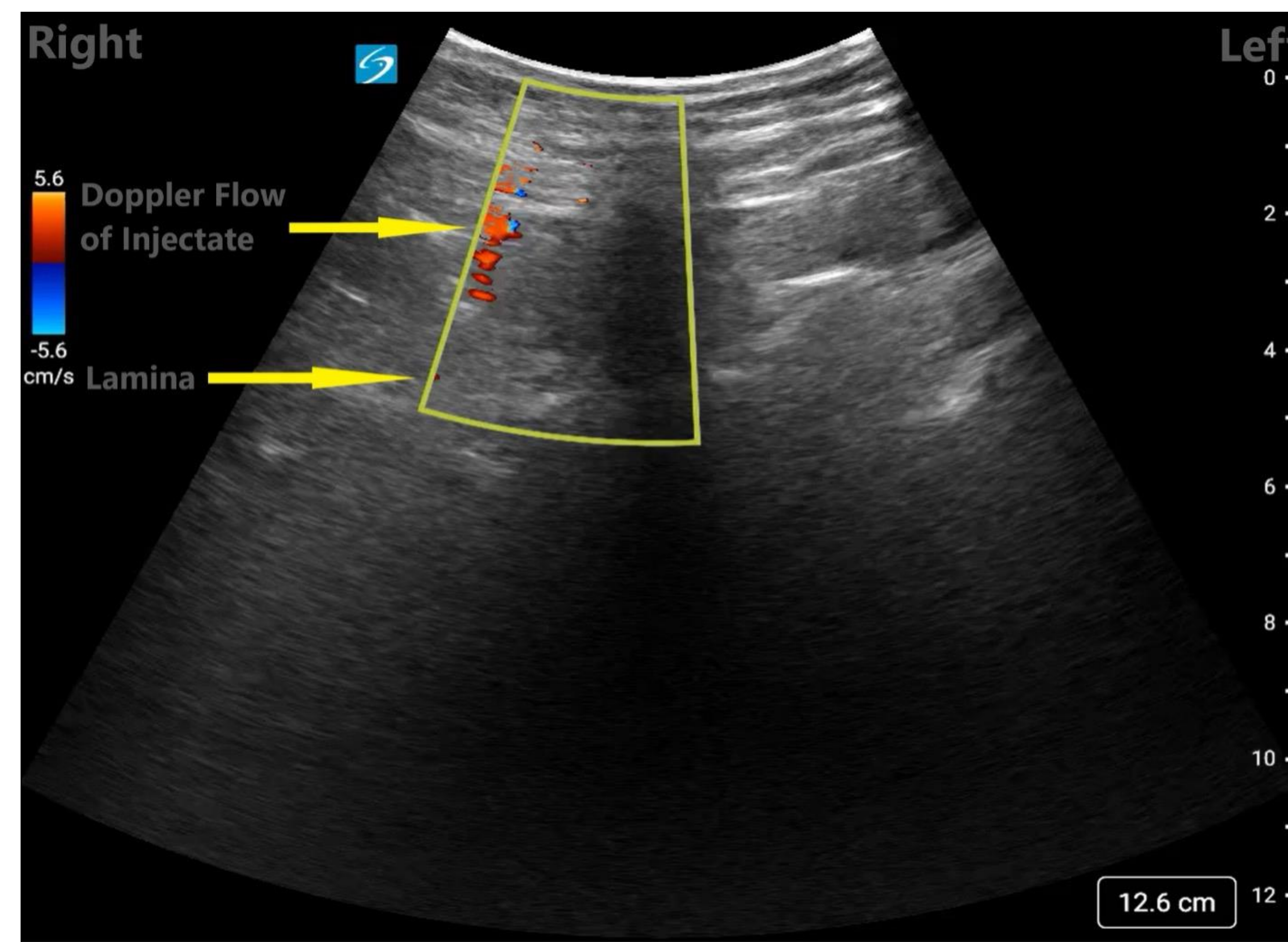


Figure 1. Ultrasound with Doppler flow showing spread of saline injectate outside lamina

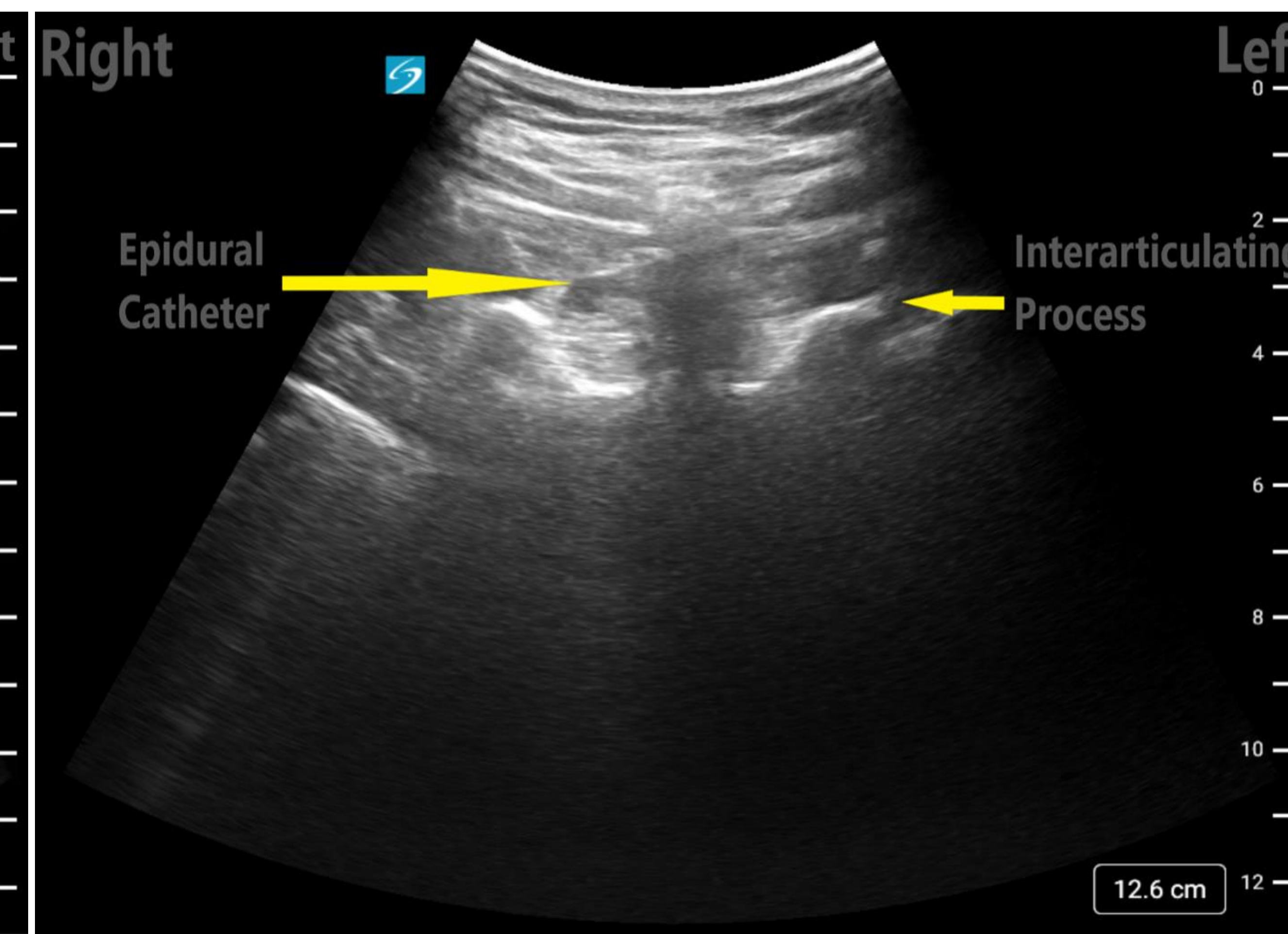


Figure 2. Ultrasound image showing misplaced epidural catheter.

- The catheter was again replaced at T9-10, and adequate sensory levels were achieved for the next 7 days until discontinuation.
- The patient passed away on hospital day 23 after developing worsening cardiac instability and hypoxic respiratory failure secondary to malignant effusions.

Discussion

- Thoracic epidural catheter placement following rib fractures provides superior analgesia, fewer respiratory complications, earlier mobilization, reduced opioid consumption, and decreased hospital length of stay [3].

- Erroneous placement from challenges such as difficult anatomy and false perception while identifying the epidural space can lead to poor rehabilitation in these patients.
- An unreliable subjective assessment of sensory distribution necessitates further objective evaluation.
- Using Doppler flow in ultrasound to visualize catheter location via concomitant saline injection has demonstrated utility in confirming correct epidural placement for labor analgesia and pelvic surgery [4,5].
- We successfully replicated its utility in this case. Doppler can be useful for detecting the spread of the injectate, particularly when the position of the catheter tip cannot be determined during scanning, in both transverse and longitudinal views.
- Future studies focusing on Doppler ultrasound in thoracic epidural placement and position confirmation will help enhance our knowledge of its utility.

References

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