

Electrical Stimulation Augmenting “Loss of Resistance” and “Saline Column” Techniques to Confirm a Scoliotic Epidural Placement

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Background

- Epidural catheter placement
 - The "loss of resistance" (LOR) technique
 - Further confirmation by attaching a saline-filled column to a needle within the epidural space, which serves as a manometer to monitor the descending liquid column within it [1]
 - Both of these approaches rely on the same principle – the mechanism of free flow of fluid into the low or negative pressure epidural potential space, where negative and low pressures are present [2]
- May not work well in restricted space patient (e.g., severe scoliosis). Electrical stimulation can be used for verification of catheter placement into the epidural space [3]

Case Report – Intervention

- 82-year-old female with acute fractures of her right-sided 8-11 ribs after a ground-level fall and completely uncontrolled pain
- History of high-dose opioids for chronic osteoarthritic shoulder pain
- Positioned sitting upright, standard monitors in place, with systolic blood pressure (BP) of 220 due to pain
- Ultrasonography to determine favorable needle entrance at T8-9 space
- Right-sided paramedian approach with “soft” LOR at 7 centimeters (cm) on the first attempt
 - Saline column dropped 3 cm then ceased further droppage
 - Epidural catheter threaded with mild resistance to depth of 15 cm
 - Stimulation with 2 milliamps caused pronounced right lateral chest wall twitching in the T8-T10 distribution
- Catheter secured in place with no change in position
- Test dose of three milliliters (mL) 1.5% lidocaine with 1:200,000 epinephrine
 - Systolic BP dropped to 140
 - Pain score reduced from “twenty” out of ten to seven out of ten

Imaging



Figure 1: Scoliotic CT Image

Case Report – Post-Intervention

- Transferred to the floor with epidural pump:
 - 0.0625% bupivacaine at 6 mL per hour/Hydromorphone 0.1 milligrams per hour/ Fentanyl patient-controlled epidural analgesia (PCEA) regimen of 10 micrograms with a lockout interval of 15 minutes.
- On hospital day #3, worsening of pain with increased activity
 - Bolus of ten mL of 1% lidocaine with brisk analgesic effect
 - Increased hourly bupivacaine dose to 10 mL per hour
 - Significant functional improvement, weaned off oxygen requirements, increased incentive spirometry figures, and worked with physical therapy

Discussion

- Merits of using an adjunct confirmation technique
 - Utilizing different physical principle to increase confidence and certainty
- Scoliosis presents a distinct difficulty for epidural anesthesia
 - Optimizing needle insertion and verifying the true epidural location
 - Ultrasonography can optimize insertion position, but the accuracy of needle placement still relies primarily on achieving distinct LOR
- Saline column technique to identify the epidural space has become more commonplace, but alternate confirmatory techniques can play a role
- Scoliosis likely contributed to an increasingly restricted epidural space
 - Affected the mechanical recognition of LOR
 - Obstructed the flow into the epidural space
- Utility of confirmation via a different mechanism (i.e., electricity), rather than remaining tied solely to assessing and reassessing mechanical means

References

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