



## CASE REPORT

# Dwyer Instrumentation for Scoliosis, a Challenge for Neuraxial Anesthesia: A Case Report

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## Abstract

We describe the case of a patient with severe scoliosis, following Dwyer instrumentation and Harrington rods insertion during adolescence, presenting for labor analgesia. Ultrasonography in accordance with radiographic imaging was used to guide the placement of an epidural catheter, successfully used for pain control during labor in an otherwise challenging patient.

## Introduction

Scoliosis is an abnormal lateral curvature of the spine that affects about 2-3% of the general population, with a higher prevalence in women [1]. Usually diagnosed in late childhood or early adolescence, its treatment mainly consists of observation, bracing and in some instances, surgery.

The Dwyer instrumentation, a corrective surgery for idiopathic scoliosis of adolescence, was brought to light in 1969 and was briefly used during the end of the 20<sup>th</sup> century for surgical repair of lumbar scoliosis in a subgroup of patients requiring surgical management. Guidelines indicating a need for surgical repair include a Cobb angle of more than 45 degrees, or rapidly progressing curvatures [2].

Following screw insertion transversely through each vertebra, a titanium cable would be applied to the convexity of the curvature to provide traction and correction of the scoliosis [3,4].

Harrington rods insertion, a method that gained popularity around the same period, mainly consisted of concave-distraction over a stainless-steel rod, with a ratchet and a collar-end attached to the spine at the top and bottom of the curvature by hooks alone (non-segmental instrumentation), and later on a convex-compression rod was added; These were the cornerstones of this method [5].

The following case report discusses the challenges we encountered in the care of a 41-year-old parturient requesting labor analgesia, who had both the Dwyer and Harrington procedures performed at the ages of 11 and 14 for treatment of severe scoliosis. HIPAA authorization was obtained.

## Case Report

A 41-year-old nulliparous woman (height 155 cm, weight 75 Kgs, BMI 32 at time of delivery) was referred to the Obstetric Anesthesia division for a consultation prior to her delivery given her history of thoraco-lumbar scoliosis surgical repair. Review of the patient's medical



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records revealed scoliosis treated surgically during childhood with a Dwyer Instrumentation in 1991 for lumbar scoliosis and Harrington rod placement in 1994 for the thoracic scoliosis. During this initial anesthesia assessment, neuraxial analgesia/anesthesia options for labor and delivery were discussed with the patient, who declined neuraxial analgesia at first. This concept, of avoiding pain control, is not uncommon in women of childbearing age having suffered from physical limitation [6]. After further discussion with the patient it was ascertained that she had been instructed by the surgeons who operated on her, to never receive any kind of neuraxial technique due to her thoracic and lumbar instrumentations. All these factors considered, we were anticipating challenges to provide adequate care during labor.

Following a lengthy discussion and thorough pre-delivery first consultation, the patient agreed to a neurosurgery consultation, which concluded it was safe to proceed with neuraxial. The risks and benefits of neuraxial analgesia, with her prior history of surgery for scoliosis repair, were discussed at length with the patient at multiple occasions, and after being initially hesitant, the patient ended up agreeing to us attempting epidural placement as soon as she would be admitted.

On admission to the Labor and Delivery Unit, the patient's back was scanned using the ultrasound imaging modality (Accuro device) to better identify the instrumentation seen on the thoracolumbar radiograph that was provided by the patient. It was felt that the use of ultrasound might help locate a space suitable for epidural or combined spinal-epidural placement. An early neuraxial placement was encouraged to optimize the patient's positioning and ideally increase the success rate of that procedure.

The "Rivanna: Accuro" Ultrasound was used in the "spine imaging mode". That provided us with a reconstructed real-time imaging which revealed an adequate entry point at the L3-L4 level, 3 cm left to the midline at an angle of about 20 degrees. A mark was placed on the back to identify the entry point.

Another ultrasound image was used for confirmation of the optimal entry point and the previously located entry point was confirmed for the procedure.

Following sterile prep, draping, and injection of 1% lidocaine subcutaneously, a 17-gauge Tuohy needle was inserted in the previously identified space with the patient in the sitting position. Loss of resistance to air was achieved, following only one redirection, at 7 cm. A 25-gauge Pencan spinal needle was then introduced through the Tuohy needle to attempt a combined spinal-epidural. No CSF was noted upon spinal needle advancement so the spinal needle was removed. The loss of resistance was reconfirmed and felt adequate. The epidural catheter was then easily threaded through

the Tuohy needle and secured at 13 cm depth from the skin. After negative aspiration from the epidural catheter, a test dose of 3 cc of 1.5% lidocaine 45 mg with epinephrine 1:200,000 was administered. Upon determination of a negative test dose, the epidural was loaded with an initial 5 ml bolus of 0.25% bupivacaine followed by a continuous infusion of Bupivacaine (0.0625%) with Fentanyl (2 mcg/mL) at a rate of 12 mL/hour and a demand dose of 8 mL at 10-minute intervals. The patient was hemodynamically stable throughout epidural placement and labor.

At the time of the epidural placement, the patient's pain had reached a 10/10 on the VAS pain scale. Following the epidural bolus and infusion, the patient's pain was gradually relieved, except for a right-sided lower abdominal quadrant patch that remained sub-optimally covered. The patient was repositioned to the right lateral position and 5 mL of Bupivacaine 0.25% was administered through the epidural catheter as a top-off for labor analgesia. Her discomfort substantially decreased but the patient did note mild persistent discomfort in this location. Given her history of scoliosis with instrumentation, the risk of having a unilateral or a "patchy" block was discussed with the patient during the pre-anesthesia consultation, a finding that was observed following the epidural placement.

From this point onwards, the patient's labor progressed uneventfully and she delivered vaginally a healthy 2860g female with Apgar scores of 9 and 9 at 1 and 5 minutes, two hours after placement of the epidural, turning a frightening experience for the patient into a memorable one.

## Discussion

The Dwyer instrumentation, despite being a stepping stone in surgical repair of scoliosis at the time, was eventually replaced by newer techniques and instruments. This led to a gradual decrease in patients undergoing this particular surgical procedure, the last of which were done in the early 1990s, but our patient was one of them.

Scoliosis and instrumentation have been associated with an increased difficulty in administering neuraxial analgesia/anesthesia, as well as increased incidence of patchy or unilateral blockade [7]. Neuraxial ultrasound may, however, improve the technical performance of central neuraxial block [8] especially in patients with unidentifiable landmarks or patients with scoliosis.

In this particular case, radiographic images were used alongside an ultrasound for safe and effective neuraxial management. We had to consider the implications of a previous spinal surgery on the feasibility and effectiveness of an epidural catheter, because of the presence of instrumentation itself and the potential for epidural fibrosis post-repair [9]. Given the patient's past surgical history of scoliosis repair with

instrumentation, a difficult procedure was anticipated when placing neuraxial analgesia for labor. Despite the use of the previously mentioned modalities, combined spinal epidural analgesia was unsuccessful. An epidural catheter was however successfully placed, leading to adequate labor analgesia despite a small right-sided patch of residual persistent discomfort [7].

Additional epidural bolus partially relieved this area of discomfort.

## Conclusion

This case report presents the management of a patient with a rare case of Idiopathic adolescent scoliosis corrected with both a Dwyer instrumentation and Harrington rod insertion. Ultrasound guidance along with previously obtained radiographic imaging was used to assist in successful placement of neuraxial analgesia for labor in this anatomically challenging patient.

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