

## Case Report

# Lumbar epidural analgesia for labor in a parturient with a history of surgery for lumbar intradural ependymoma: Literature review and case presentation

Ramsis F. Ghaly<sup>1,2,3</sup>, Tatiana Tverdohleb<sup>1</sup>, Kenneth D. Candido<sup>1,3</sup>, Nebojsa Nick Knezevic<sup>1,3</sup><sup>1</sup>Department of Anesthesiology, Advocate Illinois Masonic Medical Center, Chicago, <sup>2</sup>Ghaly Neurosurgical Associates, Aurora, <sup>3</sup>Department of Anesthesiology, University of Illinois, Chicago, Illinois, USAE-mail: \*Ramsis F. Ghaly - [rfghaly@aol.com](mailto:rfghaly@aol.com); Tatiana Tverdohleb - [tverdohlebtatiana777@gmail.com](mailto:tverdohlebtatiana777@gmail.com); Kenneth D. Candido - [kdcandido1@gmail.com](mailto:kdcandido1@gmail.com); Nebojsa Nick Knezevic - [nick.knezevic@gmail.com](mailto:nick.knezevic@gmail.com)

\*Corresponding author

Received: 30 December 17 Accepted: 02 February 18 Published: 23 October 18

## Abstract

**Background:** Ependymomas represent 50–60% of all brain and central nervous system tumors. Previous lumbar spine surgery for resection of an ependymoma should not be considered a relative contraindication for the administration of epidural/subarachnoid anesthesia to patients in labor.

**Case Description:** A 34-year-old G1P0, who underwent resection of an L1-L3 intramedullary ependymoma 8 years previously, presented in active labor with residual left leg numbness and tingling. The lumbar magnetic resonance imaging showed scar tissue and the L1-L3 laminectomy defect. With the acute onset of labor pain, the patient underwent continuous lumbar epidural analgesia; the epidural catheter was placed at the L5-S1 level. The patient underwent an emergency cesarean section with surgical anesthesia being attained up to a T4 dermatomal sensory level.

**Conclusions:** Neuraxial anesthesia can be performed safely in patients who have previously undergone lumbar resections of intradural ependymomas. However, the anesthesiologist should place the epidural needle/catheter at a nonoperative level (e.g. above/below). Furthermore, epidural local anesthetics and opioids, as in this case, placed at the L5-S1 level below an L1-L3 prior surgical scar, may diffuse intradurally, bypassing the obliterated surgical epidural space and/or attendant scar tissue.

**Key Words:** Ependymomas, epidural analgesia, labor, scar tissue, spinal analgesia

### Access this article online

**Website:**[www.surgicalneurologyint.com](http://www.surgicalneurologyint.com)**DOI:**

10.4103/sni.sni\_490\_17

**Quick Response Code:**

## INTRODUCTION

Ependymomas represent 50–60% of all brain and central nervous system tumors.<sup>[9]</sup> The most common location for these tumors is the cervical or cervicothoracic cord, followed by the conus medullaris. The surgical technique involves a dorsal approach to the tumor with a standard laminectomy.<sup>[7]</sup>

History of lumbar surgery has previously been considered a contraindication to lumbar epidural and

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** [reprints@medknow.com](mailto:reprints@medknow.com)

**How to cite this article:** Ghaly RF, Tverdohleb T, Candido KD, Knezevic NN. Lumbar epidural analgesia for labor in a parturient with a history of surgery for lumbar intradural ependymoma: Literature review and case presentation. *Surg Neurol Int* 2018;9:211.

<http://surgicalneurologyint.com/Lumbar-epidural-analgesia-for-labor-in-a-parturient-with-a-history-of-surgery-for-lumbar-intradural-ependymoma-Literature-review-and-case-presentation/>

subarachnoid (SA) analgesia used for patients in labor. This is based on the assumption that the spread of local anesthesia is uneven, leading to incomplete analgesia or an entirely failed block.

Despite significant changes in the local anatomy (e.g., scar), there are limited reports of successful epidural analgesia for patients in labor following prior lumbar surgery for scoliosis; fewer studies evaluated patients after lumbar endymoma surgery.<sup>[10]</sup>

The present case demonstrates successful labor epidural analgesia–anesthesia (AA) in a patient with a prior history of resection of an L1-L3 intradural endymoma who underwent epidural placement at the L5-S1 level.

## CASE PRESENTATION

A 34-year-old G1P0, with a history of having undergone an L1-L3 level laminectomy for resection of an intramedullary endymoma 8 years ago, with mild residual left leg numbness and tingling, presented in active labor. The magnetic resonance imaging (MRI) of the lumbar spine showed scar tissue at the L1-L3 level from the laminectomy.

When mild fetal nonreassuring heart rate developed, it was elected to proceed with epidural anesthesia administered at the L5-S1 level. This was accomplished uneventfully without paresthesia or CSF being noted.

A continuous epidural infusion with fentanyl-ropivacaine 2 mcg/mL, 0.125%, 100 mL was immediately started, and complete labor analgesia with a sensory level to T8 was achieved and maintained. Due to ongoing fetal distress, a C-section was successfully performed (surgical anesthesia achieved to the T4 spinal level by administering an additional 10 mL of 2% lidocaine with epinephrine 1:200,000 through the epidural catheter in divided doses).

## DISCUSSION

It is not uncommon for patients with histories of prior back pain or back surgery to refuse neuraxial AA due to fears of exacerbation of current or previous radicular symptoms. Although successful epidural analgesia can be achieved in approximately 40–95% of patients with a history of prior back surgery, those with prior spinal fusion surgery at L5-S1 were more at risk of traumatic needle placement, inadvertent dural puncture, and/or unsuccessful epidural catheter placement.<sup>[1]</sup> Hebl *et al.* retrospectively reviewed charts from 937 patients with spinal stenosis, lumbar disc disease, or previous spinal surgery, and found that only 10 patients had new deficits or evolving symptoms following spinal or epidural analgesia or anesthesia.<sup>[6]</sup>

## Spread of local anesthetic

The greater the epidural space compliance and the lower the resistance, the greater is the spread of epidural analgesia following local anesthetic solution injection. In the younger population, the intervertebral foramina are patent and the local anesthetic can spread paravertebrally, with a subsequent fall in residual epidural space pressure and a lower cephalad level of spread being attained. However, to balance this seeming paradox between young and the elderly, increases in intrathoracic or intraabdominal pressure as seen during bearing down during labor, for example, increase the epidural space pressure, which is believed to result in more extensive spread of local anesthetic solution in a cephalad direction.

The extent and the time course of cephalad movement of intrathecal opioids morphine and fentanyl was studied in 8 healthy subjects by Eisenach *et al.*<sup>[5]</sup> The cerebrospinal fluid (CSF) was collected at a more cephalad level after intrathecal analgesic injection. It was demonstrated that morphine moved cephalad with the same rapidity as fentanyl, although it showed a slower onset of analgesia compared to fentanyl.

## Surgery effect on epidural space and local anesthetic spread

Epidural analgesia in patients with a prior history of back surgery can be complicated by several factors. Arachnoiditis commonly occurs following back surgery; however, clinically significant arachnoiditis is rare.

Epidural fibrosis (EF) leads to failure of uniform local anesthetic spread and produces a patchy distribution of analgesia. Epidural space narrowing can occur as a result of ligamentum flavum injury in the process of surgical decortication of laminae, consequently interfering with the spread of local anesthetics in the epidural space.<sup>[8]</sup>

Additionally, obstruction of the epidural space increases the incidence of dural puncture and postdural puncture headache. In a series of 1,381 nonpregnant patients, successful epidural analgesia was accomplished in 91% of the patients with a history of prior spinal surgery, as compared to 98.7% of the patients that had no such history of spinal surgery. Furthermore, inflammatory changes that occur within the extradural space following an epidural anesthesia can lead to limited cephalad spread of anesthetic solutions.

## Mechanism of action of neuraxial local analgesics

After the local anesthetic is injected into the epidural space, some will pass through the dura into the SA space, where it is taken up by spinal nerve roots and the spinal cord. Spinal cord uptake of local anesthetics is a slow process and is accomplished by diffusion from the CSF to the pia matter and into the superficial laminae of the spinal cord. The heavily myelinated tissues in the SA space that have a higher concentration of the local

anesthetic agent, in comparison to areas of nerve roots that do not contain myelin, play an important role in the uptake of the local anesthetics. The CSF has a major role in the distribution of the local anesthetics. Local anesthetics act by blocking the neural conduction through sodium ion influx inhibition.<sup>[3]</sup>

Epidural opioid administration leads to analgesia by either crossing the dura and binding to the spinal opioid receptors or through systemic absorption and binding to supraspinal opioids receptors, or by a combination of the two.

Bolus epidural fentanyl administration exerts primarily a spinal effect, showing more profound and longer-lasting analgesic effect when compared to intravenous fentanyl administration. Bolus epidural fentanyl administered through a lumbar epidural catheter demonstrates ten times higher concentrations of fentanyl in the lumbar CSF compared to the cervical CSF.

### Labor epidural anesthesia in parturients with history of back surgery

Few studies document that patients in labor following prior lumbar surgery for ependymoma can tolerate lumbar epidural analgesia. However, labor epidural analgesia was performed in patients with a history of idiopathic scoliosis and Harrington rod instrumentation, in patients with a history of lumbar laminectomy for spinal stenosis, and in patients with previous posterior spinal fusion for kyphoscoliosis.<sup>[4]</sup>

Another parturient with a history of traumatic spine injury and the presence of a Meureig Williams plate from L1-L4 presented for labor and delivery. Continuous lumbar epidural analgesia was achieved up to a T10 level, although larger doses of local anesthetic were used than those used normally.

Labor epidural anesthesia was successfully performed in a patient with a history of lumbosacral spina bifida cystica removal in neonatal period. Bauchat *et al.* assessed the efficacy of neuraxial labor analgesia in women with prior discectomy surgery versus controls. The reported success rate of neuraxial placement in parturients with previous spine surgery was approximately 85–95%; however, only 50–60% were reported to have had successful analgesia.<sup>[2]</sup>

Despite being a relative contraindication for patients with previous lumbar surgery, lumbar epidural AA can be safely performed in selected cases. Some important

aspects to review before deciding on whether or not to proceed with the lumbar epidural AA are the extent of surgery performed, the anatomical changes suffered from the intervention, the imaging studies of the lumbar region, and the level of expertise of the health care provider.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Bajaj P. Regional anaesthesia in a patient with pre-existing neurological dysfunction. *Indian J Anaesth* 2009;53:135-8.
2. Bauchat JR, McCarthy RJ, Koski TR, Cambic CR, Lee AI, Wong CA. Prior lumbar discectomy surgery does not alter the efficacy of neuraxial labor analgesia. *Anesth Analg* 2012;115:348-53.
3. Becker DE, Reed KL. Essentials of local anesthetic pharmacology. *Anesth Prog* 2006;53:98-109.
4. Daley MD, Rolbin SH, Hew EM, Morningstar BA, Stewart JA. Epidural anesthesia for obstetrics after spinal surgery. *Reg Anesth* 1990;15:280-4.
5. Eisenach JC, Hood DD, Curry R, Shafer SL. Cephalad movement of morphine and fentanyl in humans after intrathecal injection. *Anesthesiology* 2003;99:166-73.
6. Hebl JR, Horlocker TT, Kopp SL, Schroeder DR. Neuraxial blockade in patients with preexisting spinal stenosis, lumbar disk disease, or prior spine surgery: Efficacy and neurologic complications. *Anesth Analg* 2010;111:1511-9.
7. Nagasawa DT, Smith ZA, Cremer N, Fong C, Lu DC, Yang I. Complications associated with the treatment for spinal ependymomas. *Neurosurg Focus* 2011;31:E13.
8. Sen O, Kizilkilic O, Aydin MV, Yalcin O, Erdogan B, Cekinmez M, *et al.* The role of closed-suction drainage in preventing epidural fibrosis and its correlation with a new grading system of epidural fibrosis on the basis of MRI. *Eur Spine J* 2005;14:409-14.
9. Schwartz TH, McCormick PC. Intramedullary ependymomas: Clinical presentation, surgical treatment strategies and prognosis. *J Neurooncol* 2000;47:211-8.
10. Thota R, Sathish R, Patel R, Dewoolkar L. Taylor's approach for combined spinal epidural anaesthesia in post-spine surgery: A case report. *Internet J Anesthesiol* 2005;10:1-3.