



## Perioperative Management of Intradural Extramedullary Tumor Patients Undergoing Hemilaminectomy and Tumor Resection: A Case Report

Luh Ratna Oka Rastini<sup>1\*</sup>, Made Septyana Parama Adi<sup>1</sup>

<sup>1</sup>Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Universitas Udayana/Prof. Dr. I.G.N.G Ngoerah General Hospital, Denpasar, Indonesia

### ARTICLE INFO

#### Keywords:

General anesthesia  
Intradural extramedullary tumor  
Prone position  
Thoracolumbar interfascial plane block

#### \*Corresponding author:

Luh Ratna Oka Rastini

#### E-mail address:

[ratnarastini@student.unud.ac.id](mailto:ratnarastini@student.unud.ac.id)

All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/jacr.v4i2.329>

### A B S T R A C T

**Introduction:** Intradural extramedullary (IDEM) tumor is a benign neoplasm originating in the spinal canal and accounts for approximately two-thirds of cases of primary spinal tumors. This case report aimed to further discuss the anesthetic management of IDEM tumor patients who underwent hemilaminectomy and tumor resection. **Case presentation:** A 25-year-old woman came with complaints of right hemiparesis, hypoesthesia as high as L3-L4, and unable to hold back urination since 4 months ago. Magnetic resonance imaging (MRI) examination showed a heterogeneous intradural extramedullary solid mass in the central spinal cord as high as Th 10-11 posterior, which narrowed the spinal canal. Dextra hemilaminectomy, tumor resection, and unilateral stabilization of dextra Th10-12 fusion were performed under general anesthesia and thoracolumbar interfascial plane blocks (TLIP). General anesthesia with non-kinking endotracheal intubation, controlled ventilation, and prone position is required for spinal thoracic surgery in adult patients. Propofol is a good induction agent, especially in maintaining the depth of anesthesia, because it can prevent side effects that arise from inhalation anesthetics. **Conclusion:** Bilateral modified TLIP block was performed in patients after induction of anesthesia with a median approach and ultrasonography (USG) guidance. TLIP block can reduce cumulative opioid consumption, acute pain intensity, the need for rescue analgesia, and the incidence of nausea and vomiting.

### 1. Introduction

An intradural extramedullary (IDEM) tumor is a benign neoplasm with an incidence of 5-10 per 100,000 cases. IDEM tumors account for approximately 70% of all intradural lesions, and the most commonly observed types are nerve sheath tumors, meningiomas, and myxopapillary ependymoma.<sup>1,2</sup> Back pain is the main complaint of patients that can appear before the diagnosis is made. Radicular pain is another observable symptom. Compression of the spinal cord can cause myelopathy or cauda equina syndrome. Young patients with significant complaints are at risk for rapid disease

progression accompanied by functional and neural disorders. Magnetic resonance imaging (MRI) is the main imaging modality for diagnosing IDEM tumors.<sup>3</sup>

Most IDEM tumor surgeries are performed by laminectomy using a posterior approach. The location of the tumor in the spine and its relationship to the spinal cord are the 2 main factors that will determine the surgical technique.<sup>4</sup> Anesthetic management in IDEM tumor surgery starts from the preoperative, intraoperative, and postoperative periods. Anesthesiologists need to master and apply neuroanesthetic techniques well in spinal surgery.<sup>5</sup> The discussion of this case emphasizes perioperative

considerations, general and special monitoring, choice of position for hemilaminectomy and tumor resection in IDEM tumor patients, and consideration of TLIP block for intra and postoperative analgesia.

## 2. Case Presentation

A 25-year-old woman came to consciousness with complaints of weakness in her right leg 6 months ago. Initially, the patient felt tingling and numbness in her right leg, accompanied by being unable to hold bowel movements and urination since 4 months ago. Currently, the weakness in the right leg and tingling in both legs is felt to have decreased, and the patient had bowel movements 2 days ago. There was no history of food or drug allergies. History of hypertension, diabetes, asthma, heart disease, and other systemic diseases was denied. There is no history of previous surgery.

From the physical examination, the body weight was 55 kg, the height was 163 cm, and the body mass

index was 20.75 kg/m<sup>2</sup>. Blood pressure 100/70 mm Hg, mean arterial pressure (MAP) 80 mmHg, pulse 75 beats per minute, respiratory rate 16 breaths per minute with peripheral oxygen saturation of 96% room air, axillary temperature 36.8°C. Neurologic examination shows the patient's consciousness is *compos mentis*; no meningeal sign; isochor round pupil 3 mm/3 mm; light reflex +/+ . Motor examination showed; power 55555/55555 // 12234/44455; tone: normal/normal // spastic/normal; trophy: normal/normal // atrophy/normal; physiological reflexes: +2/+2 // -/+2; pathological reflex:-/-. Sensory examination shows; light touch and pinprick test: hypoesthesia D as high as L3-4; proprioceptive: +/+ // -/+; saddle hypoesthesia, sacral sparing, anal sensation, voluntary anal contraction, deep anal tenderness. Table 1 presents the results of routine blood laboratory tests and standard clinical chemistry in these patients.

Table 1. Laboratory examination.

Examination	Results	Unit
White blood cells	7.01	x10 <sup>3</sup> /μL
Hemoglobin	11.50	g/dL
Hematocrit	35.10	%
Platelets	356	x10 <sup>3</sup> /μL
BUN	8	mg/dL
SC	0.77	mg/dL
Prothrombin time	14.5	second
APTT	31.5	second
INR	1.03	1.03
Blood sugar	80	mg/dL
Sodium	141	mmol/L
Potassium	3.85	mmol/L
SGOT	20	U/L
SGPT	13	U/L
Albumin	3.4	g/dL
PITC	Non-reactive	Non-reactive

Thoracolumbar MRI shows a heterogeneous intradural extramedullary solid mass in the central spinal cord at the Th10-11 posterior level causing severe narrowing of the spinal canal and anterior

displacement of the spinal cord at that level and compressing the transversing Th11 nerve root, suggesting a spinal meningioma (Figure 1).

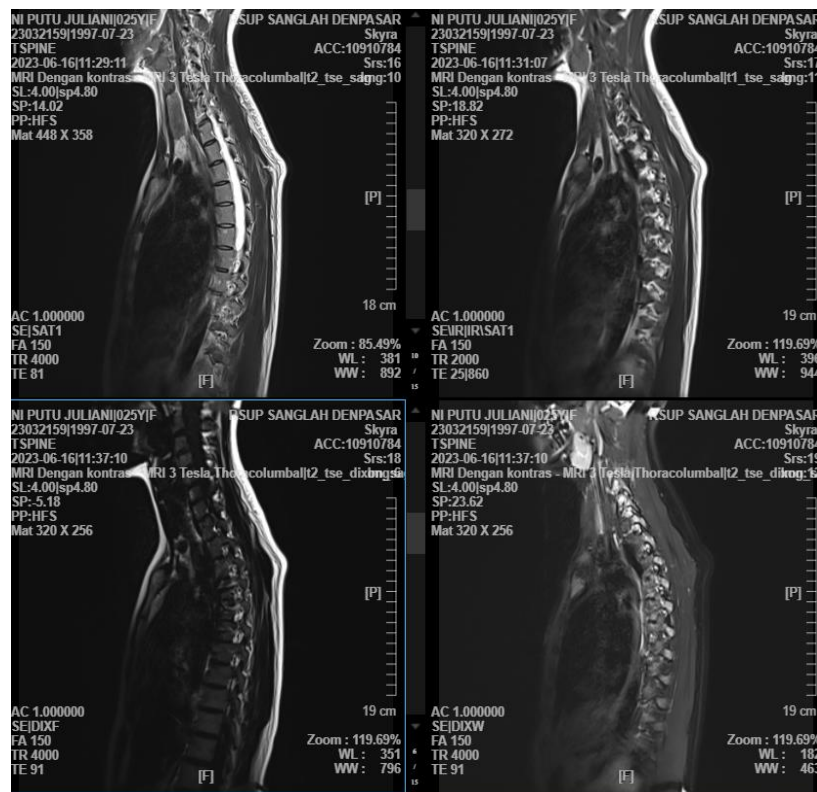


Figure 1. Thoracolumbar MRI examination.

Patients were concluded with ASA III physical status. Patients and families were given education and planned to do dextra hemilaminectomy, tumor resection, and unilateral stabilization of dextra Th10-12 fusion with preparation for 8 hours of solid food fasting, 2 hours of clear water fasting. Patients were given informed consent regarding general anesthesia techniques and postoperative planning. Installation of intravenous access on the right hand ensured smooth and ready-to-use preparation of blood components to anticipate bleeding during surgery.

While in the reception room, an evaluation of the patient's condition is carried out and ensures adequate hydration status. The patient was positioned supine and premedicated with midazolam 1 mg IV. Arterial line placement was performed on the left radial artery with an Allen test previously performed and 2% lidocaine local anesthetic infiltration. The analgesic

fentanyl 150 mcg IV was given, followed by lidocaine 80 mg IV, then anesthesia was induction with propofol TCI with a target effect of 2-3.5 mcg/ml, and the muscle relaxant atracurium 30 mg was given. Intubation was performed with a non-kinking number 7.5 endotracheal tube and fixation at the margin of 20 cm on the edge of the lip. The patient is positioned prone, padding is performed and ensures that the abdomen and eyes are free of pressure.

The TLIP block was performed in a median approach using ultrasound guidance in the prone position. Identification m. longissimus and m. iliocostalis with ultrasound in a transverse position at the level of the spine to be blocked, then local anesthetic infiltration was carried out with a plain bupivacaine regimen of 0.25%, a total of 20 ml on the left and right sides. Maintenance of anesthesia was carried out using O<sub>2</sub>, compressed water, TCI propofol

with a target effect of 1-3 mcg/ml, fentanyl intermittent 25 mcg every 45-60 minutes (total 150 mcg), and atracurium 0.1 mg/kg every 45-60 minutes (total 80 mg). Other drugs given include tranexamic

acid 1000 mg IV, paracetamol 100 mg IV, and ondansetron 8 mg IV. Then dextra hemilaminectomy, tumor resection, and unilateral stabilization of dextra Th10-12 fusion were performed.

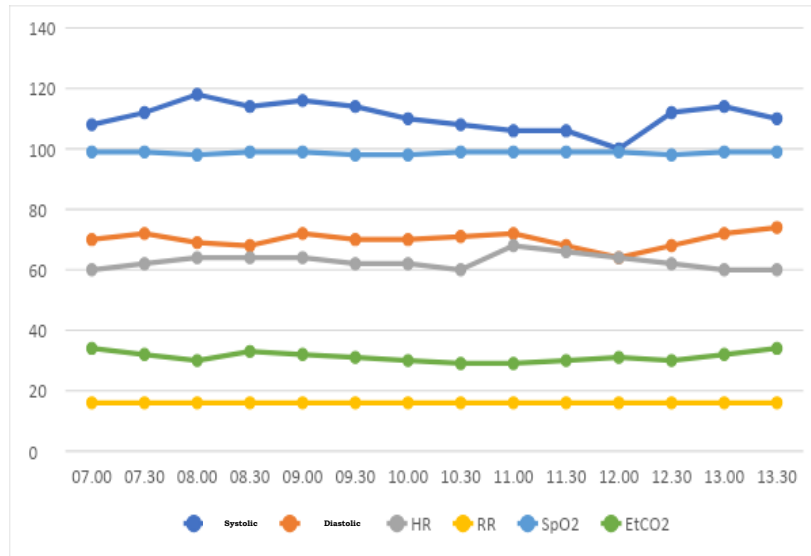


Figure 2. Intraoperative hemodynamics.

The use of the Perseus® A500 anesthesia machine (Dräger, Lübeck, Germany) is set to pressure control-CMV mode, FG O<sub>2</sub> 40%, FG flow 1.5 liters, P<sub>insp</sub> 15, P<sub>supp</sub> off, RR/Freq 16, PEEP 5, TI 1.5 and adjustments are made dynamically depending on the patient's condition and the manipulations being carried out intraoperatively. Intraoperative maintenance fluid with Ringerfundin total 1500 ml. Bleeding during surgery 300 ml. Urine as much as 350 ml. Postoperatively, the patient was extubated in the operating room before being transferred to the intermediate room. Postoperatively the patient was treated in the intermediate room with hemodynamic conditions of blood pressure 104/68 mmHg, pulse 76 times per minute, respiratory rate 16 times per minute, and 100% peripheral oxygen saturation with a face mask of 6 liters per minute, GCS E4V5M6, pupil isochor size 3mm /3mm, light reflex +/+, evaluation of pain with a numerical rating scale (NRS) obtained 0/10. Postoperative pain management uses PCA Morphine demands only 1 mg/mL, 1 mg per dose (maximum dose of 5 mg in 4 hours, LOI 6 minutes). Evaluation in the first 24 hours, namely, 7 attempts

and 7 doses delivered. Evaluation in the second 24 hours is 1 attempt and 1 dose delivered. The third 24-hour evaluation was no attempt, ibuprofen 400 mg every 8 hours orally and paracetamol 1000 mg every 8 hours IV. The patient was conscious, and there were no postoperative complications. The patient was allowed to go home on the 3rd postoperative day.

### 3. Discussion

The patient is a young woman with IDEM tumor 10-11 thoracic height with suspected Schwannoma and differential diagnosis of meningioma. The median time to diagnosis of IDEM tumors is 12 months because intradural tumors progress slowly, so there are intervals of several months before symptoms appear. The most common symptom is pain which can be local or nocturnal. Sphincter dysfunction, paraparesis, and erectile dysfunction may occur in 20%, 12%, and 2% of patients, respectively. The weakness and neurologic disturbances observed in this case could be due to intradural compression.<sup>5</sup> Pain is one of the main complaints observed in patients and is associated with various neurological deficits that occur. The use of

non-steroidal anti-inflammatory agents needs to be discussed again with the surgeon because they have the potential to cause postoperative bleeding. A history of neurological deficits will influence the anesthetic management of the patient, including positioning and monitoring of the patient's condition during surgery.<sup>5,6</sup>

General anesthesia with endotracheal intubation and controlled ventilation is required for spinal thoracic surgery in adult patients. An intravenous cannula with a large bore needs to be inserted in anticipation of massive blood loss. The recommended patient position during a hemilaminectomy is prone. The arms should be abducted but not more than 90 degrees, with slight internal rotation and lying forward in the plane to reduce the risk of brachial plexus injury. The prone position must be maintained carefully to avoid pressure on the abdomen which can be transmitted to the venous system and cause increased bleeding from the epidural veins without valves. Obstruction of the inferior vena cava worsens venous return and causes a decrease in cardiac output and an increased risk of lower extremity thrombosis.<sup>6</sup>

Management of total intravenous anesthesia (TIVA) during spinal surgery and neuromonitoring requires several concerns, such as achieving immobilization without the use of paralytic drugs, stable anesthetic conditions, maintaining adequate blood pressure to prevent blindness, loss of neuromonitoring signals and perfusion pressure to vital organs. Rapid recovery of consciousness after surgery is also required to facilitate a neurological examination. Propofol is a good induction agent, especially in maintaining the depth of anesthesia, because it can prevent side effects that arise from inhalation anesthetics.<sup>6</sup> Studies also show that propofol can maintain cerebral and spinal cord blood flow and reduce metabolic and endocrine stress better than inhaled agents. Continuous administration of propofol (generally 100-150 mcg/kg/min) can be used for maintenance. The dose was adjusted so that the blood pressure being monitored invasively was within the normotensive range (MAP range 70-100 mm Hg) or when the patient was not asleep and in the supine position. Short-duration muscle relaxants may be administered for intubation but not afterward to allow motor-evoked

potential (MEP) monitoring. The patient was also maintained normothermic during surgery. Administration of tranexamic acid in these patients aims to prevent bleeding and the risk of transfusion. Studies show that tranexamic acid is an effective agent in reducing the incidence of post- and intra-operative blood loss, as well as reducing the incidence of transfusion.<sup>7,8</sup>

The TLIP block was performed on the patient after induction of anesthesia. The TLIP block is a type of interfascial block that targets the dorsal ramus of the thoracolumbar nerve.<sup>9</sup> In this modified TLIP block, local anesthetic is injected between the longissimus and iliocostalis by inserting the needle from medial to lateral. The results of a recent study showed that TLIP blocks were clinically superior to patients who underwent unblocked spinal surgery, particularly with regard to cumulative opioid consumption, acute pain intensity, need for rescue analgesia, and the incidence of nausea and vomiting.<sup>10</sup>

Postoperative analgesia regimen PCA Morphine 1 mg/mL demand only and Paracetamol. The results of a study on non-tumor surgery cases showed that the results of a comparison of patients who underwent pain control with PCA morphine and epidural anesthesia showed that the mean pain scale was lower in the epidural group compared to PCA on the first, second, and third postoperative days. Meanwhile, the control of the effects of nausea and vomiting, return of bowel function, pruritus, and the use of rescue analgesia between patients who were given PCA and who underwent epidural anesthesia is still controversial.<sup>4,6</sup>

#### **4. Conclusion**

In patients with spinal tumors, the selection of induction agents and maintenance of anesthesia depends on the patient's comorbidities and neuromonitoring. Propofol can maintain cerebral and spinal cord blood flow and reduce metabolic and endocrine stress better than inhalation agents. The TLIP block is one type of block interfascial targeting the dorsal ramus of the thoracolumbar nerve. TLIP blocks were clinically superior to patients undergoing unblocked spinal surgery, particularly with regard to

cumulative opioid consumption, acute pain intensity, need for rescue analgesia, and the incidence of nausea and vomiting.

## 5. References

1. Bickle I, Wein S. Intradural extramedullary spinal tumours. *Radiopaedia*. 2012; 03(03): 1–8.
2. Budiman Gondowardojo Y, Ompusunggu S, Dahlan R. Diagnosis and management of intradural extramedullary tumor: Multiple case series and literature review. *Neurol Spinale Med Chir*. 2022; 5(2): 98.
3. Koeller KK, Shih RY. Intradural extramedullary spinal neoplasms: Radiologic-pathologic correlation. *Radiographics*. 2019; 39(2): 468–90.
4. Cofano F, Giambra C, Costa P, Zeppa P, Bianconi A, Mammi M, et al. Management of extramedullary intradural spinal tumors: The impact of clinical status, intraoperative neurophysiological monitoring and surgical approach on outcomes in a 12-year double-center experience. *Front Neurol*. 2020; 11.
5. Rasras S, Kiani A. Intradural extramedullary spinal tumors. *Brain and Spinal Tumors*. 2018; 10(5).
6. Buckley J, Moreland N. Anesthesia Pitfalls and considerations for spine surgery. *eScholarship*. 2018; (c): 1–43.
7. Khanna P, Sarkar S, Garg B. Anesthetic considerations in spine surgery: What orthopaedic surgeon should know! *J Clin Orthop Trauma*. 2020; 11(5): 742–8.
8. Wicaksono SA, Nugroho TE, Utami SB. Anaesthetic management in the patient with thoracic–lumbar intradural tumor accompanied by heart failure and atrial fibrillation: a case report. *Bali Med J*. 2022; 11(3): 1282–8.
9. Ekinci M, Ciftci B, Atalay YO. Ultrasound-guided modified thoracolumbar interfascial plane block is effective for pain management following multi-level lumbar spinal fusion surgery. *Ain-Shams J Anesthesiol*. 2019; 11(1): 10–2.
10. Ye Y, Bi Y, Ma J, Liu B. Thoracolumbar interfascial plane block for postoperative analgesia in spine surgery: A systematic review and meta-analysis. *PLoS One*. 2021; 16(5): 1–15.