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Management for Patient with Asthma in Lumbar Canal Stenosis Using General Anesthetic and Epidural Analgetic: A Case Report

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ABSTRACT

Background: Lumbar canal stenosis, which often occurs concurrently with degenerative spondylolisthesis (DS), is characterized by low back and leg pain. The treatment of high-degree spondylolisthesis is by surgery, which is a combination procedure of decompression and fusion. Surgical patients with a history of uncontrolled asthma three months before surgery had nearly double the risk of postoperative mortality. **Case presentation:** A 53-year-old male patient was diagnosed with Lumbar Canal Stenosis ec HNP at levels L2-13, L3-14, L4-15, L5-s1 Spondylolisthesis at level L4-15 Meyerding grade 1 Spondylosis Lumbalis. The patient has a history of mild intermittent bronchial asthma, which was diagnosed 2 years ago. The patient was planned for Decompression-Stabilization-Fusion surgery, with the anesthesia plan being general anesthesia prone position with epidural analgesia. **Conclusion:** Combined general anesthesia (GA) and epidural analgesia (EA) for major surgery due to excellent pain control, reduced perioperative morbidity, and even reduced mortality compared with systemic analgesia. For surgical patients who have a history of asthma, determining whether a patient's asthma is well-controlled or poorly controlled is key to mitigating perioperative complications.

1. Introduction

Lumbar canal stenosis, which often occurs concurrently with degenerative spondylolisthesis (DS), is a common cause of pain and disability in older persons.¹ Symptomatic lumbar spinal stenosis is characterized by low back and leg pain in the setting of compression of the central canal and/or exiting nerve roots by disk, osteophyte, ligamentum flavum, or other structures.² Although there are no rigorous epidemiological studies of the prevalence of lumbar spinal stenosis, one estimate suggests that approximately 103 million individuals have symptomatic lumbar spinal stenosis worldwide.¹ More than 350,000 persons in the US 45 years or older

underwent decompressive laminectomy, and another 370,000 had lumbar fusion in 2014, with the great majority of these procedures done for lumbar spinal stenosis.³ In a consecutive series, 14 of 272 patients who underwent surgery for lumbar spinal stenosis, 34% had spondylolisthesis of 5 mm or more.² The treatment of high-degree spondylolisthesis is by surgery, which is a combination procedure of decompression and fusion with or without any fusion aid.⁴ Surgical treatment for spondylolisthesis requires a prone position for the patient. Physiological changes in the body with anesthesia in the prone position can occur in almost all organs and, most importantly, the function of the heart and respiration.⁵

Asthma is one of the most common respiratory illnesses among elderly patients undergoing surgery.⁶ Asthma is defined as a disorder of variable intensity pulmonary disease characterized by airway inflammation and hyper-responsiveness resulting in episodic wheezing, coughing, breathlessness, chest tightness, and reversible airflow obstruction.⁷⁻⁹ Surgical patients with a history of uncontrolled asthma three months before surgery had nearly double the risk of postoperative mortality and three times the risk of developing post-operative pneumonia as compared to surgical patients with controlled asthma.¹⁰ To minimize the risk of perioperative respiratory adverse events in asthmatic surgical patients, adequate preoperative assessment and optimization are imperative. Adequate depth of Anesthesia, using fewer histamine-releasing agents during the intraoperative period, and close follow-up of the post-op respiratory system are prerequisites to minimize morbidity and mortality among surgical patients.¹¹ This study aimed to describe the anesthetic management for patients with asthma in lumbar canal stenosis using a general anesthetic and epidural analgesic.

2. Case Presentation

A 53-year-old male patient came to Prof. Dr. I.G.N.G Ngoerah General Hospital with complaints of pain in the back that radiates to the toes. Complaints become more and more severe over time, and the patient is said to have difficulty walking long distances. The patient felt his legs getting weaker and weaker, so the patient sought treatment. It is said that there are no complaints about defecation and urination. Fever, cough, runny nose, and shortness of breath have been denied for the past 2 weeks.

On physical examination, the patient was seen experiencing mild pain with an NRS scale value of 1/10 when stationary and an NRS of 2/10 when moving. The patient weighs 74 kg and is 160 cm tall with a BMI value of 28.9 kg/m², which is classified as obese. The patient also has uncontrolled STG II hypertension with a blood pressure value of 160/100 mmHg. The patient has undergone a diagnostic evaluation of lumbosacral dynamic view and

Lumbosacral AP-Lateral, showing compression of CV L5, Spondyloantrolisthesis of CV L4 to L5 grade I according to the Meyerding classification. The patient also underwent a lumbosacral MRI examination, which showed lumbar spondylosis, Fatty marrow changes on CV Th 11, L1, superior endplate L5; inferior endplate L4-5; Disc dehydration at L1-2, L2-3, L3-4, L4-5, L5-S1.

The patient has a history of mild intermittent bronchial asthma, which was diagnosed 2 years ago, with the current clinical condition being respiratory frequency 16 times per minute, vesicular throughout the lung fields, rhonchi -/-, no wheezing, SpO₂ 99% room air. The last recurrence was 1 year ago, currently on treatment with salbutamol 2 mg every 8 hours intraoral.

In preparation for surgery, STATICS, anesthesia and emergency drugs, infusion warmer, mattress warmer, ready-to-use blood components, 2-line large bore IV line, prone position padding, etCO₂, arterial line, and epidural kit were prepared. The patient has also been asked to fast for 8 hours. The anesthesia plan for this patient is general anesthesia orotracheal tube non-kinking prone position and epidural analgesia. Before entering the operating room, premedication was given: dexamethasone 10 mg IV, Diphenhydramine 10 mg IV, Midazolam 1.5 mg IV, fentanyl 25 mcg IV, ketamine 10 mg IV. Induction with Propofol with dosage 2-3 mg/kgBW (128-232 mg) IV and an intubation facility. Then, intubation was performed with an ETT, and the patient was positioned and pronated. Maintenance anesthesia using propofol drip continues 50 – 150 mcg/KgBW/minute, fentanyl intermittent 0.25 mcg/kg every 45-60 minutes, atracurium 0.15 mg/KgBW every 30-45 minutes. Postoperative pain management using epidural bupivacaine 0.1% and morphine 1 mg volume 10 ml every 10-12 hours; ibuprofen 400 mg every 8 hours intraoral; paracetamol 500 mg every 6 hours.

3. Discussion

In this case report, a 53-year-old male with lumbar canal stenosis in L2-L3, L3-L4, L4-L5, L5-S1, and spondylolisthesis L4-L5 will have a posterior decompression stabilization fusion procedure in a

prone position. However, during the preoperative examination, it was found that the patient had a history of asthma.

During the preoperative interview, a history of recent asthma exacerbations, recent hospitalizations, as well as any prior history of tracheal intubation and mechanical ventilation due to asthma, is important information to obtain. During the review of systems, the patient should provide a history of any recent wheezing, chest tightness, cough, or shortness of breath. When presenting for surgery, determining whether a patient's asthma is well-controlled or poorly controlled is key to mitigating perioperative complications. Elective surgery should be postponed until asthma is well controlled. A detailed history and focused cardiopulmonary physical examination are requisite in making this determination.^{12,13} Based on the criteria of the Global Initiative of Asthma (GINA), asthma is said to be well-controlled if there are no daily asthma symptoms more than 2 times a week, no asthma symptoms at night, no use of relievers more than 2 times a week, and no there are limitations in activities due to asthma symptoms.¹⁴ The patient in this case is included in well-controlled because asthma symptoms last appeared 1 year ago.

Induction of general anesthesia, airway manipulation, and emergence represent the most critical times for perioperative respiratory complications in patients with asthma. Ensuring that expert team members are involved with the case is essential. Anesthesia induction in this patient used dexamethasone 10 mg iv, diphenhydramine 10 mg iv, midazolam 1.5 mg IV, fentanyl 25 mcg IV, and ketamine 10 mg IV. In terms of IV agents, propofol demonstrates an excellent ability to blunt airway reflex bronchoconstriction, but this bronchodilation is inferior to volatile anesthetics. Compared to etomidate and thiopental, propofol is associated with lower airway resistance. Ketamine has direct bronchodilating effects and blunts airway reflex bronchoconstriction, but it also causes increased secretions, which can complicate airway management.

Lumbar spine surgery can be performed under anesthetic modalities, including general anesthesia (GA) or regional anesthesia (RA) (epidural, spinal, or a

combination of these). Although GA is more commonly used in lumbar spine surgery, controversy still exists about the optimum choice of anesthesia. It has not yet been definitively established whether GA or RA is safer, more efficient, and less costly. Consequently, the choice of GA or RA in spinal surgery differs based on the preferences and biases of the anesthesiologist, surgeon, and patient.¹⁵ In this patient, general anesthesia was chosen because of greater patient acceptance and the ability to perform operations of long duration in the prone position with a secured airway.

Several guidelines recommend combined general anesthesia (GA) and epidural analgesia (EA) for major surgery due to excellent pain control, reduced perioperative morbidity, and even reduced mortality compared with systemic analgesia.^{16,17} In this patient, the epidural analgesia regimen used was epidural bupivacaine 0.1% with an adjuvant regimen using Morphine 1 mg, volume 10 ml. Bupivacaine is a common agent in surgery with epidural analgesia due to the long blockage, separation of the sensory block from the motor block, non-absolute absence of tachyphylaxis, and limited placental transmission in this type of surgery. The bupivacaine-morphine combination also produces greater analgesic effects. Research shows that intrathecal bupivacaine has a short onset of sensory blockade. The analgesic effects of epidural bupivacaine, when administered alone, last almost 4 - 6 hours, but if the morphine regimen is added, the analgesic effect can last for 12-24 hours.¹⁸

4. Conclusion

Combined general anesthesia (GA) and epidural analgesia (EA) for major surgery due to excellent pain control, reduced perioperative morbidity, and even reduced mortality compared with systemic analgesia. For surgical patients who have a history of asthma, determining whether a patient's asthma is well-controlled or poorly controlled is key to mitigating perioperative complications.

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