



## CASE REPORT

# Laparoscopic gastrostomy under awake thoracic epidural anesthesia: A successful experience

*Uyanık thorakal epidural anestezi altında laparotomik gastrostomi: Başarılı bir deneyim*

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## Summary

General anesthesia is the first choice as an anesthesia method particularly for abdominal operations. However, because neuromuscular blockade induced during general anesthesia will increase atelectasis in a patient with pulmonary disease, it will also increase postoperative ventilator dependence, which will be even more apparent in cases of chronic obstructive pulmonary disease (COPD) that pose a risk, particularly for postoperative complications. Herein, thoracic epidural anesthesia (TEA) was found to be a better option for our patient with severe COPD and stage IV lung cancer, as it provided sufficient anesthesia and better postoperative care for laparoscopic gastrostomy.

Keywords: Chronic obstructive pulmoner disease; laparoscopic gastrostomy; lung cancer; throcal epidural anaesthesia.

## Özet

Genel anestezi, özellikle batin operasyonları için ilk tercih edilen anestezi yöntemidir. Ancak akciğer hastalığı olan birinde, genel anestezi esnasında sağlanacak neuromuskuler blokaj ateletaksiyi artıracığından, postoperatif ventilatör bağımlılığını artıracaktır. Özellikle postoperatif komplikasyonlar için risk oluşturan kronik obstruktif akciğer hastalığı (COPD) olgularında bu ihtiyaç daha belirgin olacaktır. Thorakal epidural anaesthesia (TEA), üst abdominal operasyonlar için yeterli anestezi sağladığından, ciddi akciğer hastalığı ve evre 4 akciğer kanseri olan hastamız için en iyi seçenektir.

Anahtar sözcükler: Akciğer kanseri; kronik obstruktif akciğer hastalığı; laparoskopik gastrostomi; torakal epidural anestezi.

## Introduction

When the risks of general anesthesia are higher than its advantages in patients with severe dyspnea and general anesthesia is contraindicated in presence of severe acute and chronic pulmonary diseases, whether operation can improve quality of life and health becomes an ethical dilemma. This results in avoidance of general anesthesia and confronts us with the fact that the operation is risk, or there is no definitive treatment or no other choice apart from palliative surgical operation. If there is no contraindication and the total risk and benefit balance is in favor of operation, laparoscopic gastrostomy may contribute to postoperative well-being and a comfortable life quality.

Several studies have shown the advantages of tho-

racic epidural anesthesia (TEA).<sup>[1-4]</sup> The purpose of this case report was to present the administration of TEA for laparoscopic gastrostomy in a patient with stage IV lung cancer for whom general anesthesia was a risk, according to previous knowledge in the literature.

## Case Report

A 57-year-old male patient (height: 162 cm, weight: 55 kg) with a history of stage IV lung cancer and chronic obstructive pulmonary disease (COPD) underwent palliative percutaneous endoscopic gastrostomy (PEG) performed by a gastroenterologist; however, as the esophageal lumen was narrowed due to tumoral invasion (Fig. 1), endoscopy could not be proceeded and the procedure was terminated. Then, it was decided to perform gastrostomy with a surgical meth-

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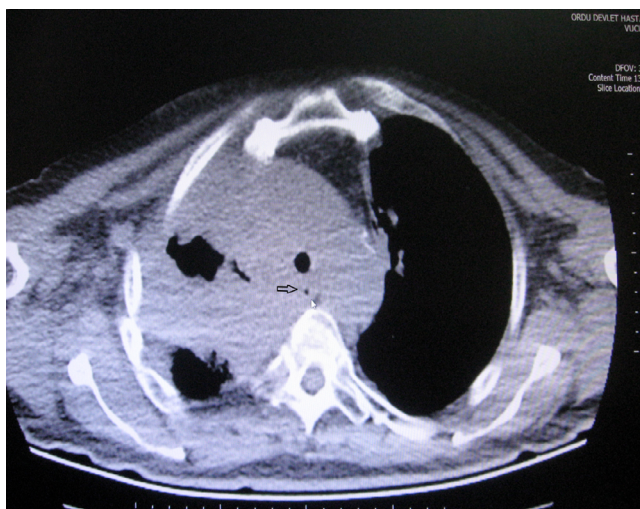
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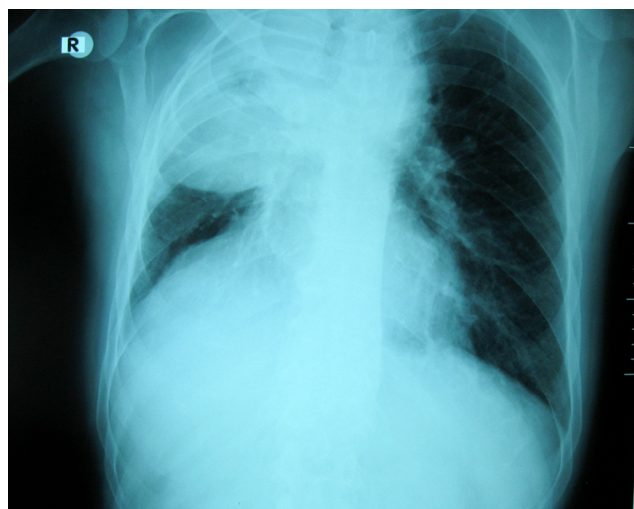
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od. The patient who had applied to the anesthesia outpatient clinic for preoperative assessment had a hearing problem and did not have any systematic disease other than lung cancer diagnosed 1 year ago and COPD diagnosed 3 months ago. He was followed up at home with bronchodilator therapy and had a swallowing problem in the last few weeks. Physical examination revealed mild dyspnea and tachypnea, but cardiac examination was normal. Respiratory sounds could not be detected in the upper and middle right lobes of the right lung, whereas they could partly be heard in the lower lobe. Sounds in the left lung could be heard in all lobes. Because the patient was unable to cooperate, a pulmonary function test could not be performed, and the department of chest diseases reported a high risk for operation due to the current disease. Laboratory findings were as follows: erythrocytes 3.800.000/mm<sup>3</sup>, hemoglobin 10.2 g.dL<sup>-1</sup>, hematocrit 33.7%, platelets 164.000/mm<sup>3</sup>, prothrombin time 14.5 s, partial thromboplastin time 68.8%, and INR 1.15. Other preoperative laboratory findings, including urine examination, blood sugar levels, and serum electrolytes, were within the normal limits. Chest radiography revealed a radio-opaque area in the upper and middle lobes of the right lung due to the tumoral tissue (Fig. 2). The patient's son was informed of the following outcomes if general anesthesia was to be administered: 1) it would be difficult to regain postoperative respiratory functions, 2) the patient would need to be followed by mechanical ventilator in the intensive care, and 3) the operation could be performed only with TEA; thereafter, the son provided written consent. Preoperatively, the patient

received 500–750 mL of Ringer lactate solution via intravenous (IV) cannula but did not receive any premedication. Standard monitoring, including noninvasive arterial pressure (NIBP), electrocardiography (ECG), and pulse oximetry (SpO<sub>2</sub>), was established in the operating room. His baseline blood pressure was 160/90 mmHg, pulse was 95/min, SpO<sub>2</sub> was 95, and respiratory frequency was 18/min. The patient was placed in a sitting position, and 2% lignocaine (5 mL) was used to infiltrate the chosen space. An 18-gauge Tuohy needle was inserted at the T8/T9 intervertebral space, and a test dose (1 cc) of 2% lignocaine was administered through the needle to confirm the correct placement. The epidural space was identified using the “loss of resistance” technique, and an epidural catheter was passed through the needle. A midline approach was used under complete aseptic precautions. The anesthetic solution was prepared with 18 mL of 2% lidocaine, epinephrine (1:200.000), and 2 mL of 8.4% sodium bicarbonate. After negative aspiration, 3 mL of the solution was administered as a test dose. The tip of the catheter was advanced at 3 cm cephalad beyond the tip of the needle (T7/T6) and secured with a sterile dressing. If there was no evidence of intravascular or subarachnoid injection 2 min later, an additional 7 mL was injected with 50 µg fentanyl for a 1.5-min period. The upper and lower levels of sensory and motor block were assessed using a pinprick test and the Bromage scale, respectively. When the level of sensory block reached T4, the Bromage scale was 0 and the operation was initiated. Because his blood pressure decreased to 85/50 mmHg at 10 min after the procedure, 10 mg iv ephedrine was administered, and blood pressure



**Figure 1.** Thoracic CT shows that the cancer tissue led to narrowing of the esophageal lumen.



**Figure 2.** PA chest radiography; lung cancer covering the right upper and middle lobes.

of 100/65 mmHg and 108/70 mm/Hg were recorded. Furthermore, it was observed that the patient had a mild respiration difficulty and his respiratory rate increased. He received ventilation with an oxygen mask, and SpO<sub>2</sub> values (93%–96%) did not decrease. During his follow-up, respiration improved and hypotension and bradycardia did not develop. At the end of the 45-min operation, the patient was transferred to the intensive care unit for better follow-up. A total of 10 cc of 2.5% marcaine was injected through the epidural catheter in the intensive care unit. His NIBP, HR, and SpO<sub>2</sub> values were normal. The patient was transferred to the service unit without encountering any problems.

## Discussion

The present case report aimed to present our experience of a patient with stage IV lung cancer and COPD who was predicted to develop postoperative pulmonary complications (PPCs) and require mechanical ventilatory support after undergoing PEG. The PPCs in the patient were successfully averted by providing adequate anesthesia and analgesia using TEA.

Approximately 5% of patients undergoing noncardiac surgery experience severe pulmonary complications. Patients with COPD are 300%–700% more sensitive to postoperative complications than those without. Particularly, procedures close to the diaphragm lead to atelectasis and weakness of respiratory muscles responsible for reducing lung volumes, further increasing the risk of complications.<sup>[1]</sup> Caret et al.<sup>[4]</sup> defined seven risk factors for PPCs, including 1) lower preoperative SpO<sub>2</sub>, 2) acute respiratory infection in the preceding months, 3) advanced age, 4) preoperative anemia, 5) upper abdominal or thoracic surgery, 6) operation duration longer than 2 h, and 7) emergency operations. As our patient had anemia and COPD and had undergone a procedure close to the diaphragm, he had also carried a potential risk for developing PPCs.

Many factors lead to PPCs, including weakened mucociliary activity by anesthetic gases and tracheal intubation during general anesthesia, atelectasis caused by the inactivation of respiratory muscles during mechanical ventilation and positive end-expiratory pressure, and hypoxia and unplanned re-intubation due to the residual effect of muscle relaxant agents.<sup>[5]</sup>

A meta-analysis by Khetarpal et al stressed that PPCs could be avoided by administering regional anesthesia to patients with COPD.<sup>[6]</sup>

Surgical trauma can impair respiratory functions by three mechanisms: 1) functional impairment of respiratory muscles (intercostal, abdominal muscles) following incision, 2) limitation of respiratory function due to postoperative pain, and 3) impaired diaphragmatic activity as a result of reduced phrenic motor neuron functions by visceral stimulation. In addition, individuals with severe lung disease use accessory respiratory muscles, e.g., abdominal muscles. When these muscles are paralyzed by spinal or epidural block, they are unable to maintain spontaneous respiration.<sup>[7]</sup> This underlies the mechanism of dyspnea and tachypnea developed in our patient after undergoing TEA. Despite such risks of TEA that particularly affect patients with chronic lung disease, we preferred using TEA owing to its favorable properties, which include preservation of mucociliary activity; reduction of atelectasis incidence, opioid use, and postoperative pain;<sup>[1]</sup> reduction of the risk of postoperative ileus;<sup>[8]</sup> and allowing early mobilization.<sup>[3]</sup> Consani et al.<sup>[9]</sup> used TEA and maintained block by hourly sufentanyl infusion through the epidural catheter during a 3-h subtotal gastrectomy operation in a patient with respiratory failure. Successful anesthesia maintenance ensured a favorable operative outcome and averted all possible PPCs.

Cardiovascular causes constitute 30% of all preoperative mortalities in low-risk individuals and 60% in high-risk individuals.<sup>[10]</sup> TEA reduces major determinants of myocardial oxygen demand and optimizes myocardial blood flow distribution that mediates coronary contraction.<sup>[2]</sup> A meta-analysis by Popping et al.<sup>[11]</sup> showed a significant reduction in myocardial infarction with primary TEA in abdominal and thoracic procedures. To our view, although our patient was preoperatively expected to experience reduced myocardial oxygen supply as a result of anemia, reduced respiratory reserve, paralysis of accessory respiratory muscles by TEA, and reduced diaphragmatic function by a reflex surgical stimulus, this did not occur by virtue of favorable properties of TEA, including an improvement in myocardial blood supply by sympathetic blockage, maintenance of cardiac contractility throughout the procedure, and lowering of blood pressure.

Addition of bicarbonate to lidocaine increases the unionized fraction of the latter, thus facilitating passage through the neuronal membrane and accelerating the onset of block.<sup>[12]</sup> Lidocaine-bicarbonate-fentanyl combination has been used for abdominal operations in which the level of epidural block remained inadequate and thus had to be increased.<sup>[13]</sup> We also used the same combination to achieve an adequate level of anesthesia.

Surgeons desire a loose abdominal wall for abdominal operations. In our case, the surgeon stated that there was no difficulty related to the technique, and relaxation was sufficient to perform the operation. In conclusion, we eliminated PPCs by performing TEA in a patient at risk of adverse events related to general anesthesia.

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