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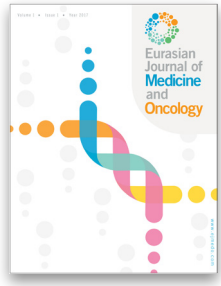

Case Report

Determination of Puncture Point for Spinal Needle with Ultrasound in a Morbidly Obese Patient

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Abstract

Obesity, defined as a body mass index (BMI) ≥30 kg/m^2, is an important clinical condition that affects many organ systems. In addition to the systematic effects, obesity can lead to complexity in the application of clinical anesthesia, such as regional anesthesia approaches. The use of ultrasound (US) may be necessary to ensure the success and reliability of neuraxial blocks, especially in patients with anatomical landmarks that are difficult to determine. Presently described is a case with a morbidly obese patient case for whom we had to determine the puncture point for a spinal needle using US due to pulmonary issues. In the preoperative evaluation of this 69-year old, 180 kg, 150 cm tall, female patient with a BMI of 75 kg/m^2 who had a fracture of the left femoral diaphysis, it was observed that she presented with wheezy breathing and a cough. The physical examination found that end expiration was prolonged and wheezing was auscultated at the end of expiration. Spinal anesthesia was administered to the patient with US guidance as a result of the pulmonary issues. She was admitted to the intensive care unit with no observed problem and was discharged to the orthopedic clinic the following day.

Keywords: Obesity, spinal anesthesia, ultrasonography

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Obesity is defined by the World Health Organization as a body mass index (BMI) of ≥30 kg/m^2.[1] When the BMI is ≥40 kg m^2, the patient enters the class of extreme obesity (Class III). Many pathological changes occur; obesity negatively affects all organ systems, led by the respiratory system (obstructive sleep apnea, obesity-hypoventilation syndrome, bronchial asthma, pulmonary hypertension), the cardiovascular system (arrhythmia, atherosclerosis, heart failure, coronary artery disease, peripheral vein disease, sudden cardiac death, systemic hypertension, thromboembolism), and the endocrine-metabolic system (diabetes mellitus, hyperinsulinemia, hypothyroidism, insulin resistance, metabolic syndrome).[2] These pathological changes make the management of both general anesthesia and regional anesthesia more difficult in obese patients. In particular, the use of anatomical landmarks to guide the administration of regional anesthesia in the traditional method can become extremely difficult and may lead to failure in this patient population. As a result, in recent years, performing the procedure with ultrasound (US) guidance, a non-invasive method without negative effects, such as radiation, has become popular. This case report describes the administration of spinal anesthesia in an obese patient with the assistance of US due to pulmonary issues.

Case Report

A 69-year-old female patient with a left femur diaphysis fracture from a fall was taken for preoperative assessment. Her weight was 180 kg and her height was 155 cm (BMI:

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75 kg/m^2). Her medical history included antihypertensive (amlodipine 10 mg) and oral antidiabetic (metformin 3x500 mg) treatment for hypertension and Type II diabetes mellitus for 5 years. Following complaints of noisy respiration and a cough, a physical examination auscultated deepened lung sounds and widespread ronchi. Based on lengthened expiration and wheezing at the end of expirium, the patient began treatment with the chest diseases clinic. Though there was lymph node edema in the left leg (elephantiasis), the patient's vital signs were within normal limits (blood pressure: 140/90 mmHg, pulse: 80/minute, S1 and S2 normal). Electrocardiography identified no pathology; however, posteroanterior direct lung graphs found a wide central mediastinum, a prominent aortic knob, an elevated right diaphragm, and an increased cardiothoracic ratio. Bedside echocardiography did not identify any serious cardiac pathology. Arterial blood gas analysis was within normal limits. She received 6 points on the STOP-BANG obstructive sleep apnea scoring survey, and was determined to be at high risk of sleep apnea syndrome. Due to her existing diseases and physical state, the patient was assessed as Class III according to the American Society of Anesthesiologists. An airway evaluation observed a short neck, Mallampati score of 4, limited neck movement, excessive fatty tissue in the mouth and pharynx, and fat cushions in the upper thoracic and cervical region. Biochemical and hematological laboratory values were within normal limits. Regional anesthesia was planned for perioperative management due to her pulmonary issues. After informed consent was provided, a venous route was opened with a 20-G cannula before surgery. For prehydration, 500 cc crystalloid fluid was administered. For premedication, intravenous 50 mg ranitidine and 10 mg metoclopramide were given. With preparations for difficult intubation, US, and spinal anesthesia completed, the patient was taken to the operating room and placed in a sitting position on the operating table (Fig. 1). Standard monitoring was applied. With palpation of anatomic points impossible, the patient's lumbar region was examined using US and the "count up" approach. Beginning at the L5-S1 interval, the skin at the L4-5 interval was marked with a skin-marking pen (Fig. 2). Antisepsis of the marked region and surroundings was ensured with povidone iodine solution and the area was covered under sterile conditions. A 22-G Quincke spinal needle (B. Braun Melsungen A.G., Melsungen, Germany) of 120 mm length was used for a single puncture on the midline of the region, entering the subarachnoid space. No complications, such as paresthesia or hemorrhagic cerebrospinal fluid, were observed. After observing the free flow of cerebrospinal fluid, 4 mL (20 mg) hyperbaric bupivacaine (Marcaine Spinal heavy 0.5%; AstraZeneca plc, Cambridge, UK) was injected. Sensorial block level was tested with the pinprick test and the operation was initiated when it reached T5 level (maximum block level: T5, motor block level: T3, motor block reversal duration: 175 minutes). During the nearly 100-minute operation, no problem was observed in terms of anesthesia. Oxygen saturation was stable, with mask oxygen at 97 to 99%. Hypotension or bradycardia was not observed. The patient was taken to the intensive care unit for close monitoring after the surgery, and 4x1 g paracetemol (Perfalgan vial 1g/100 mL; Bristol-Myers Squibb, Inc., New York, NY, USA) and 2x8 mg lornoxicam (Xefo, Abdi İbrahim İlaç Sanayi ve Ticaret A.Ş., Istanbul, Turkey) were administered for postoperative analgesia. When necessary, 100 mg tramadol (Contramal, Abdi İbrahim İlaç Sanayi ve Ticaret A.Ş., Istanbul, Turkey) was added. The patient was transferred to the orthopedic service the next day.

Figure 1. The patient's appearance before spinal anesthesia.

Discussion

Obesity is an important problem that affects perioperative management in clinical anesthesia. Changes in the organ systems make detailed preoperative assessment of these patients mandatory. Simultaneous observation of cardiac and pulmonary problems in obese patients is likely. As a result, obtaining information about previously administered

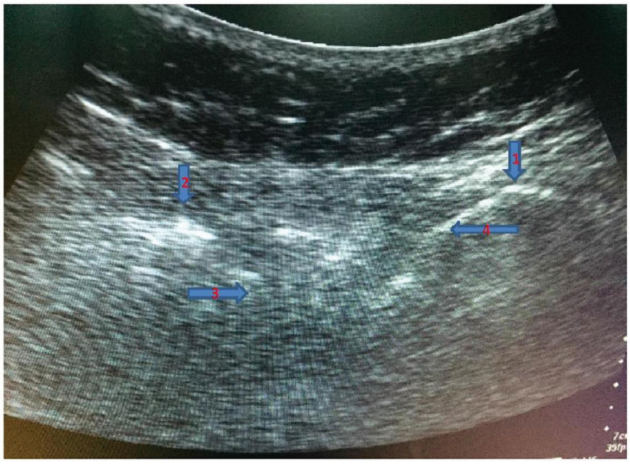

Figure 2. Ultrasound imaging of the spinal interval. Arrow 1: L5; arrow 2: L4; arrow 3: epidural space; arrow 4: ligamentum flavum.

anesthesia and the presence of active complaints may be useful as a guide for anesthesia management.

One of the most significant diseases encountered by obese patients is obstructive sleep apnea syndrome. Research has shown that to predict sleep apnea syndrome, threshold values for BMI, neck circumference, and age are >42 kg/m^2, 42 cm, and 37 years, respectively.[3] The patient in this case scored above the 3 threshold values in the STOP-BANG scoring system, but had no diagnosis of sleep apnea syndrome. Nonetheless, the risk was assessed as high.[2]

Additionally, there were findings indicating that our patient would have difficult airway management. In morbidly obese patients, regional anesthesia techniques are a good alternative to general anesthesia to avoid possible intubation difficulties. However, problems encountered distinguishing anatomical points may make this technique difficult. US or fluoroscopic imaging methods may be of assistance in such instances.[4, 5] Due to the lack of radiation and easy applicability, we chose to use US to identify the anatomical region for spinal needle entry.

The literature indicates that determination of the entry point with US before puncture increased success and reduced the number of spinal needle entries.[6] Grau et al.,[7] in a study of 300 patients, reported that with US, both the rate of failure of epidural analgesia and pain scores after administration were reduced by significant levels. Similarly, Kallidaikurichi Srinivasan et al.[8] concluded that a paramedian approach with US was more successful than the traditional midline approach with anatomical landmarks. In our case, the use of US to identify the needle entry point was an important factor in our success in reaching the subarachnoid space in a single attempt.

To the best of our knowledge, there are 2 cases in the literature of patients with spinal anesthesia administered with US who had high BMI values.[9, 10] Lebbi et al.[9] performed a transurethral prostate resection in a patient with sleep apnea syndrome and a BMI of 53 kg/m^2, while Whitty et al.[10] performed a cesarean on a patient with a BMI of 70 kg/m^2. The BMI of our patient was 75 kg/m^2; making it the highest reported in the literature in such a case.

Given the risks of general anesthesia for morbidly obese patients, we believe the choice of neuraxial anesthesia accompanied by US helps to avoid possible negative postoperative results, and application is simple.

Disclosures

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship contributions: Concept – I.O., S.D., A.N.O.; Design – I.O., S.D., A.N.O.; Supervision – I.O., S.D., A.N.O.; Materials – I.O., S.D., A.N.O.; Data collection &/or processing – I.O., S.D., A.N.O.; Analysis and/or interpretation – I.O., S.D., A.N.O.; Literature search – I.O.; Writing – I.O.; Critical review – I.O., S.D., A.N.O.

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