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OLGU SUNUMU/CASE REPORT

ULTRASONOGRAPHY GUIDED SPINAL ANESTHESIA IN A CASE WITH SEVERE KYPHOSCOLIOSIS

Ağır Kifoskolyozlu Bir Vakada Ultrason Kılavuzlu Spinal Anestezi

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ABSTRACT

Patients with spinal abnormalities present unusual challenges for the administration of sedation and anesthesia during surgical and technical procedures. Airway management and respiratory problems are the commonest. In this case with severe kyphoscoliosis, we aimed to evaluate the advantages of spinal anesthesia technique performed under the guidance of ultrasonography. A 80-year-old female patient presented to our hospital with total uterine prolapsus. Medical history of the patient revealed severe congenital kyphoscoliosis, and restrictive lung disease. Lumbar vertebras and intervertebral spaces of the patient were scanned with an 8MHz head piece of the ultrasound. For spinal access, L4-L5 intervertebral space through which dura can be observed was selected. At the end of the operation, pin prick test detected sensory block at T12 dermatome. This case demonstrates that spinal anesthesia performed under the guidance of ultrasonography can be successful even in cases of severe kyphoscoliosis.

Key words: Anesthesia, Spinal, Neuroaxial blockade, Kyphoscoliosis, Ultrasonography

ÖZ

Vertebra anomalili hastalarda cerrahi ve teknik prosedürler sırasında sedasyon ve anestezi uygulanması sıradışı zorlukları ortaya çıkarır. Hava yolu yönetimi ve solunumsal problemler bunların en yaygın olanlarıdır. Biz şiddetli kifoskolyozlu bu hastada, ultrasonografi kılavuzluğunda yapılan spinal anestezi tekniğinin avantajlarını değerlendirmeyi amaçladık. Seksen yaşında kadın hasta, hastanemize total uterin prolapsus ile getirildi. Hastanın tıbbi geçmişinde konjenital kifoskolyoz ve restriktif akciğer hastalığı saptandı. Hastanın lumbar vertebraları ve intervertebral aralıkları ultrasonun 8MHz probu ile tarandı. Spinal erişim için, duranın görülebildiği L4- L5 intervertebral aralık seçildi. Operasyonun sounda, duysal blok seviyesi (pinprick testi) T12 dermatonunda saptandı. Bu olgu ultrasonografi kılavuzluğunda yapılan spinal anestezinin şiddetli kifoskolyozlu hastalarda bile başarılı olabildiğini göstermektedir.

Anahtar kelimeler: Anestezi, Spinal, Nöroaksiyel blok, Kifoskolyoz, Ultrasonografi

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INTRODUCTION

Patients with spinal abnormalities present unusual challenges for the administration of sedation and anesthesia during surgical and technical procedures. In the scoliotic spine, vertebral bodies are rotated axially, with their spinous processes facing into the concavity of the curve. The degree of spinal rotation is difficult to estimate clinically or from simple inspection of x-rays, and there is currently no technique suitable for operating room use. Ultrasonography (US) can help to estimate the depth and location of the epidural space (1). One study has previously measured vertebral rotation in scoliotic patients using ultrasound imaging, and reported values that correlated well with radiologically derived calculations (2). Herein, we aimed to evaluate the advantages of spinal anesthesia technique performed under the guidance of US in a patient with severe kyphoscoliosis and uterine prolapses.

THE CASE

A 80-year-old female patient (height, 140 cm; body weight 45 kg) presented to our hospital with total uterine prolapsus. Medical history of the patient revealed severe congenital kyphoscoliosis, and restrictive lung disease. On physical examination, widespread rales and rhonchi, decreased respiratory sounds at basal segments of both lungs were auscultated. Neck movements were restricted on extension, and the patients could not lie down at supine position. Pulmonary function test results (FEV1= 0.37, FEV1/FVC= 64%, PEF= 0.89) were consistent with a severe restrictive pattern. The patient was under medication due to hypertension. On her echocardiogram, ejection fraction of 60%, and a pericardial effusion 0.6 cm away from its anterior aspect were detected. In the

Figure 1. The patient with severe congenital kyphoscoliosis.

operating room, the patient could not be positioned in the supine position, so she was prepared for anesthesia while she was sitting upright (Fig. 1). Lumbar vertebras and intervertebral spaces of the patient were scanned with an 8MHz headpiece of the ultrasound. Transverse processes of lumbar vertebras, and dura were tried to be detected using a convex vertical probe. For spinal access, L4-L5 intervertebral space through which dura can be observed was selected. Under the guidance of US, subarachnoidal space was entered at the first attempt using a 26 G atraumatic spinal needle directed 45°-60- degrees cephalad (Fig. 2). After observing outflow of cerebrospinal fluid, 4 cc levobupivacaine (5 mg/ml) was injected through the spinal needle slowly.

Figure 2. Subarachnoidal space was entered under the guidance of ultrasound.

Although the volume of the local anesthetic relatively high severity of the spinal deformity and the disadvantage of semisitting position could be an obstacle to achieve an adequate spinal block level and to usual local anesthetic distribution. Isobaric local anesthetic with a relatively high volume was chosen to overcome of these advantages. Patient's lumbar, and cervical regions were supported, and placed at supine as much as can be possible (at 60º semi-sitting position). Ten minutes later, pin prick test revealed the level of her sensory block at T6 dermatome, and initiation of the operation was approved. Her heart rate was between 95-123/min during the operation, blood pressure as mean arterial pressure was between 86-102 mmHg, and pulse oxymetry parameters were between 90-92%. Her operation lasted for a total of 75 minutes. During the operation, oxygen was delivered to the patient only at a dose of 2L/min. Her blood pressure did not drop to hypotensive levels during the operation. At the end of the operation, pin prick test detected sensory block at T12 dermatome. The patient with an improved health state was monitored in the observation room, and then sent to the ward. Written consent of the patient was taken postoperatively.

DISCUSSION

Skeletal/costovertebral deformities one of the pathophysiological states and disease processes that may be classified as restrictive lung disease which are characterized by a reduction of lung volume and both total and vital capacity. Hence, patients with restrictive lung disease are at risk for exaggerated pulmonary dysfunction postoperatively (3). Studies about spine deformities in relation to restrictive pulmonary disease obtained from pediatric population underwent spine surgery (4, 5). In a study of 24 pediatric patients the surgical outcomes were documented. Mean preoperative FVC was 26% (13-39%). Eight patients had preoperative home BiPAP, 15 preoperative in-hospital BiPAP, and 2 preoperative mechanical ventilation. Nine patients had preoperative nutritional support. Mean duration of ICU stay was 5 days (1-21). Total postoperative hospital stay was 17 days (7-33). Ventilatory support in the immediate postoperative includes 16 patients requiring BiPAP and 2 volumetric ventilation. None of the patients required a tracheostomy (4). In another pediatric scoliosis surgery study it has been shown that in addition to restrictive lung disease obstructive lung disease are also can be associated with scoliosis. However, there is no recommendations on adults spine surgery cases with restrictive disease (3).

Spinal anesthesia is less reliable in the presence of kyphoscoliosis, but successful outcomes have been described (6, 7). In a case of severe kyphoscoliosis, an attempt at continuous spinal anesthesia with repeated doses of hyperbaric bupivacaine was unsuccessful, and adequate surgical anesthesia was achieved by adding isobaric bupivacaine solution (6). Douglas et al.

described an asymmetric block in a patient with marked scoliosis; the patient had incomplete block on the left, but satisfactory spinal block was obtained with hyperbaric bupivacain after the table was tilted to the left (7). In our patient with severe kyphoscoliosis, we achieved adequate sensory and motor blockade with the injection of levobupivacaine.

Before a decision is made to administer spinal anesthesia in patients with kyphoscoliosis, one should consider the following potential problems: these patients may have pulmonary dysfunction and spinal anesthesia may cause further impairment by affecting the intercostal muscles (2); insertion of the needle through the midline or lateral approach may be difficult. In the kyphoscoliotic spine, the rotation of the vertebral bodies adds a further unknown variable. The spinous processes face into the concavity of the curve, which may also be counterintuitive to those unfamiliar with scoliosis. Moe and Nash have described a technique that estimates rotation from radiographs, but this method requires some familiarity with spinal radiographs, and the information derived may not easily translate to the clinical situation (8). Radiographic reports may be helpful in assessing the location and extent of vertebral involvement; however, such data may not reliably facilitate placement because, even in healthy volunteers, anesthesiologists incorrectly identify the lumbar interspaces by palpation 71% of the time (9). Alternatively, US may be a helpful tool in defining the relevant anatomy. US may be more accurate than palpation in correctly identifying lumbar interspaces. Watson et al. performed a study to determine the accuracy with which a single anesthesiologist could identify the L3-4 interspace using ultrasonography in nonpregnant subjects in the sitting position (1). Using ultrasound, the anesthesiologist who had received minimal instruction correctly identified the L3-4 interspace in 13 of 17 (76%) cases. With lumbar radiograph as the standard, Furness et al. showed that the correct intervertebral level was identified in 71% of 50 cases using ultrasound in nonpregnant subjects compared with a 30% success rate with palpation (9).

The main limited US technology in neuroaxial blockades is the narrow acoustic window between the adjacent laminae. However it still can be helpful as a pre-procedure examination in certain circumstances. Chin et al (10) identified the interlaminar spaces visualizing by ligamentum flawum-dura mater complex and the posterior aspect of the vertebral body in their US assisted approach for spinal anesthesia in joint arthroplasty cases in the elderly and they suggested it could facilitate spinal anesthesia in patients had age related changes in lumbar spine. Weed et al. (11) in their pre-procedure US screening for spinal anesthesia study demonstrated that the good images of the posterior longitudinal ligament is a reliable indicator for a suitable window to the intratecal space and they emphasized that ultrasound can play in the decision making process.

In the present case, we relied on the information obtained from the ultrasound and performed the spinal anesthesia. Ultrasonography has various supportive applications, including central venous cannulation and peripheral nerve blockade. In the future, use of US for invasive procedures may increasingly be seen as best practice. The US technique described by Suzuki et al., was intended for the assessment of scoliosis only, rather than for guiding interventions (2). US has been successfully used to

estimate the depth of the epidural space, and to improve the accuracy in identifying the lumbar interspace level in a limited number of reports (1). In obstetrical practice, Grau et al. reported that US assistance reduced the number of epidural insertion attempts (12).

This case demonstrates that spinal anesthesia performed under the guidance of US can be successful even in cases of severe kyphoscoliosis and may help achieve adequate motor and sensory blockade. It can be suggested that in neuroaxial blockades where US use is not common, under certain circumstances such as severe kyphoscoliosis it should be used routinely.

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