

SEVERE KYPHOSCOLIOSIS AND SPINAL ANESTHESIA: CASE REPORT

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ABSTRACT

Kyphoscoliosis is an uncommon deformity in which the scoliosis is accompanied by a kyphosis of greater than 50°. Patients with severe kyphoscoliosis form a critical group for anaesthetic interventions as they predispose to cardiac and pulmonary diseases. Abnormal curvatures of the spine present difficulties on the technical aspects of administration of anesthetic. This patient is presented to discuss the problems that are encountered with patients having spinal deformity from anaesthesiologist's point of view.

Key words: Spinal deformity, Kyphoscoliosis, Regional anesthesia

ÖZET

ŞİDDETLİ KİFOSKOLYOZ VE SPİNAL ANESTEZİ: OLGU SUNUMU

Kifoskolyoz, 50 derecenin üstündeki kifozun skolyoza eşlik ettiği sık rastlanmayan bir deformitedir. İleri kifoskolyozu olan olgular, anestezi girişimleri açısından kardiyak ve pulmoner sorunları nedeniyle kritik bir grup oluştururlar. Anesteziğin uygulanması aşamasında omurganın bozulmuş anatomisi teknik sorunlar yaşatır. Bu olgu, anestezi açısından omurga deformiteli hastayla karşılaşılması durumunda yaşanan sorunları ve çözümünü tartışmayı amaçlamaktadır.

Anahtar sözcükler: Omurga deformitesi, Kifoskolyoz, Bölgesel anestezi

INTRODUCTION

Kyphoscoliosis is an uncommon deformity in which the scoliosis is accompanied by a kyphosis of greater than 50°. These curves typically include severely dysplastic vertebrae at the apex with deformed vertebral bodies (2). Idiopathic scoliosis usually begins in childhood and manifests with rapid growth in adolescence. Patients with severe kyphoscoliosis form a critical group for anesthetic interventions as they predispose to cardiac and pulmonary diseases. In patients with severe abnormal curvatures of the spine,

pulmonary functions should be tested attentively. Additionally, in kyphoscoliotic patients, due to muscle dystrophy, malign hyperthermia may be a disastrous complication of general anesthesia (7).

Idiopathic scoliosis and scoliosis in patients with neuromuscular disease are associated with a restrictive respiratory system defect and with diminished efficiency of breathing both at rest and during exercise. The pathologically increased spinal flexion of a kyphotic deformity may lead to neurologic impairment. Surgical straightening of the spine has its

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greatest impact on respiration through improving efficiency and slowing the decline in Forced Vital Capacity (FVC) in selected patients with neuromuscular disease (1).

CASE REPORT

A 34 year old woman, weighting 34 kg. height 130 cm. was seen in our Obstetrics and Gynecology department for routine pre-operative anesthetic examination. She was admitted to our hospital for tubal ligation. On physical examination, severe kyphoscoliosis was detected by inspection and because of the well-known risks of pulmonary system, further investigations were requested. Pulmonary Function Testing (PFT) showed severe restrictive lung disease pattern (Table 1).

Table 1. Pre-operative pulmonary function tests of the patient.

	Normal	Patient	Patient/ Normal (%)
Forced vital capacity (FVC)	3.17	1.40	44
Forced expiratory volume (FEV ₁)	2.73	1.12	41
FEV ₁ /FVC	86.5	80	93
Forced expiratory flow rate (FEF 25-75)	3.3	1.1	33

On radiographic examinations of the spine, a double-curve with 138 degrees on thoracal and 100 degrees on lumbar site was measured with Cobb's method (3) (Figure 1, 2).

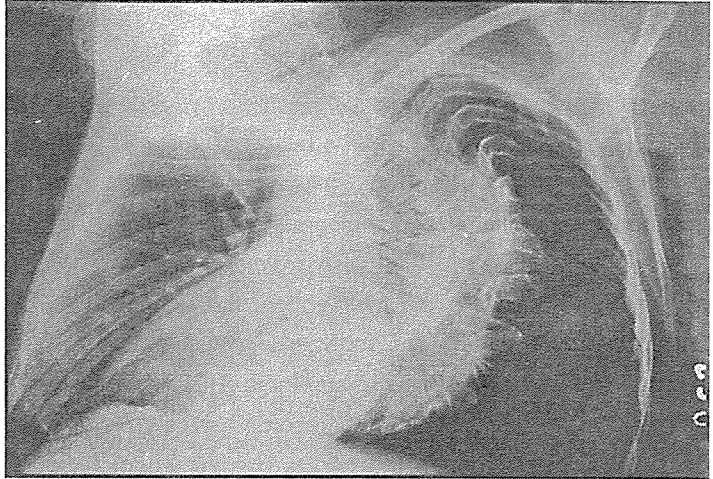


Figure 1. The x-ray of the thoracic vertebrae of the patient.

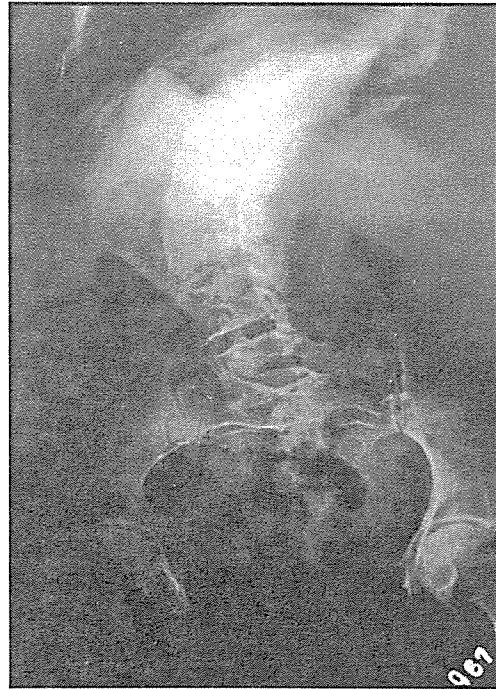


Figure 2. The x-ray of the lumbar vertebrae of the patient.

The thoracic curve was convex to the right with an apex at T8 level and lumbar curve was convex to the left with the apex at L2-3 intervertebral disk space. Idiopathic curve as small as 35° can significantly impair the volume and efficiency of respiration during exercise (4). When the results of PFT were regarded, we decided not to perform general anesthesia and

then spinal anesthesia seemed to be the most suitable method for this particular patient.

On the operation day, the patient was pre-hydrated with Ringer Lactate solution with a rate of 10 ml/kg/h from peripheral venous line for 30 minutes. She was monitored and initial electrocardiogram, non-invasive arterial blood pressure and pulse oximeter values were recorded. Before the intervention, the arterial blood gas of the patient was analyzed. Mean Arterial Blood Pressures (MAP) and Heart Rates (HR) were checked every five minutes and recorded every 15 during the operation and continued to be checked in the recovery room for two hours. The vital parameters of the patient were uneventful during and after the operation.

TECHNIQUE

Lumbar puncture was performed in sitting position using a 22-gauge Quincke point needle positioned midline at the L4-5 intervertebral space but after three unsuccessful attempts, L5-S1 level was tried. At this level, we succeeded to inject the solution at first attempt. The solution consisted of 2 ml. of heavy bupivacaine % 5 (MARCAINE®, Eczacıbaşı) and 1 ml. (50 micrograms) of fentanyl citrate (FENTANYL, Abbott Laboratories). The patient was then returned to supine position with the help of pillows to her both sides. A complete sensory and motor block from T10 downwards was achieved. The surgical procedure lasted for 130 minutes uneventfully. After the operation, arterial blood gas analysis was checked and compared with the initial-base value (Table 2).

Table 2. Arterial blood gas analysis results

	Pre-operative*	Post-operative
pH	7.366	7.414
P _{CO2} (mmHg)	29.1	31.9
P _{O2} (mmHg)	124.1	78.6
HCO ₃ (mmol/l)	16.3	20.1
Actual Base Excess (ABE, mmol/l)	-7.6	-3.1

* Under oxygen support with a rate of 3 l/min.

DISCUSSION

In patients with severe kyphoscoliosis, deciding the route of anesthesia is a challenging subject. Intubation of the patient can be difficult because of cervical vertebral anomalies such as rotation and fusion (7). Another problem is diminished pulmonary functions, which may even lead to mechanical ventilation after the operation. Regional anesthetic techniques can be extremely helpful in such conditions. The main handicap of regional techniques in such patients is the problem of performing the block because of anatomical difficulties. Also, tolerating the position, which must be given during the operation, may cause problems.

Abnormal curvatures of the spine, especially scoliosis and kyphoscoliosis, have an effect on the technical aspects of administration of anesthetic as well as factors that determine the level of spinal anesthesia. Following the decision of applying a regional technique, we must choose the level of the spinal anesthesia. The technique of placing the block becomes more difficult because of the rotation and angulation of the vertebral bodies and spinous processes. Finding the middle and the interlaminar spaces can also be difficult. Many practitioners find paramedian approaches to lumbar puncture to be easier in patients with severe scoliosis and kyphoscoliosis, especially if there is associated degenerative joint disease. Viewing the anteroposterior and lateral x-rays of the lumbar spine prior to attempting block can overcome some of the technical difficulties by identifying the level where lumbar puncture may be easier. Spinal curvature affects the ultimate level by changing the contour of the subarachnoid space.

Severe kyphosis or kyphoscoliosis can be associated with a decreased volume of cerebrospinal fluid and with hypobaric technique or rapid injection, a higher than expected level can occur.

Severity of the curve is important because thoracic curves bigger than 60 degrees generally produce significant decreases in pulmonary function. Curves more than 100 degrees can be associated with significant impairment in gas exchange (7). Also, the location of the curve is important because thoracic scoliosis is associated with pulmonary function abnormalities. Cervical scoliosis can cause difficulties in airway management, and it may be associated with other congenital anomalies.

Patients with scoliosis may develop elevated pulmonary vascular resistance and pulmonary hypertension. The slope of the ventilatory response to CO₂ may be decreased in patients with scoliosis. Patients with mild scoliosis have been reported to exhibit abnormal ventilatory patterns in response to hypoxia and hypercarbia. This pattern tends to minimize the work of breathing (e.g., higher respiratory rate and lower tidal volume) (5). Weinstein demonstrated that FVC and forced expiratory volume in one second (FEV₁) decrease with increasing thoracic curve severity (6). Some scoliosis patients do have an increased risk of malign hyperthermia because of their underlying disease. For example, patients with certain muscle disorders are at increased risk of developing both malign hyperthermia and scoliosis.

As a result, in patients with advanced kyphoscoliosis, which may lead to postoperative pulmonary problems, spinal anesthesia may be a good choice that must be kept in mind.

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