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Combined Spinal Epidural in A Patient With Severe Lumbar Kyphoscoliosis – An Anaesthetic Challenge

KEYWORDS: Central neuraxial block, lumbar kyphoscoliosis, Cobb's angle, combined spinal epidural anaesthesia.

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ABSTRACT *Patients with spine abnormalities present unique challenges to the anaesthesiologists. Spinal deformities may cause difficulties with both tracheal intubation and regional anesthesia. We report the anaesthetic management of such a case of severe lumbar kyphoscoliosis posted for vaginal hysterectomy. A 72 year old female patient with a history of spine surgery was posted for vaginal hysterectomy for 3rd degree utereo-vaginal prolapse. Because of the unexpected effect of local anaesthetic solution in severe kyphoscoliosis, a combined spinal and epidural anaesthesia technique was chosen to provide anaesthesia. At the L2-L3 intervertebral space Inj. Bupivacaine 0.5% (Hyperbaric) 2.5cc + Inj. Fentanyl 25µg was deposited in the subarachnoid space and an 18G epidural catheter was placed 5cms inside the epidural space, using needle through needle technique, via a paramedian approach. A successful motor and sensory blockade at the level of T10 was achieved.*

INTRODUCTION

Patients with spinal abnormalities present unusual challenges to the anaesthesiologists for administration of sedation and anaesthesia during surgical and technical procedures. Scoliosis is a deformity of the spine resulting in a lateral curvature of the spine, which is associated with rotation of the vertebrae and deformity of the rib cage.[1-4] We describe the anaesthetic management of vaginal hysterectomy operation using combine spinal and epidural anaesthesia in a patient with severe lumbar kyphoscoliosis.

CASE REPORT

A 72-year-old female patient, American society of anaesthesiologists (ASA) physical status grade II, was posted for vaginal hysterectomy for third degree utero - vaginal prolapse. She was a known case of bronchial asthma since 20 years on irregular treatment. She had a history of lumbar laminectomy at the L3-L4 level for prolapsed intervertebral disc 20 years back. She was 137 cm in height and weighed 40kg (BMI – 21.3kg/m^2). She had severe dextrorotatory lumbar scoliosis with kyphosis of the lumbar spine. There was no deformity of the thoracic spine. Her preoperative chest x-ray and pulmonary function tests were normal. X-rays and computed tomograms of the lumbar spines revealed severe scoliosis with a Cobb's angle of 60 degrees.

It was noted from the lumbar spine CT scan images that the L2-L3 intervertebral space could be easily penetrated. With the patient in the sitting position, epidural space at L2-L3 intervertebral space was located using an 18 gauge Tuohy's needle, with the convex side paramedian approach. Loss of resistance to air was achieved at 4cms on the second attempt. Administration of epidural test dose was negative for intravascular or intrathecal injection. A 27 gauge spinal needle was inserted through the Tuohy's needle and dural puncture was achieved. After aspiration of free and clear CSF, 12.5mg of inj. Bupivacaine (hyperbaric) with 25 µg of inj. Fentanyl was deposited in the subarachnoid space. An 18 gauge epidural catheter was placed in the epidural space and fixed at a distance of 10cm at the skin. Patient was made supine. A spinal anaesthesia level of T8 was achieved. Surgical procedure was performed without complication.

Figure 1: Lumbar spine Xray of patient showing Cobb's angle of 60°

Figure 2: 3-D reconstructed CT image of the patient's lumbar spine

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DISCUSSION

Scoliosis is derived from the Greek word meaning 'crooked'. Kyphoscoliosis poses unique challenges for the anaesthesia provider and can complicate general or regional anesthesia. Scoliosis can be broadly classified into congenital, neuromuscular or idiopathic. There is usually secondary involvement of the respiratory, cardiovascular and neurological systems. The severity of scoliosis is measured using the Cobb's method of measurement which consists of three steps:

1. Locating the superior end vertebra
2. Locating the inferior end vertebra
3. Drawing intersecting perpendicular lines from the superior surface of the superior end vertebra and from the inferior surface of the inferior end vertebra.

The angle of deviation of these perpendicular lines from the straight lines is the angle of the curve.[1]

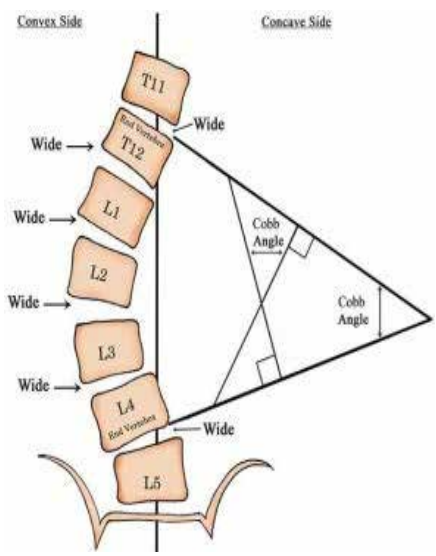

Figure 3: Measurement of Cobb's angle

Table 1: Severity and clinical correlation[2]

Cobb's angle (degrees)	Clinical manifestation
<10	No symptoms
>25	Increased pulmonary artery pressure
>40	Consider surgical intervention
>70	Significant decrease in lung volume
>100	Dyspnea on exertion
>120	Alveolar hypoventilation, chronic respiratory failure

In addition on the lateral curvature in scoliosis, there is also rotation of the vertebral bodies. Anatomically, the spinous processes point towards the midline (concave side) and the vertebral bodies rotate towards the convex side of the curve and maximum rotation occurs at the apex of the scoliotic curve.[3,4] Difficulty in performing neuraxial anaesthesia may result in neural injury, spinal haematoma, post dural puncture headache or infection.[5] Spinal anesthesia is less reliable in presence of kyphoscoliosis, but successful outcomes have been described.[6,7]

Some studies have suggested that baricity of the drug is an important determinant of local anesthetic distribution in the subarachnoid space in patients with kyphoscoliosis. Hyperbaric and hypobaric solutions of bupivacaine have been used for spinal anesthesia in such patients with varying degrees of success.[8] It is difficult to predict the spread of the local anesthetic in the subarachnoid space in these patients. This was our rationale for inserted an epidural catheter, to provide additional doses of local anesthetic if the spinal anesthesia failed or there was unilateral blockade.

Bowens[5] suggested an algorithmic approach to providing safe neuraxial anaesthesia procedures in scoliotic patients. First, the provider should determine the type and severity of the scoliosis

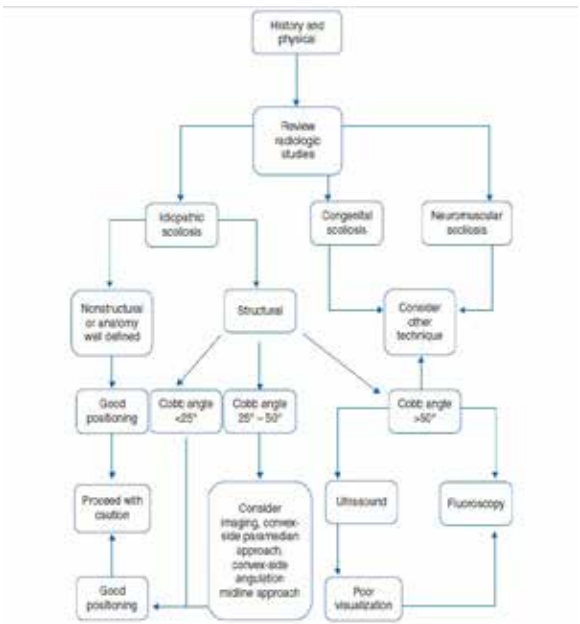

Figure 4: Algorithm to guide neuraxial techniques in scoliotic patients.[5]

from the patient's history, physical examination and any prior radiological studies. Idiopathic scoliosis is classified as nonstructural or structural. If the scoliosis can be corrected by positioning (non-structural scoliosis) or if the anatomy is well defined, then the provider should proceed with the neuraxial procedure, utilizing good positioning and caution. Structural scoliosis is a rigid curve, which cannot be modified significantly by postural manoeuvres. Surgical therapy for structural scoliosis is based on the severity of the curve and probability that the curve will progress. Mild scoliosis (11-25°) is observed, moderate scoliosis (25-50°) with likely progression in the skeletally immature is braced, and severe scoliosis (>50°) is treated with surgery. Based on these same parameters which indicate increasing complexity, Bowens made the following recommendations. For mild scoliosis, the provider should proceed with the neuraxial procedure using good patient positioning and caution. In moderate scoliosis, the provider should consider imaging modalities such as ultrasound or fluoroscopy. As the vertebral body rotates towards the convex-side of the scoliotic curve, a direct path to the neuraxial spaces occurs on the convex-side when using a paramedian approach. Therefore, if the spinous process is palpable or can be identified with a needle, then a paramedian approach could be attempted on the convex-side of the curve.[9,10] In patients that have scoliotic curves with a Cobb angle >50° and unclear anatomy, imaging modalities should be used for neuraxial access.

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In our case, combined spinal epidural anaesthesia with adequate level of analgesia was achieved with the convex side paramedian approach without any complications.

CONCLUSION

Although imaging techniques like ultrasound and fluoroscopy may assist in administering neuraxial blocks in patients with kyphoscoliosis, success of the neuraxial blockade depends on the skill and experience of the anaesthesiologist in case imaging modalities are not available.

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