

Case of Kyphoscoliosis Secondary to Polio: A Challenge to the Anaesthesiologist

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Abstract: *Kyphoscoliosis presents a unique challenge to the anaesthesiologist for administering sedation and anaesthesia owing to deformity of the spine and cardiopulmonary complications. Regional anaesthesia is particularly challenging. Asymmetrical and patchy block has been reported earlier. Spinal deformities may cause difficulties with both tracheal intubation and regional anaesthesia. We present a case report of a poliomyelitis patient with left femur fracture with thoracolumbar kyphoscoliosis posted for open reduction internal fixation. After examining the risk factors, spinal block by injecting single dose local anaesthetic solution to the intrathecal space was chosen to provide anaesthesia via the paramedian approach*

Keywords: Kyphoscoliosis, Subarachnoid block

1. Introduction

Kyphoscoliosis is a spinal deformity characterized by anterior flexion (kyphosis) and lateral curvature (scoliosis) of the vertebral column. Poliomyelitis in the childhood affects the growth of the musculoskeletal tissue and may progress in severity during period of rapid skeletal growth¹. Although polio has been eradicated from most parts of the world, and India has been declared polio free in 2014 with the success of vaccination programs, the old cases of poliomyelitis still present with deformities and pose unique challenges intra operatively.

Poliomyelitis patients with Kyphoscoliosis present numerous anaesthetic concerns for the administration of general and regional Anaesthesia due to deformity of spine and cardiopulmonary abnormalities. Anaesthetic concerns for providing general anaesthesia to patients with poliomyelitis and kyphoscoliosis are increased sensitivity to sedative drugs, prolonged action of Nondepolarizing muscle relaxant (NDMR) agents, dysfunctional autonomic nervous system, and underdeveloped muscles of respiration making extubation difficult.² On the other hand Central neuraxial block is controversial in these patients and poses an anaesthetic challenge, in the form of difficulties in palpating anatomical landmarks, performing a successful lumbarpuncture, and difficulty in predicting the spread of the agent and therefore extent of the block³

2. Case Report

History: A 55-year-old male patient with a fracture in femur left side with thoracolumbar kyphoscoliosis was posted for open reduction and internal fixation with plating. He was suffering from poliomyelitis since childhood and had a history of progressive spinal deformity leading to thoracolumbar kyphoscoliosis. On admission, he had no complaints other than pain in left lower limb. Prior to injury, he was able to walk and climb stairs with support. He did not complain of any shortness of breath or any other symptoms suggestive of respiratory or cardiovascular instability.

Pre anaesthetic examination revealed Mallampati Grade 1, adequate mouth opening and free neck movements. Upon general examination vitals were found to be stable and within normal limits. On spinal examination (Fig 1), interspinous space was not felt. X-ray whole spine (Fig 2) showed kyphoscoliosis of thoracolumbar spine with 40° Cobb angle. Hemogram, liver function test, renal function test, and coagulation profile were within normal limits.



Figure 1: Spinal examination in our patient with kyphoscoliosis showing leftward convexity of the spine



Figure 2: Xray spine showing kyphoscoliosis of Thoracolumbar spine with a Cobbs angle of 40°

After careful evaluation of the risk factors, Central Neuraxial blockade was chosen as the mode of anaesthesia and the same was explained to the patient. NPO guidelines were given along with 0.5mg of alprazolam the night before the surgery.



Figure 3, 4: Using Huang's modified paramedian approach to achieve sub arachnoid block

The surgical site (left lower limb) had achieved satisfactory sensory block. Intra operative period was uneventful with duration of surgery lasting approximately 2 h 30 min. The patient was shifted to postoperative ward, patient's hemodynamics were stable, and no spinal-related complications were observed

3. Discussion

Kyphoscoliosis is due to the disruption of balance between structural and dynamic components or the neuromuscular elements of the spine⁴. Kyphosis is an exaggerated anterior flexion of spine resulting in round or hunch back appearance. Thoracolumbar Kyphosis may be caused due to Poliomyelitis, osteoporosis, Scheuermann's disease, post traumatic, tumours, ankylosing spondylitis, paralytic

On the day of surgery, iv line was secured with an 18-G cannula. Half an hour before shifting to the operation room, intravenous ranitidine 50 mg and metoclopramide 10 mg were given as premedication. The patient was pre loaded with ringers lactate (15ml/kg)

The Technique

Under strict aseptic precautions, with patient in sitting position, lumbar puncture was performed at L3-L4 intervertebral disc space using 25-gauge Quincke needle via modified paramedian approach(Fig3,4). The needle is entered just lateral to dorsal spine perpendicular to the skin. It is advanced toward and onto the lamina and the needle then is "walked" cephalad over the lamina until the interlaminar space is entered

After ensuring free flow of the CSF, the injection of the local anaesthetic was given -15 mg of 0.5% hyperbaric Bupivacaine (3 ml) with Fentanyl 25 µg (0.5 ml), the patient was made to lie in supine position and the level of sensory block was tested with pinprick method in the mid axillary line after 3 min. Level of block on the left side was T6 & on right side, up to T10.

Kyphosis etc. Kyphosis is usually associated with scoliosis⁵. Scoliosis is derived from the Greek word meaning 'crooked'. Patients with scoliosis suffer from restrictive lung disease which decreases vital capacity, functional residual capacity, tidal volume, and increases respiratory rate. Exercise tolerance tests, pulmonary function test and arterial blood gas analysis help to determine the severity of respiratory impairment.³

The amount of compromise in cardiac and pulmonary function of kyphoscoliosis patient is related to the amount of Cobb's angle in thoracolumbar X-ray. Cardiopulmonary function starts decreasing if this angle is larger than 45° and it becomes very significant with angle greater than 100°. If untreated severe scoliosis may be fatal by the fifth decade as a result of pulmonary hypertension and respiratory failure.

In our patient poliomyelitis was the cause of the spinal deformity but he did not present with any cardio respiratory symptoms.

While performing central Neuraxial blockade we must keep in mind that due to the angulation and rotation of vertebral body, the subarachnoid and epidural space is deviated toward the convexity of angulation.

Huang described a modified paramedian approach of spinal anaesthesia in such patients.⁷ Advantages of the technique include (i) the wider angle between the spinous and transverse processes on the convex side of the curve facilitates the needle insertion. (ii) The needle is inserted perpendicular to the skin just lateral to the dorsal spine, which is simpler than the standard paramedian approach in which the needle is angled in both sagittal and transverse planes².

The main handicap of regional anaesthesia is decreased success rate due to unsuccessful insertions, multiple attempts, false loss of resistance, failed or inadequate block.³ In our case too, the convexity of scoliotic spine was toward left side. This could have led to altered distribution of local anaesthetic along the convexity leading to higher level of blockade on the left side than the right

Anaesthesia in patient with kyphoscoliosis poses a significant risk and there is no single mode of anaesthesia that can be recommended for the management for all cases. General anaesthesia can be associated with difficult intubation and prolonged post-operative ventilation. Epidural anaesthesia may not always give adequate level of block. Spinal anaesthesia and combined spinal anaesthesia are better options.

In all cases preparations for emergency airway must be made beforehand to avoid any mishap. The success of the procedure here depended on the co-operation of the patient, surgeon and a good preparation of the patient and well prepared anaesthesia team

4. Conclusion

Subarachnoid block is an effective and safe option for patients with kyphoscoliosis where a modified paramedian approach with needle insertion toward convexity may offer several advantages. Efforts towards maintaining airway will result in successful outcome

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