

Spinal Anaesthesia in a Case of Kyphoscoliosis

Dr. Sanjolisoni¹, Dr. Suresh Panday², Dr. S. P. Chittora³

¹Post Graduate Student, Department of Anaesthesiology, Jhalawar Medical College, Jhalawar, Rajasthan India

²Senior Professor and Guide, Department of Anaesthesiology, Jhalawar Medical College, Jhalawar, Rajasthan India

³Senior Professor and Head of Department, Department of Anaesthesiology, Jhalawar Medical College, Jhalawar, Rajasthan India

Abstract: *Kyphoscoliosis is forward and lateral bending of the spine commonly affecting the dorsal and lumbar spine. Spinal deformities are likely to be associated with physiologic derangements in cardiac and pulmonary function and may cause difficulties with both tracheal intubation and regional anaesthesia. Due to problems associated with respiratory system, spinal anaesthesia is used widely, though technically difficult. We present a case of thoracolumbar kyphoscoliosis posted for intertrochantric fracture right femur successfully managed with spinal anaesthesia.*

Keywords: Spinal anaesthesia, Kyphoscoliosis

1. Introduction

Kyphoscoliosis is a spinal deformity characterized by anterior flexion (kyphosis) and lateral curvature (scoliosis) of the vertebral column. Idiopathic kyphoscoliosis accounts for 80% of cases, commonly begins during late childhood and may progress in severity during period of rapid skeletal growth. Incidence of idiopathic kyphoscoliosis is approximately 4 per 1000 population. There may be familial predisposition to this disease, and female to male ratio is 4:1. Kyphoscoliosis may be associated with diseases of the neuromuscular system, such as poliomyelitis, cerebral palsy and muscular dystrophy and also with neurofibromatosis, Marfan's syndrome. Restrictive lung disease and pulmonary hypertension progressing to cor pulmonale are the principle causes of death in these patients.¹

Airway management and cardio-respiratory changes make general anaesthesia hazardous where as regional anaesthesia is scared with technical problems due to abnormal curvature of spine and unpredictability of level of anaesthesia.²

2. Case Report

A 80 year old male with kyphoscoliosis and fracture intertrochanteric right femur was posted for bipolar. Patient came with history of pain and swelling in right hip joint. Patient had history of kyphoscoliosis since childhood. Patient was able to lie down on his back and was able to move unaided. There was no history of any motor or sensory symptoms or any bowel disturbances. On examination general condition was moderate with moderate built and poor nourishment. Patient was alert and cooperative. His airway was assessed as Mallampati class II. Investigations revealed haemoglobin, platelet count, Blood urea, serum creatinine, liver function test, blood sugar level, ECG were normal. X-ray chest showed crowding of ribs on left side, prominent bronchovascular markings. PFT show mixed (obstructive plus restrictive) disorder. 2DEcho was normal (EF60%, mild pulmonary hypertension). Bedside PFT were done. Cough test and wheeze test was negative, maximum laryngeal height was 3.5 cm, forced expiratory time was 3 sec, breath holding time was 32 sec, matchstick test-can blow off

candle at 22 cm distance. The risk of anaesthetic technique (difficult spinal anaesthesia and complications like partial block, failed spinal, high spinal, general anaesthesia and postoperative intensive care) was explained to patient and his care takers and the patient was accepted for anaesthesia under ASA grade III physical status with written informed consent.

Patient was shifted to operation theatre and intravenous access was obtained with 18G IV canula, patient was preloaded with 500 ml ringer lactate while pulseoximeter, NIBP and ECG monitors were connected. Difficult intubation cart including LMA, bougie, were kept ready. Patient was prepared for regional block (subarachnoid block). To palpate the spine itself was very difficult. Intervertebral space was identified by tracing the spine from upwards. Spinal anaesthesia was given with 25 G Quincke spinal needle in L3 -L4 intervertebral disc space in sitting position by injecting 3 ml of 0.5% hyperbaric bupivacaine. Then patient was given supine position. After waiting for 15 min, Sensory block was achieved up to T6 & surgery was started. Hemodynamic parameters & saturation were monitored and maintained within normal limits. Postoperative pain relief was given by injection diclofenac 75 mg intramuscular; patient was monitored and shifted to the ward later. Placement of spinal needle is difficult in patient with severe thoracolumbar kyphoscoliosis due to ossification of interspinous ligaments and bony bridges.



Figure 1: Photograph of patient with kyphoscoliosis in sitting position

3. Discussion

Kyphosis is an exaggerated anterior flexion of spine resulting in round or hunch back appearance.³ Causes of thoracic and thoracolumbar kyphosis are osteoporosis,

Scheuermann's disease, post traumatic kyphosis, post infection kyphosis, tumours, ankylosing spondylitis, paralytic kyphosis etc. Kyphosis is usually associated scoliosis.⁴ 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.⁵ Exercise tolerance tests, pulmonary function test and arterial blood gas analysis helps to determine the severity of respiratory impairment. The compliance of the lung decreases with increase in work of breathing. Tidal volume, vital capacity and total lung capacity are reduced in PFT. Chronic hypoxemia results in cor pulmonale. Echocardiography shows pulmonary hypertension and right ventricular hypertrophy. Incidence of pulmonary infection is high due to poor cough reflex.¹ The severity of pulmonary impairment depends on the degree of the Cobb's angle, the number of vertebrae involved, and the cephalad location of the curvature. The severity of compression is directly related to the degree of kyphoscoliosis angulations and is determined by measuring Cobb's angle which is defined as the angle between the perpendicular of the lines drawn parallel to the upper border of the highest and lower border of the vertebrae. If this angle is 40° the cardio pulmonary function frequently decreases and if 100° it significantly decreases. In severe cases, displacement with rotation of the trachea and main stem bronchi may also be noted, which could cause problems during intubation for general anaesthesia.²

The main handicap of regional anaesthesia is decreased success rate due to unsuccessful insertions, multiple attempts, false loss of resistance, failed or inadequate block. The CSF volume is decreased in kyphotic spine, thus even lower doses of local anaesthetics may achieve higher than expected level of block resulting in higher incidence of hypotension.⁶ The volume of local anaesthetic must be accordingly adjusted. There are reports that in patients with severe curves, hyperbaric solution may pool in the dependent portion of the spine and results in inadequate block.⁷ Caution must be advised with regional anaesthesia as neurological anomalies may associate with spinal abnormalities. Epidural anaesthesia is also difficult due to the difficulty in positioning of the patient, passing the needle, unpredictable catheter direction and altered epidural space volume. The conventional dose of local anaesthetic causes higher block. Combined Spinal Epidural (CSE) technique is a good alternative. It offers rapid onset, efficacy and safety with minimal chances of toxic effects combined with potential for improving an inadequate block and prolonging duration of analgesia intra-operatively and post operatively.⁸ This technique reduces or eliminates some of the disadvantages of spinal anaesthesia while preserving their advantages. Spinal Anaesthesia is the option in selected cases of kyphoscoliosis and there are case reports of successful subarachnoid block in patients with severe kyphoscoliosis. Isobaric bupivacaine has been tried in severe kyphoscoliosis with good results.

Positive pressure ventilation decreases venous return and along with negative inotropic effect of anaesthetic agents can lead to severe decrease in blood pressure. Coughing and bucking at the end of the surgery may transiently but

significantly decreases functional residual capacity, resulting in further ventilation perfusion mismatch and hypoxemia.⁹ The abnormal spine makes intubation and ventilation difficult. Co-existing hypoxemia and pulmonary infection may lead to difficult extubation and prolonged ventilation due to difficulty in aligning the airway. Postoperatively after general anaesthesia, elements of laryngeal incompetence and impaired swallowing further decrease the airway defense mechanisms. All these factors together can lead to delay in extubation and need for postoperative ventilation.¹⁰ The risk of malignant hyperthermia in kyphoscoliosis patient cannot be undermined with susceptible agents like succinyl choline or halothane. So General Anaesthesia (GA) is not favoured as a choice of anaesthesia due to difficulty in intubation and post op ventilation, presence of pulmonary infection, poor respiratory reserve and location of the surgery.

Anesthesia in patient with kyphosis poses a significant risk and there is no single regimen that can be recommended for anesthetic management for all cases. The location of surgery primarily determines the type of anaesthesia. General anaesthesia can be associated with difficult intubation and prolonged post-operative ventilation. Epidural anaesthesia may not always give adequate level of block. Spinal anaesthesia¹¹ and combined spinal anaesthesia¹² are better options.

Preparations for emergency airway must always 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 with a proper planning with meticulous approach can be a useful technique in patients with thoracolumbar kyphoscoliosis with normal coagulation status with efforts towards maintaining airway will result in successful outcome.

References

- [1] Schwartz JJ. Skin and musculoskeletal diseases. In: Schwartz JJ, eds. Anaesthesia and Co-Existing. 5th ed. Philadelphia: Saunders Elsevier; 2010: 505.
- [2] Ramez Salem M, Klowden AJ. General anaesthesia. In: Ramez Salem M, Klowden AJ, eds. Anaesthesia for Orthopaedic Surgery. 3rd ed. New York: Churchill-Living Stone; 1994.
- [3] Micheal K. Urban, Salim Lohlou. Muscle diseases. In: Micheal K. Urban, Salim Lohlou, eds. Anaesthesia and Uncommon Disease. 5th ed. Pennsylvania: Lee A Fleisher; 2009: 144-145.
- [4] Rothman Simon E. The spine. In: Rothman Simon E, eds. Paediatric Kyphosis: Scheuermann's disease and Congenital Deformity. 5th ed. Philadelphia: Saunders Elsevier; 2006.
- [5] Veliath DG, Sharma R, Ranjan RV, Rajesh Kumar CP, Ramachandran TR. Parturient with kyphoscoliosis (operated) for caesarean section. J AnaesthClinPharmacol. 2012;28:124-6.
- [6] Klienman W, Mikhail M. Spinal, epidural, and caudal blocks. In: Morgan GE, Mikhail SM, Murray MJ, eds. Clinical Anaesthesiology. 4th ed. New York: McGraw Hill Inc; 2006: 289-323.
- [7] Moran DH, Johnson MD. Continuous spinal anaesthesia with combined hyperbaric and isobaric bupivacaine in a patient with scoliosis. AnaesthAnalg. 1990;70:445.
- [8] Holmstrom E, Laugaland K, Rawal N, Haliberg S. Combined spinal epidural block versus spinal and epidural block for orthopaedic surgery. Can J Anaesth; 1993;10(7):601-6.
- [9] Bickler PE, Dueck R, Prutow RJ. Effects of barbiturate anaesthesia on functional residual capacity and ribcage/diaphragm contribution to ventilation. Anaesthesiology. 1987;66:147-8.
- [10] Baydur A, MilicEmili J. Respiratory mechanics in kyphoscoliosis. Monaldi Chest Dis. 1993;48(1):69-79.
- [11] Bansal N, Gupta S. Anaesthetic management of a parturient with severe kyphoscoliosis. Kathmandu Univ Med J. 2008;6(3):379-82.
- [12] Oksun Kim, Sang-Seock Lee, Tae-Joong Yoo, YunHee Lim, Jun Heum Yon. Combined spinal-epidural anaesthesia in a patient with severe thoracic kyphoscoliosis. Korean J Anaesthesiol. 2008;54:4.