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Original Research Paper

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MANAGING NEURAXIAL BLOCKADE IN A COMPLEX CASE: SEVERE SCOLIOSIS WITH CONGENITAL DWARFISM - A TERTIARY CENTER EXPERIENCE

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ABSTRACT

Background: Scoliosis is a complex deformity of vertebral spines resulting in lateral curvature, rotation of the vertebrae and deformity of the rib cage resulting in restrictive lung pattern. Anaesthetic management during surgical interventions in scoliosis patients poses notable challenges, primarily in airway and respiratory management. This case study delves into the intricate management of neuraxial blockade in a patient presenting with a challenging medical profile characterized by severe scoliosis compounded by congenital dwarfism. The study outlines the strategies employed, the procedural considerations, and the outcomes observed in a tertiary care setting. Through this case, the nuances of navigating neuraxial blockade in complex anatomical variations are elucidated, offering valuable insights for clinical practice and further research.(1) **Case Study:** A 34-year-old female with severe idiopathic scoliosis, Cobb's angle >80 degrees, and congenital dwarfism presented for hernioplasty due to umbilical hernia. Using a midline approach at the L1-L2 space, spinal anesthesia was administered with a 23 G Quincke needle angled towards the convex side of the spinal curve. A combination of Levobupivacaine 0.5% hyperbaric 2.3 ml and Buprenorphine 60 μg was injected after ensuring adequate cerebrospinal fluid flow, resulting in a dense block at level T6. The patient's intraoperative occurrences, hemodynamic stability was all carefully observed and noted. **Result:** The procedure went smoothly without any complications, exhibiting notable hemodynamic stability. **Conclusion:** This case report underscores that despite the challenges linked to scoliosis, most patients, irrespective of prior corrective surgeries, can reliably undergo successful neuraxial anaesthesia. It's prudent to minimize the use of general anaesthesia in cases of severe scoliosis due to potential difficulties with airway management and the presence of a restrictive lung pattern.

KEYWORDS : Severe Scoliosis, Cobb's angle, neuraxial blockade

INTRODUCTION

Scoliosis presents a multifaceted spinal deformity characterized by lateral curvature, vertebral rotation, and rib cage distortion. Idiopathic scoliosis, comprising 75-90% of cases, primarily affects adolescents.[1] It often leads to secondary complications involving the respiratory, cardiovascular, and neurologic systems. Airway issues such as altered anatomy, challenging laryngoscopy, and intubation difficulties, as well as respiratory challenges like restrictive lung disease, pulmonary hypertension, and hypoxia, are prevalent in scoliosis patients. Cardiac conditions including cor pulmonale, right ventricular hypertrophy, and cardiomyopathy may also occur.[2] Scoliosis-induced restrictive lung disease diminishes vital capacity, tidal volume, and functional residual capacity whileelevating respiratory rate. Consequently, administering anesthesia during surgical procedures for scoliosis patients poses notable challenges, particularly concerning airway management and respiratory complications.[2] The study outlines the strategies employed, the procedural considerations, and the outcomes observed in a tertiary care setting. Through this case, the nuances of navigating neuraxial blockade in complex anatomical variations are elucidated, offering valuable insights for clinical practice and further research.

Case report

A 34-year-old female with severe idiopathic scoliosis, Cobb's angle >70 degrees, and congenital dwarfism presented with umbilical hernia posted for hernioplasty. She complained of chest pain, reduced effort tolerance less than a flight of stairs, and dyspnea on exertion, with a metabolic equivalent score of less than 4. Her past surgical history included a lower segment cesarean section under spinal anesthesia, which was uneventful.

On examination, the patient, weighing 35 kg and measuring 142 cm tall, appeared conscious, oriented, and thin-built. She exhibited characteristic physical features associated with severe scoliosis and congenital dwarfism, including a hump on the right side of the back, a short neck with limited extension, and shrugged shoulders. Airway examination revealed limited mouth opening, protruded teeth, and a Mallampati Grade of 3. Additionally, her thyromental distance was less than 6.5 cm, and sternomental distance less than 12.5 cm. Auscultation revealed reduced air entry in the left lung, consistent with a severe restrictive pattern observed on pulmonary function tests which includes FeV1 / FVC = less than 65%.

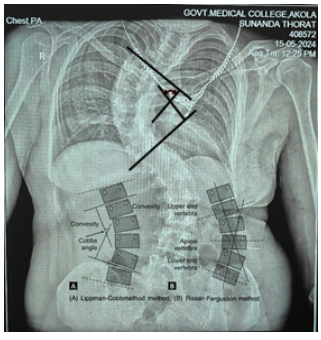

FIG shows COBB's angle - > 45 degrees.

Cardiovascular examination revealed normal heart sounds without murmurs, while a 12- lead ECG showed Pan T wave inversion, and a 2D echo was within normal limits. Laboratory investigations, including coagulation profile, were normal. The patient was classified as ASA 2.Preparations for spinal anesthesia were made with meticulous attention to patient positioning and airway management due to anatomical

challenges posed by scoliosis and dwarfism. Monitors which include sp02, electrocardiogram, non-invasive BP were attached, difficult airway and resuscitatory equipment were readily available.

Patient in sitting position, under aseptic precautions parts painted and draped, using a midline approach at the L1-L2 space, subarachnoid block was achieved with a 23 G Quincke needle angled towards the convex side of the spinal curve. A combination of Levobupivacaine 0.5% (2.3 cc) and Buprenorphine 60 μg was injected after ensuring adequate cerebrospinal fluid flow with negative aspiration of blood, resulting in a dense block at level T6. The hernioplasty procedure commenced under the established anesthesia, with careful monitoring of vital signs and anesthesia depth throughout.

Patient remains hemodynamically stable and procedure is uneventful.

TIME	HR	BP	SP02	FLUIDS
12:05	102	110/70	100	1st RL started
12:15	98	90/70	100	Going
12:25	88	110/60	100	Going
12:35	86	120/80	100	Going
12:45	89	110/70	100	2ndRLstarted
12:55	82	100/60	100	Going
1:05	92	100/70	100	Going
			Total – 900ml Output – 300 ml	

Intra Operative Monitoring Chart

DISCUSSION

Managing severe scoliosis presents unique challenges for anaesthesiologists due to several factors:

1. Complex positioning requirements for spinal anaesthesia administration.
2. Surgical positioning difficulties due to spinal curvature.
3. Restricted lung capacity from the scoliotic deformity leading to respiratory challenges.
4. Uncertainty in predicting anaesthesia level post-spinal administration.
5. Challenges in airway management during intubation.

The patient, being of short stature with congenital spinal issues, received spinal anesthesia in a carefully supported sitting position, with additional pillow support. Surgical positioning was facilitated by bolster and ring pillows to maintain a comfortable supine position. A reduced dose of spinal anesthesia was administered to prevent high- level effects, considering the patient's stature. General anesthesia was avoided due to the patient's restrictive lung pattern, ensuring optimal respiratory function throughout the procedure.

Moderate to severe scoliosis can lead to persistent one-sided pain relief. Additionally, the abnormal spinal curvature makes it hard to anticipate how a drug will spread when administered through the intrathecal space. Extreme caution is necessary to avoid excessively high blocks, which can cause breathing difficulties. Inserting spinal anaesthesia may also prove challenging, sometimes requiring multiple attempts before success.[3]

Idiopathic scoliosis is categorized into non- structural or structural types. Non-structural scoliosis can be corrected through positioning or has well-defined anatomy, making it suitable for neuraxial procedures with careful positioning and attention. On the other hand, structural scoliosis involves rigid curves that cannot be significantly altered by posture adjustments. Surgical intervention for structural scoliosis depends on the severity of the curve and the likelihood of progression.[2]

The Cobb's angle is a radiological measurement made on an AP view x-ray of the spine to evaluate the severity of scoliosis. It serves as a measure of spinal curvature in the coronal plane. It's determined by drawing lines parallel to the superior endplate of the most tilted upper vertebra and the inferior endplate of the most tilted lower vertebra. Perpendicular lines are then extended from these lines, intersecting to form the Cobb angle.[1]

Performing neuraxial anaesthesia can pose risks such as neural injury, spinal hematoma, post-dural puncture headache, or infection due to the challenges presented by spinal deformities. Additionally, managing the airway becomes more complex when the upper thoracic and cervical spine are affected. Despite these difficulties, we successfully conducted neuraxial blockade for a patient with severe scoliosis and congenital dwarfism.

CONCLUSION

This case report underscores that despite the challenges linked to scoliosis, most patients, irrespective of prior corrective surgeries, can reliably undergo successful neuraxial anaesthesia. It's prudent to minimize the use of general anaesthesia in cases of severe scoliosis due to potential difficulties with airway management and the presence of a restrictive lung pattern.

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