Parturient with kyphoscoliosis (operated) for cesarean section

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Abstract
Anesthesia for emergency cesarean section for the pregnant patient with surgically corrected scoliosis is associated with potential risks for both mother and the fetus due to alterations in maternal physiology and the pathological changes seen in scoliosis. The anesthetic management must address the well being of both mother and fetus. The need for anesthesia for obstetric delivery in pregnant women with scoliosis is much more than in the normal parturient. We report the successful use of spinal anesthesia in a patient with surgically corrected scoliosis for emergency cesarean section.

Key words: Cesarean section, luque rods, obstetric anesthesia, spinal anesthesia, scoliosis with pregnancy

Introduction
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. Seventy percent of cases are idiopathic. It can develop at any age but manifests clinically during periods of rapid growth. Its prevalence in the general population varies from 0.3% to 15.3% with a female preponderance of 3:1. Scoliosis is associated with restrictive lung disease and hypoxemia, which can lead to cardiovascular compromise. If untreated severe idiopathic scoliosis is fatal by the fifth decade as a result of pulmonary hypertension and respiratory failure.1

Case Report
A 142 cm, 54 kg, 22-year-old 39-weeks pregnant woman, who was diagnosed as a case of Cephalo-pelvic disproportion (CPD), was posted for emergency cesarean section. She gave a past history of surgery on her spine at 9 years of age for correction of scoliosis for which Luque rods were placed from T4–T12 vertebrae.

Anesthetic airway assessment revealed a Mallampatti score of one, with intact dentition, adequate mouth opening, and a full range of neck movements. A full stomach status was present as the patient had taken a meal 3 h before surgery; metoclopramide 10 mg and ranitidine 50 mg were administered intravenously 30 min prior to the surgery. Examination of the spine revealed a lateral curvature along with an incision scar extending from T3–L2 vertebrae. Another scar was seen over the right iliac crest. The lower lumbar vertebrae were clearly visible and the intervertebral spaces could be easily identified. Her blood investigations were within normal limits. She had a past history of surgery on her spine at 9 years of age for correction of scoliosis for which Luque rods were placed from T4–T12 vertebrae.

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The patient was shifted to the operating room where peripheral
venous access was secured with an 18G cannula. She was preloaded with Ringer’s lactate 10 ml/kg. Continuous ECG, NIBP, and pulse oximetry monitoring was established. The various anesthetic options were discussed with the patient, and it was decided to administer spinal anesthesia due to the severe restrictive lung disease as well as the full stomach of our patient. The patient was then placed in the lateral position and a 26G Quinke needle was introduced into the L4–L5 interspace until clear CSF was obtained. Spinal anesthesia was then administered by injecting 1.8 ml of 0.5% bupivacaine. The patient was then placed in the supine position and the sensory blockade was confirmed by loss of sensation to pinprick below the T7 dermatome. Oxygen supplementation was administered to the patient.

The patient delivered of a baby girl with an Apgar score of 9/10 in the first minute and 9/10 in the fifth minute. She was comfortable during the surgical procedure which was successfully completed. There was no hypotension in the perioperative period. After surgery, she was monitored closely for 12 h in the postoperative ward. Postoperatively she did not complain of back pain or headache and was discharged after 4 days.

**Discussion**

An important focus in obstetric surgery is the safe and skilled anesthetic management to minimize risk to the mother and the fetus. Foran emergency cesarean section in a patient with severe restrictive lung disease, who had undergone spinal deformity correction with Luque rods, with a full stomach status, the feasibility and choice of anesthesia for delivery is important. The physiological changes in pregnancy can worsen the respiratory function in a scoliosis patient with restrictive lung disorder. The maternal mortality and morbidity correlates well with the degree of functional impairment before pregnancy.[2,3] Increased mucosal vascularity of the respiratory tract during pregnancy may lead to difficulty in endotracheal intubation. Edema of the airway results in increased potential for bleeding and smaller sized endotracheal tubes should be used for general anesthesia.[4]

Scoliosis is derived from the greek word meaning ‘crooked’. Patients with scoliosis suffer from restrictive lung disease which decreased vital capacity, functional residual capacity, tidal volume, and increased respiratory rate.[1,2] 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. After surgical correction, the cardiorespiratory problems are usually arrested and slight improvements may be noticed. Even if the lungs are healthy, the distortion of the thoracic cage makes the respiratory system much less compliant, and increases the work of breathing. 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 anesthesia.[1]

The severity of scoliosis depends primarily on the type, duration of scoliosis, as well as on the Cobb’s angle of curvature.[1,5] Scoliosis may be idiopathic, congenital, neuromuscular, mesenchymal disorders, or traumatic. Idiopathic scoliosis is the most common and mostly occurs in the infantile, juvenile, and adolescent forms. The lung grows and develops from birth until 8 years of age. The number of alveoli increases from approximately 20 million at birth to 200 hundred and 40 million at 4 years of age. Thoracic scoliosis causes a significant reduction in the number of alveoli predisposing these patients to impairment in gas exchange and pulmonary hypertension.[1]

The Cobb’s angle is a radiological measurement made on an AP view x-ray of the spine to evaluate the severity of scoliosis. The Cobb’s angle can be correlated with the pulmonary function tests. An angle more than 60° results in a restrictive type of pulmonary impairment with a decrease in FEV1, FVC, and chest wall compliance.[1,5] In this patient the Cobb’s angle was 60°. Surgical correction of scoliosis is indicated when the Cobb’s angle exceeds 50° in the thoracic spine and 40° in the lumbar spine.

General anesthesia is indicated in scoliosis because of maternal preference; when there is maternal cardiopulmonary disease; and when there is difficulty in performing regional block. Severe scoliosis is associated with altered anatomy of the airway causing difficulty in laryngoscopy and intubation. It is also associated with pulmonary hypertension and patients run the risk of increase in pulmonary artery pressures during laryngoscopy and difficult intubation. Care should be taken...
to avoid hypoxia, hypercapnea, acidosis, and anesthetic gases such as nitrous oxide as they increase the pulmonary vascular resistance.\[4\]

In scoliosis with neuromuscular etiology, laryngeal incompetence and impaired swallowing may be present, which could increase the chances of intra and postoperative pulmonary aspiration of gastric contents. Scoliosis patients with severe restrictive lung disease could present problems during extubation, may require postoperative ventilation, with difficulty in weaning off the ventilator.

Regional epidural anesthesia in a patient who had undergone correction of a spinal deformity for scoliosis with Luque rods is a technical challenge to the anesthetist, as after spinal fixation the screws from the spinal implant can pass through the ligamentum flavum and the scarring from the applied bone graft can distort the anatomy and prevent the location of the epidural space. The rate of successful epidural placement varies depending on the level of fusion of the vertebrae.\[3\]

There are reports on the use of ultrasound for locating the epidural space.\[2\] Distortion of the epidural space after surgical corrective surgery for scoliosis can prevent the normal spread of the local anesthetic in the epidural space, resulting in a high degree of patchy blockade.\[7,8\] There is a greater chance for dural puncture when epidural anesthesia is attempted.\[7\] The cerebrospinal fluid (CSF) provides a clear indication of successful needle placement and is a medium through which the local anesthetic solution usually spreads readily.\[7\] Spinal anesthesia was considered the best anesthetic choice because the intrathecal space is not directly affected by the previous spine surgery and the spread of local anesthetic is more reliable than by the epidural route. The other advantage is that the appearance of the CSF eliminates the difficulty in identifying a distorted epidural space and the complication of dural puncture.

The increased intraabdominal pressure in pregnancy and the presence of engorged veins in the epidural space causes a decrease in the subarachnoid space. In such cases, the normal dose of the local anesthetic can lead to higher levels of block leading to hypotension. This is more so in cases of severe scoliosis, which can be associated with decreased volumes of CSF.\[7\] There are reports of anesthetic management of the kyphoscoliotic parturient using a combined spinal epidural,\[2\] continuous spinal anesthesia,\[9\] and local infiltration anesthesia when there is a failure in spinal or epidural anesthesia.\[6\]

In conclusion, the etiology of scoliosis may be varied. Based on the clinical assessment as well as the chest x-ray, pulmonary function tests, and full stomach status of this patient, administration of spinal anesthesia was the best option for this patient.

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