Case Report

Continuous Spinal Anesthesia in a Patient with Scoliosis for Lower Limb Surgery

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Abstract

Scoliosis is a complex deformity of the spine resulting in lateral curvature, rotation of the vertebra, and a deformed ribcage. Scoliosis causes restrictive ventilatory defect with ventilation-perfusion mismatch and hypoxemia. Any incidental surgical procedure is a challenge to the anesthesiologist for both general anesthesia (GA) and regional anesthesia (RA). Continuous spinal anesthesia (CSA) has several advantages over both spinal and epidural anesthesia that makes it a useful technique in high risk patients undergoing surgeries in the lower abdomen or lower limbs. We are presenting a case of CSA for fracture of both the bones of the right lower limb of a patient with reduced cardiorespiratory reserve due to scoliosis.

Key words: 0.5% bupivacaine heavy, continuous spinal anesthesia, reduced respiratory reserve

Introduction

Scoliosis is a complex deformity of the spine resulting in lateral curvature, rotation of the vertebra, and a deformed ribcage. Scoliosis causes restrictive ventilatory defect with ventilation-perfusion mismatch and hypoxemia. Any incidental surgical procedure is a challenge to the anesthesiologist both for general anesthesia (GA) and regional anesthesia (RA). Continuous spinal anesthesia (CSA) has several advantages over both spinal and epidural anesthesia that makes it a useful technique in high risk patients undergoing surgeries in the lower abdomen or lower limbs. We are presenting a case of CSA for fracture of both the bones of the right lower limb of a patient with reduced cardiorespiratory reserve due to scoliosis.

Case Report

A 30-year-old female patient [Figure 1] with thoracolumbar scoliosis presented with bone fractures of the right lower limb. She was posted for closed reduction and internal fixation with intermedullary interlocking (IMIL) nailing.

On examination the patient was conscious, cooperative, moderately built, and nourished. The patient had scoliosis since birth. She had history of breathlessness on exertion [the New York Heart Association (NYHA) class 2]. Her breath holding time was 12 s. Airway examination showed mouth opening of two fingers, Mallampati grade 3, restricted extension of the neck, thyromental distance of 4.5 cm, and the presence of buck teeth. All the features were suggestive of difficult intubation. Spinal examination revealed severe scoliosis of the thoracolumbar spine. Bilateral air entry was reduced in the infrascapular and inframammary areas of the chest. Cardiovascular system examination revealed normal heart sounds. The results of the routine investigations done were within normal limits. The electrocardiogram (ECG) showed sinus rhythm. Chest X-ray showed scoliosis and tubular heart with Cobb angle of 80°. The pulmonary function test (PFT) [Figure 2] showed moderate-to-severe restriction. Arterial blood gas (ABG) showed pH 7.488, pCO_2 32.7 mmHg, Po2 48.1 mmHg, SpO_2 79.5%, and lactate 1.4 mmol/L. The patient's consent was taken and preoperative chest physiotherapy and incentive spirometry were started. CSA was accomplished using 18G epidural set (Braun Medical India Pvt. Ltd, Mumbai, India), and a

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catheter was fixed at 9 cm after confirming the free flow of cerebrospinal fluid. Starting dose of 1 mL of 0.5% bupivacaine heavy was given. Sensory level up to T10 was achieved. Level of anesthesia was assessed using touch and pinprick sensation. Top up doses of 0.5 mL of 0.5% bupivacaine heavy was given to maintain the desired sensory level up to T10. The surgery was completed in 2 h. Two top ups were given. Total dose of 2 mL of 0.5% bupivacaine heavy was given. Intraoperative patient vitals were heart rate (HR) = 70-90 bpm, blood pressure (BP) = 90/60-110/70 mmHg, and saturation of peripheral oxygen (SpO_2) = 92-95% (supplemental oxygen 4 L/min). Surgery was completed uneventfully. Then 300 mcg of intrathecal morphine was given for postoperative analgesia and the catheter was removed at the end of the procedure in the operation theater (OT). The patient was then moved to the recovery room and monitored for 2 h. After confirming recovery from the sensory and motor blockades of CSA, the patient was moved to the ward. Incentive spirometry and chest physiotherapy were continued in the postoperative period. The patient was mobilized on the third postoperative day. She was discharged from the hospital 1 week after the procedure without any complication.

Figure 1: Patient's photo showing the deformed spine

Discussion

The problems encountered in a case of scoliosis for GA/RA are:

1) Difficult airway
2) Reduced total leukocyte count (TLC) and thereby reduced respiratory reserve
3) Decreased cardiac reserve if associated with pulmonary arterial hypertension (PAH)
4) Difficulty in performing spinal anesthesia or GA
5) The local anesthetic dose required varies
6) High level of regional anesthesia paralyzing the intercostal muscles may exaggerate the existing hypoxia or atelectasis. Hence, either spinal or epidural level has to be below T8. Titrating local anesthetic dose required for the maintenance of level below T8 is not an easy task. Hence, either spinal or epidural level has to be below T8 to avoid intercostal muscle paralysis. Epidural anesthesia is associated with greater incidence of missed segment, failure, and inadequate relaxation. CSA is a very reliable technique for providing anesthesia. CSA has several advantages over both single dose spinal anesthesia and continuous epidural anesthesia (CEA) that makes it a very useful technique in the high risk patients undergoing lower abdominal, pelvic, or lower limb surgery. CSA has the advantage of spinal anesthesia that has an immediate

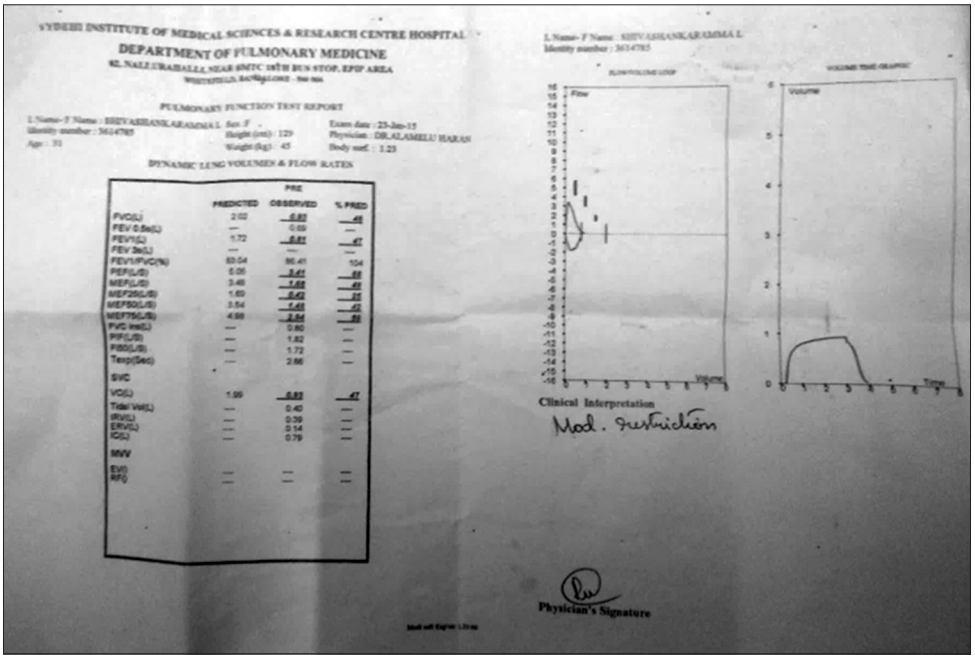

Figure 2: Severe restrictive disorder with minimal response to bronchodilator

onset and definite anesthesia and the initial dose can be minimized so that hemodynamic parameters are maintained and anesthesia can also be prolonged. Hence, CSA is used for various purposes. Goyal *et al*.[1] have used CSA in 90-year-old in order to maintain hemodynamics and prolong anesthesia for required duration. Shukla *et al*.[2] have used CSA for severe ankylosing spondylosis with difficult airway. They claim that CSA avoids total spinal complications of epidural and thus, the difficult airway will not become an emergency airway. Various authors[4-7] have used micro/macro catheters with various degree of success. In our case where room air saturation was 86-88%, single-shot spinal anesthesia required for the duration of 120 min will spread to an unwanted higher level. Hence, CSA with initial minimal dose and repeated incremental doses to maintain the level was considered to be an optimum choice. The only complication we anticipated was postdural puncture headache (PDPH), as the patient was a young female but we did not encounter it in this case. CSA is not a very popular technique probably due to *cauda equina* syndrome attributed to microcatheter/hyperbaric lignocaine.[6] The failure rate with the microcatheter was higher.[7]

Conclusion

This patient with room air saturation of 86-88% was managed without compromising her vitals and by avoiding the need for postoperative intensive care unit (ICU) care by means of CSA.

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Conflicts of interest

There are no conflicts of interest.

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