

Anaesthetic Management of a Patient with Severe Thoracolumbar Kyphoscoliosis Undergoing Exploratory Laparotomy for a Large Ovarian Cyst: A Case Report

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ABSTRACT

Severe thoracolumbar kyphoscoliosis usually makes anaesthesia difficult. The chest is deformed, the lungs work poorly, and the twisted spine is hard to reach for a neuraxial block. A 30-year-old woman with this deformity presented with a large ovarian cyst and was listed for open abdominal surgery. Before this illness she could carry out her routine household work (about four metabolic equivalents) but became breathless on climbing one flight of stairs (modified Medical Research Council dyspnoea grade 2). Her chest radiograph showed a double curve, with the thoracic spine bent to the right at a Cobb's angle of 74 degrees and the lumbar spine to the left at 64 degrees. Lung function testing showed a severe restrictive pattern, and her breathing did not improve after a bronchodilator. The heart scan and the rest of the workup were normal. General anaesthesia in a patient with such poor lung reserve carries a real risk of breathing trouble after surgery, so a spinal block was chosen instead, even though the distorted anatomy made it harder. The landmarks were felt for patiently, and the block was placed in the sitting position at the L3-L4 space. A dose of 3.8 mL of 0.5 percent heavy bupivacaine with 10 micrograms of dexmedetomidine was given. A sensory level of T6 was reached. She stayed stable through the whole operation, with no drop in oxygen and no swings in blood pressure, and her recovery was smooth. This case shows that a spinal block, planned with care and placed with patience, can be a safe option for major abdominal surgery in a patient with severe kyphoscoliosis and weak lungs.

Keywords: Cobb angle, Dexmedetomidine, Neuraxial anaesthesia, Restrictive lung disease

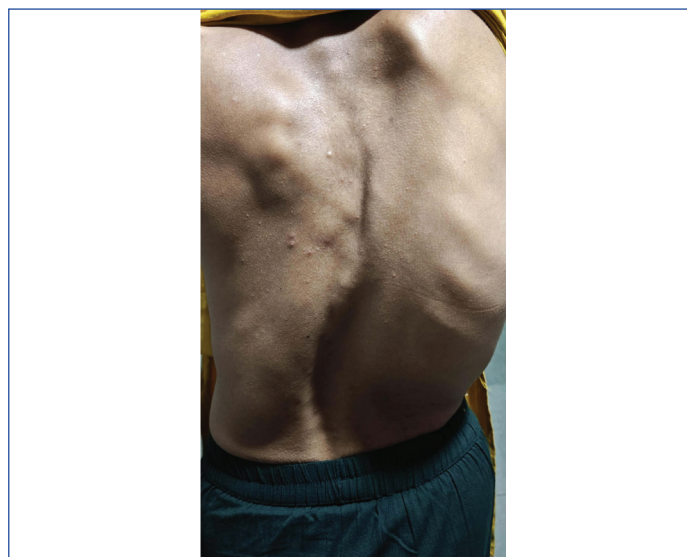
CASE REPORT

A 30-year-old woman presented to the Department of Obstetrics and Gynaecology with lower-abdominal pain and swelling. The pain had begun gradually about three months earlier, was dull and aching, felt deep in the lower abdomen, and had slowly grown worse along with steadily increasing abdominal distension. She was a homemaker. Before this illness she could carry out her routine household work (about four metabolic equivalents) but became breathless on climbing one flight of stairs (modified Medical Research Council dyspnoea grade 2). Imaging showed a large complex cyst in the right ovary, and an open operation was planned. She had delivered twice by caesarean section and had undergone tubal ligation. Detailed anaesthetic records of these two earlier caesarean deliveries were not available. She also carried a long-standing, severe kyphoscoliosis of the thoracolumbar spine that had never been operated on [Table/Fig-1]. The deformity had been present since her teenage years and had slowly progressed. There was no history of spinal injury, spinal tuberculosis, poliomyelitis or any neuromuscular illness, so it was taken to be idiopathic. There was no diabetes, hypertension, tuberculosis or asthma.

She looked comfortable at rest. Her height was 156 cm and her weight 45 kg, giving a body mass index of about 18.5. Pulse was 88 per minute, blood pressure 118 by 78 mmHg, and oxygen saturation 99 percent in room air. The airway looked reasonable, with a Mallampati class II and a good mouth opening. Her spine carried an obvious twist and hump. Breath sounds were equal on both sides and the heart sounds were normal.

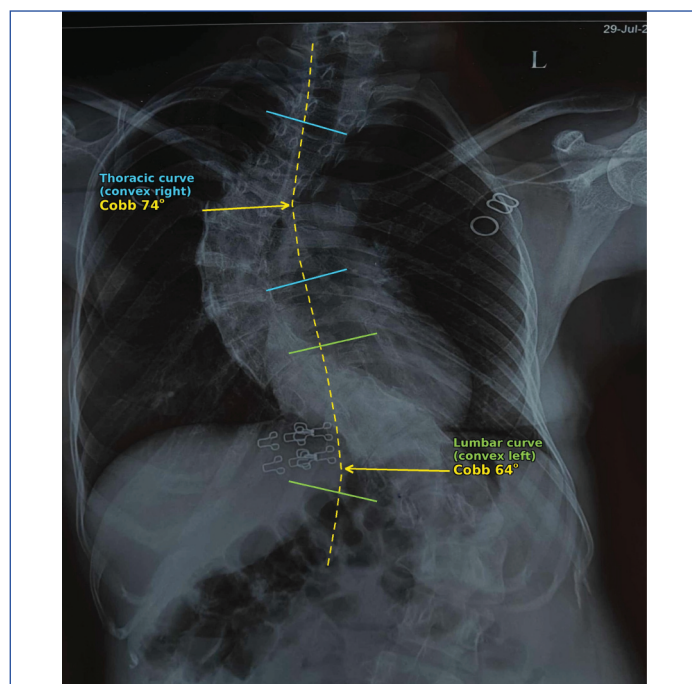
Preoperative Evaluation

The chest radiograph showed the deformity clearly: a severe double curve, convex to the right in the thoracic region at a Cobb's angle of 74 degrees and convex to the left in the lumbar



[Table/Fig-1]: Preoperative photograph showing the severe thoracolumbar scoliotic deformity of the spine.

region at 64 degrees [Table/Fig-2]. The lung fields, heart shadow and mediastinum looked normal. Routine blood tests came back largely normal apart from mild anaemia and a slightly raised INR; the full set of values is given in [Table/Fig-3]. The INR of 1.35 was only mildly raised and stayed below the value of 1.5 that is generally accepted as safe for a spinal injection; the platelet count and the activated partial thromboplastin time were normal, so no correction was needed before the block. The lung function test was the key investigation in this patient. It showed a severe restrictive defect. The forced vital capacity and the forced expiratory volume in one second were both about 44 percent of predicted, the FEV1/FVC ratio was preserved at 85 percent, and there was no useful



[Table/Fig-2]: Chest radiograph showing the severe double scoliotic curve- right thoracic and left lumbar convexity, with the Cobb angles of both curves marked (dashed line traces the spinal axis; tangent lines mark the end vertebrae).

Parameter	Value	Reference range
Haemoglobin	9.3 g/dL	12.0-15.5
Total leucocyte count	6,100 /mm ³	4,000-11,000
Platelet count	2.33 lac/mm ³	1.5-4.0
Prothrombin time / INR	18.9 s / 1.35	11-13.5 s / 0.8-1.2
Random blood sugar	99 mg/dL	70-140
Blood urea	13 mg/dL	15-40
Serum creatinine	0.6 mg/dL	0.6-1.2
Serum sodium	137 mmol/L	136-145
Serum potassium	4.3 mmol/L	3.5-5.0
Serum chloride	98 mmol/L	98-107
SGOT (AST) / SGPT (ALT)	13/16 IU/L	<40
Total bilirubin	1.0 mg/dL	0.3-1.2
CEA	2.38 ng/mL	<5.0
CA-125	15.2 U/mL	<35

[Table/Fig-3]: Summary of preoperative blood investigations.

AST: Aspartate aminotransferase; ALT: Alanine aminotransferase; CEA: Carcinoembryonic antigen; INR: International normalised ratio

response to a bronchodilator; the full spirometry values are given in [Table/Fig-4]. The electrocardiogram showed sinus rhythm with poor R-wave progression. Echocardiography was reassuring, with normal chamber function, an ejection fraction of 55 percent, and no pulmonary hypertension. A contrast CT of the abdomen confirmed a large cystic lesion, roughly 9.9 by 17.6 by 21 cm, arising from the right adnexa and reaching up to the level of the umbilicus.

Because of the lung disease, the team did not rush to surgery. Opinions were taken from pulmonary medicine and cardiology. Sputum was sent to screen for tuberculosis, and it was negative. The pulmonologist's view was that she could be taken up for surgery, but only as a high-risk case, with the final anaesthetic decision left to the anaesthesia team. She was started on bronchodilator nebulisation. Even though the spirometry showed no reversibility, regular bronchodilator nebulisation and chest physiotherapy were continued to clear secretions, treat any small reversible airway component, and lower the chance of lung collapse and chest infection after surgery. The night before surgery she was given alprazolam 0.5 mg, and the nebulisation was repeated that night

Parameter	Predicted	Pre-bronchodilator (% predicted)	Post-bronchodilator (% predicted)
FVC (L)	3.24	1.44 (44%)	1.45 (45%)
FEV1 (L)	2.81	1.23 (44%)	1.32 (47%)
FEV1/FVC (%)	83	85	91
PEF (L/s)	6.57	3.19 (49%)	4.58 (70%)
FEF25-75 (L/s)	3.85	1.48 (38%)	2.26 (59%)

[Table/Fig-4]: Pulmonary function test (spirometry) values before and after bronchodilator.

Interpretation: severe restrictive pattern with no significant bronchodilator reversibility. FVC:

Forced vital capacity; FEV1: Forced expiratory volume in one second; PEF: Peak expiratory flow;

FEF25-75: Forced expiratory flow at 25-75% of FVC

and again in the morning. She was kept fasting from 8 pm. She was graded ASA physical status III, and high-risk written consent was taken from the patient and her family.

Anaesthetic Management

Inside the operating room, standard monitors- electrocardiography, non-invasive blood pressure and pulse oximetry - were attached, and two 20G intravenous cannulae were secured. Before the block she received ranitidine 50 mg and ondansetron 4 mg into the vein, and a litre of Ringer's lactate was run in to preload her.

The block was the most challenging part of the anaesthetic. With the spine so badly twisted, the usual surface landmarks could not be trusted. With the patient seated upright, the midline and the interspaces were identified by slow, careful palpation rather than a quick guess. The L3-L4 space, which lay below the lumbar curve, turned out to be the most accessible. A 23G Quincke needle was used. After free flow of clear cerebrospinal fluid, 3.8 mL of 0.5 percent heavy bupivacaine mixed with 10 micrograms of dexmedetomidine was injected. The sensory level was checked with a pinprick and reached the T6 dermatome in about ten minutes. Motor power was tested by the modified Bromage scale and showed a complete block (grade 3). Oxygen was given by face mask at 6 L per minute.

The procedure carried out was an exploratory laparotomy with cystectomy and removal of the right tube and ovary, lasting about 70 minutes. She stayed steady throughout. There was no fall in blood pressure, no drop in oxygen saturation, and no breathing distress. Tramadol 50 mg was given into the vein for pain, along with maintenance fluids.

Postoperative Course

She recovered from the block without trouble. Once it wore off she was awake, oriented and moving all four limbs. Oxygen by face mask was continued, fluids were kept running to maintain hydration, and her vital signs were watched closely. The rest of her stay passed without event, and she was discharged in good condition.

DISCUSSION

Kyphoscoliosis bends the spine in two directions at once, sideways and forward. When the curve is large, the chest cage is pulled out of shape, the lungs can no longer expand fully, and breathing becomes restricted [1]. The present patient fitted this picture closely. Cobb's angles of 74 and 64 degrees, together with lung volumes at 44 percent of predicted, confirmed a severe restrictive defect and marked her out as a high-risk anaesthetic case.

For a patient like this, general anaesthesia is the less attractive choice. A deformed chest and limited movement can make the airway hard to manage, and weak lungs raise the chance of lung tissue collapsing, a long stay on the ventilator, and chest infections after surgery [2]. The main anaesthetic challenges in such patients are threefold. The airway can be awkward because of the short, deformed neck and chest. The lungs have little reserve, so any depression of breathing is poorly tolerated. And the twisted spine makes a neuraxial block hard to place and its spread hard to

Study (year)	Patient/deformity	Surgery	Anaesthetic technique	Outcome
Kaur M et al., (2020) [1]	Adult; severe thoracolumbar kyphoscoliosis with canal stenosis	Intertrochanteric femur fracture fixation	Spinal; first attempt failed (even with fluoroscopy), success next day at L3-L4 after reviewing films	Uneventful
Deshmukh S et al., (2024) [5]	27 y; congenital thoracolumbar kyphoscoliosis (pregnant)	Emergency caesarean section	Spinal anaesthesia; multidisciplinary care	Mother and baby well
Beh ZY et al., (2024) [6]	29 y; osteogenesis imperfecta with severe kyphoscoliosis, restrictive lung disease	Open bilateral ovarian cystectomy	Neuraxial failed → quadratus lumborum block with deep sedation	Uneventful
Present case (2026)	30 y; severe thoracolumbar kyphoscoliosis (Cobb 74°/64°), restrictive lung disease	Exploratory laparotomy, cystectomy with right salpingo-oophorectomy	Single-shot spinal at L3–L4 (3.8 mL 0.5% bupivacaine + dexmedetomidine 10 µg), T6 level	Uneventful

[Table/Fig-5]: Comparison of the present case with previously reported similar cases [1,5,6].

predict. Staying away from a breathing tube and positive-pressure ventilation, where it is possible, makes sense. A spinal block lets the patient keep breathing on her own and gives good pain relief afterwards, and it has been used successfully for caesarean section and lower abdominal surgery in patients with kyphoscoliosis [3,4].

A few similar cases have been reported, and they are summarised in [Table/Fig-5] [1,5,6]. Kaur M et al., described a patient with severe thoracolumbar kyphoscoliosis and an intertrochanteric femur fracture in whom the first spinal attempt failed even under fluoroscopy; the block succeeded the next day at the L3-L4 space only after the preoperative spine films were studied carefully [1]. The same lesson- study the films and pick a space below the main curve- worked in the present case and gave a first-attempt success. Deshmukh S et al., managed a young primigravida with congenital thoracolumbar kyphoscoliosis for an emergency caesarean section under spinal anaesthesia with the help of a full multidisciplinary team [5], much as a joint pulmonary, cardiology and anaesthesia review guided the plan here.

Not every such case ends with a successful spinal. Beh ZY et al., reported a 29-year-old woman with osteogenesis imperfecta, severe kyphoscoliosis and very poor lung function who needed an open ovarian cystectomy; their neuraxial attempt failed, and the surgery was completed with a quadratus lumborum block and deep sedation [6]. That report is a reminder that the spread of a spinal drug is unpredictable in these spines and that a backup plan must be ready. For the present patient several other options were weighed. General anaesthesia was set aside because of the difficult airway and the poor lung reserve. An epidural alone was thought likely to be slow and patchy. A truncal block such as the quadratus lumborum block was kept in reserve as a fallback, and ultrasound was on hand in case the landmarks could not be felt. In the end a carefully placed single-shot spinal proved enough.

When the landmarks are impossible to feel, ultrasound is now the most useful aid. In a randomised trial in patients with abnormal spines, including scoliosis, a pre-procedure ultrasound scan cut the number of needle passes and improved first-attempt success compared with the landmark method [7]. Kilicaslan B described the same benefit in a very difficult spine, in a patient with achondroplasia and scoliosis [8], and a recent Cochrane review supports ultrasound guidance for neuraxial blocks in adults with difficult anatomy [9]. Ultrasound was available as a backup here, though careful palpation alone proved enough.

Dexmedetomidine was added to the bupivacaine. This drug is an alpha-2 agonist. It lengthens both the sensory and the motor block and the period of pain relief, it allows a smaller dose of local anaesthetic, and it adds light, rousable sedation without depressing breathing [10,11]. That last point matters in a patient whose lungs have so little to spare [12]. She stayed calm and stable for the whole case, which fits well with what others have reported using this combination.

This report has limits. It is a single case, so the findings cannot be generalised. An arterial blood gas was not taken before surgery, as the saturation stayed at 99 percent on room air, but it might have added to the assessment of respiratory reserve in such a high-risk patient.

CONCLUSION(S)

A spinal block can be a safe and practical choice for major abdominal surgery in a patient with severe thoracolumbar kyphoscoliosis and restrictive lung disease. It sidesteps the airway and breathing risks that come with general anaesthesia. The keys are a careful preoperative check with help from other specialists, a good look at the spine films, the choice of an interspace below the main curve, sound positioning, and an unhurried, careful technique. Adding dexmedetomidine to the local anaesthetic is a useful way to lengthen the block while keeping breathing and circulation steady.

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