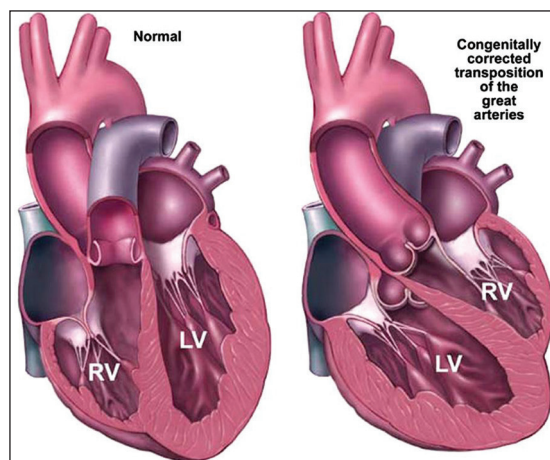


## Combined spinal-epidural anesthesia for cesarean section in a parturient with congenitally corrected transposition of the great arteries

Sir,

Congenitally corrected transposition of the great arteries (CC-TGA) is a rare, noncyanotic congenital heart disease characterized by inversion of the ventricles resulting in a combination of atrioventricular (AV) discordance — the right atrium communicates with the mitral valve and left ventricle (LV), and the left atrium communicates with the tricuspid valve and right ventricle (RV), and ventriculoarterial discordance - the LV gives rise to the pulmonary artery, and the RV gives rise to the aorta [Figure 1].<sup>[1-4]</sup> It is commonly associated with serious cardiac anomalies including ventricular septal defect, pulmonary stenosis, systemic AV (tricuspid) valve abnormalities including regurgitation or Ebstein's anomaly.<sup>[1-4]</sup> Abnormalities of the conduction system are common producing variable forms of arrhythmias or heart block.<sup>[1-4]</sup> Few reports have described the use of epidural analgesia/anesthesia for vaginal<sup>[3-7]</sup> or cesarean delivery<sup>[4]</sup> in parturients with CC-TGA but none have used combined spinal-epidural (CSE) technique.

We encountered a 19-year-old primigravida (height: 160 cm, weight: 63 kg) at 38 weeks of gestation presenting for elective cesarean section for breech presentation. At the age of 12 years, she was diagnosed with CC-TGA complicated by complete heart block and had undergone permanent pacemaker placement. With advancing pregnancy, she was maintained on oral diuretic therapy. On examination, there were no signs of overt heart failure (New York Heart Association functional class II), heart rate was 75 beats/min with regular rhythm, and blood pressure (BP) was 110/70 mmHg. A systolic murmur was heard on the left of the sternum, and breath sounds were normal. Electrocardiogram (ECG) showed regular paced ventricular rhythm. Transthoracic echocardiography performed at 36 weeks of gestation demonstrated the presence of CC-TGA, severe pulmonary stenosis (peak gradient 68 mmHg), severe tricuspid regurgitation, and systemic ventricular ejection fraction of 60%.



**Figure 1:** The atrioventricular and ventriculoarterial relations in a normal heart (left) and congenitally corrected transposition of the great arteries (right). (From Cordone *et al.*<sup>[3]</sup> used with permission from Elsevier)

After patient counseling, we decided to use low-dose sequential CSE technique. Monitoring included ECG, pulse oximetry, and invasive arterial BP. Using the needle-through-needle technique at the L3-4 interspace, a 27-gauge spinal needle was introduced through an 18-gauge Tuohy needle. Hyperbaric bupivacaine 5 mg (1 ml 0.5%) and fentanyl 25 µg were injected intrathecally. Plain bupivacaine 25 mg (5 ml 0.5%) was injected epidurally immediately after catheter placement. The patient then lay in a head-up position with left lateral tilt, and surgery started after 10 min postspinal when the upper anesthetic level assessed by pinprick reached T4. A 3400 g healthy male infant was delivered after 6 min of skin incision, with Apgar scores of 8 and 10 at 1 and 5 min, respectively. Following delivery, syntocinon 5 U slow intravenous (IV) bolus was administered followed by 10 U infusion over 1 h. After 30 min of intrathecal injection, bupivacaine 25 mg (10 ml 0.25%) with fentanyl 2 µg/ml were incrementally injected over 10 min in the epidural catheter.

Ringer acetate 1000 ml was administered over 1 h after intrathecal injection. Maternal hypotension (systolic BP <80% of baseline) occurred twice (at 6 and 10 min postspinal) and was treated with IV boluses of ephedrine 3 mg. Surgery was completed after 50 min postspinal without the use of electrocautery. Urine output was 50 ml in the first h postspinal but subsequently increased to 200 ml after administration of IV furosemide 20 mg. Postoperatively, the patient was monitored in the intensive care unit for 24 h, and the epidural catheter was used for postoperative analgesia. After 4 days, she was discharged home with her baby in a good condition.

The main long-term complication of CC-TGA affecting patients' function and life expectancy is systemic (morphologic right) ventricular dysfunction resulting from pressure overload-the RV pumps blood against the high systemic pressures, volume overload-caused by tricuspid regurgitation and aggravated by advancing pregnancy, and relative myocardial hypoperfusion - the systemic RV being supplied with a single (right coronary) artery.<sup>[1,2]</sup> Medical management includes anti failure medications, antiarrhythmic drugs, and placement of a permanent pacemaker for advanced degrees of AV block.<sup>[1,2]</sup>

Our patient had associated severe pulmonary stenosis and tricuspid regurgitation, permanent pacemaker, and preserved systemic ventricular function. Anesthetic goals were to maintain preload, avoid increase in pulmonary vascular resistance, maintain systemic (morphologic right) ventricular function, and avoid increase in systemic vascular resistance. Low-dose sequential CSE technique helped to achieve these goals. The more gradual sympathetic blockade helped to maintain venous return and preload, and the associated modest decrease in systemic vascular resistance benefited the overloaded systemic RV. Furthermore, spontaneous respiration favored venous return and pulmonary pressure.<sup>[8]</sup> We preferred neuraxial over general anesthesia to avoid the stress-induced increase in systemic and pulmonary vascular resistance (during tracheal intubation and recovery), the myocardial depressant effects of anesthetic agents, and the deleterious effects of positive pressure ventilation on venous return and pulmonary pressure.<sup>[8]</sup>

The traditional CSE technique involves administering the usual intrathecal dose and using the epidural catheter to extend the block and provide postoperative analgesia. Recently, this has been modified to intrathecal administration of a small dose of the local anesthetic with opioid followed immediately by epidural administration of saline (epidural volume extension) or local anesthetic (low-dose sequential CSE).<sup>[9]</sup> This modified technique had been successfully used for cesarean section in high-risk parturients with various forms of congenital and acquired cardiac diseases,<sup>[10,11]</sup> but has never been reported in CC-TGA. Regarding other neuraxial techniques, single shot spinal anesthesia produces significant hemodynamic compromise requiring rapid fluid loading and high-dose vasopressor administration which are unacceptable in high-risk cardiac patients,<sup>[10]</sup> while continuous spinal anesthesia (incremental injection through an indwelling intrathecal catheter) is associated with increased risk of postdural puncture headache.<sup>[12]</sup> When used alone, epidural anesthesia produces a slower, less reliable

block with less patient satisfaction and a significant failure rate.<sup>[10]</sup>

In our patient with CC-TGA undergoing a cesarean section, the low-dose sequential CSE technique provided an adequate anesthetic block with good hemodynamic stability and helped to achieve a favorable maternal and neonatal outcome.

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### Conflict of interest

There are no conflicts of interest.

**Mohamed Mohamed Tawfik, Helmi Hafez,  
Mostafa Abdelkhalek, Nasser Sameh Allakkany<sup>1</sup>**

Departments of Anesthesia and Surgical Intensive Care and  
<sup>1</sup>Obstetrics and Gynecology, Mansoura  
University Hospitals, Mansoura, Egypt

**Address for correspondence:** Dr. Mohamed Mohamed Tawfik,  
Department of Anesthesia and Surgical Intensive Care,  
Mansoura University Hospitals, Elgomhoria Street,  
Mansoura, Dakahlia, Egypt.  
E-mail: m2tawfik@mans.edu.eg

### References

1. Warnes CA. Transposition of the great arteries. *Circulation* 2006;114:2699-709.
2. Dob DP, Naguib MA, Gatzoulis MA. A functional understanding of moderate to complex congenital heart disease and the impact of pregnancy. Part I: The transposition complexes. *Int J Obstet Anesth* 2010;19:298-305.
3. Cordone M, Wolfson A, Wolfson N, Penning D. Anesthetic management of labor in a patient with congenitally corrected transposition of the great arteries. *Int J Obstet Anesth* 2008;17:57-60.
4. Arendt KW, Connolly HM, Warnes CA, Watson WJ, Hebl JR, Craigo PA. Anesthetic management of parturients with congenitally corrected transposition of the great arteries: Three cases and review of literature. *Anesth Analg* 2008;107:1973-7.
5. Sellers JD, Block FE, McDonald JS. Anesthetic management of labor in a patient with dextrocardia, congenitally corrected transposition, Wolff-Parkinson-White syndrome, and congestive heart failure. *Am J Obstet Gynecol* 1989;161:1001-3.
6. Yarrow S, Russell R. Transposition of the great vessels: A series of three cases with a review of literature. *Int J Obstet Anesth* 2000; 9:179-85.
7. Schabel JE, Jasiewicz RC. Anesthetic management of a pregnant patient with congenitally corrected transposition of the great arteries for labor and vaginal delivery. *J Clin Anesth* 2001;13: 517-20.
8. Cannesson M, Earing MG, Collange V, Kersten JR. Anesthesia for noncardiac surgery in adults with congenital heart disease. *Anesthesiology* 2009;111:432-40.
9. Tyagi A, Sharma CS, Kumar D, Sharma DK, Jain AK, Sethi AK. Epidural

- volume extension: A review. *Anaesth Intensive Care* 2012;40:604-13.
10. Hamlyn EL, Douglass CA, Plaat F, Crowhurst JA, Stocks GM. Low-dose sequential combined spinal-epidural: An anaesthetic technique for caesarean section in patients with significant cardiac disease. *Int J Obstet Anesth* 2005;14:355-61.
  11. Landau R, Giraud R, Morales M, Kern C, Trindade P. Sequential combined spinal-epidural anesthesia for cesarean section in a woman with a double-outlet right ventricle. *Acta Anaesthesiol Scand* 2004;48:922-6.
  12. Dresner M, Pinder A. Anaesthesia for caesarean section in women with complex cardiac disease: 34 cases using the Braun Spinocath spinal catheter. *Int J Obstet Anesth* 2009;18:131-6.

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