Anaesthetic management for elective caesarean section in a complex congenitally corrected transposition of the great arteries.

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INTRODUCTION

Congenitally corrected transposition of the great arteries (ccTGA) is a rare congenital cardiac condition accounting for around 0.5% of all congenital cardiac defects.[1] Unlike (dextro) TGA, the ventricles are also transposed. Hence the morphological right ventricle becomes the systemic ventricle, receiving blood from the left atrium. Similarly the morphological left ventricle receives blood from the right atrium and supplies the pulmonary circulation (See Figure right). There are a wide range of presentations of ccTGA depending on the presence of other associated cardiac anatomical defects. Common examples are Ventricular septal defect (VSD), Pulmonary atresia, pulmonary stenosis and Ebstein's anomaly. If ccTGA is complicated by any of these anatomical defects it increases the risk of congestive cardiac failure, arrhythmias, the need for a pacemaker and need for corrective surgery. All patients with ccTG are at increased risk of systemic ventricular dysfunction and tricuspid regurgitation[2]

A literature search does reveal successful caesarean delivery in these patients with anaesthesia given via epidural, CSE and general anaesthesia. If an anatomical shunt is present then cardiac decompensation and pulmonary hypertension are a risk during general anesthesia which should be avoided if at all possible.

We describe the management of a complex ccTGA with associated cardiac defects who required expedited delivery as a result of cardiac decompensation.

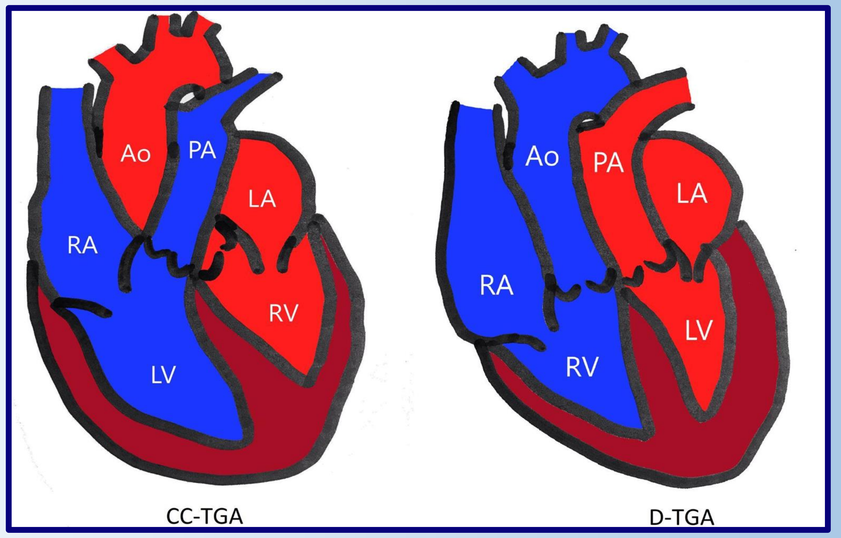
CASE REPORT

A 23 year old primigravida, BMI 22, with ccTGA, coarctation of the aorta, ventricular septal defect and Ebstein's anomaly presented at 7 weeks with an unplanned pregnancy. She had a coarctation repair, PA banding and pacemaker implantation (for complete heart block) in the first few weeks of life. This was followed by a tricuspid valve repair and rebanding of the PA at age 6. As a teenager she had a thrombotic cerebrovascular event and was commenced on warfarin long term. Other pre-pregnancy medications were topiramate for migraine and carvedilol 3.125mg BD. Routine echo pre-conception showed reasonable biventricular function, good morphological(m) RV,trivial mTR and mild mMR.

As a modified WHO class III, she was counselled fully about her maternal and neonatal risks, including deteriorating ventricular function, preterm delivery and death. She accepted those risks and decided to continue with the pregnancy. There was input throughout the pregnancy from the wide MDT of Obstetricians, Anaesthetists (including paediatric cardiac),Cardiology, Hematology, and Midwifery. Her anticoagulation was switched to dalteparin (with Xa monitoring). To optimise oxygen delivery in her cyanotic condition, a haemoglobin of >150g/dl was maintained with ferinject and red cell transfusion.

By 34 weeks gestation her oxygen saturations dropped from 90% to low 80's, coinciding with decreased Hb hence expediting delivery by elective caesarean section. She was admitted the day before to allow control of her dalteparin dosing and was also given PO lansoprazole 30mg.

Once in theatre, routine monitoring (NIBP, Sats and ECG) was applied. Two wide bore IV lines were inserted and an infusion of compound sodium lactate was started. The right radial artery was cannulated for invasive blood pressure and arterial blood gas monitoring.



We also used FloTrac™ pulse contour analysis to calculate cardiac index, stroke volume and stroke volume variation. She was commenced on 2L/min oxygen via nasal cannula with oxygen saturations in the range of 89-92%. Initial arterial blood gas values were pH 7.464, pCO2 4.38, pO2 7.31, BE-0.2 and Lac 0.9. Pacemaker precautions were undertaken.

A combined spinal-epidural (needle through needle) was then placed in the sitting position at L3/4. 1ml of 0.5% heavy bupivacaine with 25mcg of fentanyl was given, phenylephrine infusion was started and epidural catheter threaded. 3-5mls boluses of 0.75% isobaric ropivacaine were given via the epidural catheter approximately every 10 minutes .

Ondansetron 4mg and co-amoxiclav 1.2g were then administered. After 30 minutes and 12mls of ropivacaine there was inability to straight leg raise and a block height of T4 (temperature) and T6 (light touch) was established. However she complained of discomfort with the surgical 'forceps test'. Further boluses were given (total 18ml) over 30 minutes with T4 (temperature) and T6 (light touch) block again demonstrated but discomfort still felt.

As the usual option of a GA conversion was undesirable we chose to use a target controlled infusion (TCI) of remifentanil which was started at 1ng/ml (Cet) and titrated to a max of 3ng/ml. Surgery was commenced and continued without analgesic or haemodynamic issues. phenylephrine infusion was reduced fairly rapidly to zero as the patient remained haemodynamically stable throughout.

A healthy 2.37kg male baby was delivered. 5 units of oxytocin was given as an infusion over 20 minutes and following that a further 40 units given over 4 hours. The rest of the surgery continued without incident and the total operative time was 67 mins and the estimated blood loss was 600 mls. Carboprost 250mcg IM was given at the end of surgery to increase uterine tone. No morphine or diamorphine was used due to a preexisting allergy. A post procedure arterial blood gas showed a pH 7.353, pCO2 5.79, pO2 8.20, BE-1.4 and Lac 1.7.

She was monitored continuously in recovery and HDU post-op and remained comfortable and haemodynamically stable. Her analgesia was managed with regular oral paracetamol and diclofenac, and PRN dihydrocodeine and tramadol. She was discharged to the labour ward after 23 hours where dalteparin was recommenced and 2 units of red cells transfused to bring her haemoglobin concentration from 143 to 150 g/dl. On Day 4 after no further complications she was discharged home. Baby was discharged from hospital well on day 8.

DISCUSSION

Anaesthetic management of a decompensated ccTGA is challenging. We have shown that ccTGA can be managed effectively using a sequential CSE and remifentanil TCI technique.

When the procedure is elective, anticoagulation can be managed to allow neuraxial blockade. Low dose spinal and sequential epidural top up can reduce adverse hemodynamic effects which could cause right to left shunting and severe hypoxia. Cyanotic heart disease patients are generally polycythemic and it is also important to establish individual baseline Hb required to avoid hypoxia.

Intraoperative cardiac monitoring is another key aspect of care. In addition to the arterial line, we used FloTrac™ pulse contour analysis to monitor cardiac index, stroke volume and stroke volume variation. As a result, we were able to use judicious amounts of fluid and vasopressor to maintain haemodynamic stability.

With neuraxial analgesia there is always the risk that the patient may experience intraoperative pain. Any inadequate block reported by a patient must not be ignored, but actively managed as was re-emphasised by the recent guidelines published on this[3]. We used a remifentanil TCI as a successful rescue technique when our patient felt discomfort to complement the neuraxial block and avoid a GA with the inherent cardiac decompensation. We therefore support the use of remifentanil TCI as a titratable, elegant and safe method of active management even in complicated patients to manage pain during caesarean section.

REFERENCES

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