



Epidural analgesia in patient with surgically repaired Tetralogy Fallot during two labors and deliveries

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Summary

We describe the anesthetic management of a patient with surgically repaired Tetralogy Fallot (TOF) during two labors and deliveries. TOF is the most common congenital heart disease, but pregnancy in patients with surgically repaired illness usually has favorable outcome. Every subsequent pregnancy has a risk of persistent cardiac changes and the use of epidural analgesia should be carefully conducted.

The course of the first pregnancy and labor

A 27 year old female, BMI-24.5 was presented at 38 weeks of pregnancy for induction of labor. She was admitted to obstetric department a week earlier to assess her cardiac status and to plan the course of labor. The repair of congenital heart disease TOF was done at the age of 2 and 6.

Cardiac ultrasound performed one year prior to the first pregnancy revealed all cardiac cavities with normal size, mild aortal valve regurgitation of +1, mild mitral valve regurgitation of +1, mean-24.8 mm Hg, and peak pulmonary pressure 38 mmHg, EF-65%.

During pregnancy she was followed by cardiologist and at 22nd week of pregnancy and characterized as NYHA I. Cardiac ultrasound at 22nd week of pregnancy detect normal sizes of all cardiac cavities, mild mitral regurgitation of +1, aortal regurgitation of +2, maximal flow under pulmonary valve 3.3 m/s, and mean pressure of 26.5 mmHg was registered.

Cardiac ultrasound at hospital admission was similar as in the 22nd week of pregnancy. On ECG sinus rhythm of 82 beats per minute and RBBB were registered.

The whole course of pregnancy was completely uneventful. The birth plan was done on the basis of an agreement of team consisting of obstetrician, cardiologist and anesthesiologist. She was induced in 38th week of pregnancy with favorable cervix status by amniotomy and oxytocin infusion.

Standard monitoring consisting of ECG, pulse oximetry and non-invasive blood pressure monitor was set. During entire labor all hemodynamic variables were of normal range. Epidural catheter was placed at level L3/4 at dilatation of 3 cm at the first attempt. Analgesia was achieved with bolus of 8 ml of 0.25% levobupivacine + fentanyl 5 micrograms per ml. Due to rapid flow of the first stage of labor only one additional dose of 5 ml of the same anesthetic mixture at dilatation of

TABLE 1

Patient demographic data, course of labor and fetal outcome.

Labor	Age	BMI	Length (h) and events during stages of labor			Total amount of epidural drugs		Blood losses and transfusion	Fetal outcome
			I	II	III, IV	Levobup. (mg)	Fentanyl (μ g)		
I	27	24.5	2,5	1	Uneventful Normotensive	32.5	65	500 ml No transfusion	3100/51 Apgar 10, 10
II	31	24.2	6	2,5	Hypotension and weakness	105	167	700 ml Two RBC packages	3700/50 Apgar 10, 10

8 cm was used. Visual analog scale (VAS) was rated as 2 after the first bolus of mixture, and 5 after second bolus. Patient was satisfied with achieved level of analgesia. Healthy baby girl of 3100 grams and 51 cm was born by vacuum-assisted vaginal delivery without pushing effort 3.5 hours after induction of the labor. The APGAR score of 10 was rated by neonatologist at the first and fifth minute following delivery. She was completely hemodynamically stable during entire labor. The overall amount of levobupivacaine applied was 32.5 mg and 65 micrograms of fentanyl. Estimated blood loss was approximately 500 ml and the parturient tolerated it very well. Mother and baby were discharged from the hospital three days after delivery in good condition.

The course of second pregnancy and labor

Her second pregnancy was at the age of 31 years. A year earlier (30 years) a new cardiac ultrasound exam revealed mild dilatation of right ventricle and asynchronous septal motion, otherwise she was NYHA I. She was assessed by cardiologist at 24th week of pregnancy. On cardiac ultrasound pulmonary valve regurgitation of +1 and tricuspid valve regurgitation of +2 were registered without indirect signs of significant pulmonary hypertension. On the next cardiologist exam her condition was good but she complained of occasional episodes of arrhythmia.

She was admitted into hospital at 38th week of pregnancy and was assessed by the same team consisting of obstetrician, cardiologist and anesthesiologist. The labor was induced at 39th week with favorable cervix status. All blood tests were within normal limits. Epidural catheter was placed at the level of L3/4 before induction of labor. Standard monitoring was used: ECG, pulse oxymetry and noninvasive blood pressure measurement. For epidural analgesia due to new moments in cardiac findings we decided to use low concentration of 0.125%, levobupivacaine + fentanyl 5 micrograms per ml. Analgesia was gradually achieved with 10 ml of mixture and was followed with continuous infusion of 8 ml per hour of 0.125% levobupivacaine + fentanyl 1.5 micrograms per ml and 5 ml boluses on patient demand. VAS score was

between 2 and 4. At the time of full dilatation additional dose of 10 ml of epidural mixture was given to cover sacral dermatomes. Ringer lactate with rate of 100 ml/h was infused during entire labor. She was completely stable during the first and second stage of labor. Healthy baby boy was delivered of 3700 grams and 50 cm by vacuum-assisted vaginal delivery with minimal pushing effort. The APGAR score of 10 was the first and fifth minute following delivery. Blood loss during the third and the fourth stage of labor was estimated as no more than 700 ml and was followed with one episode of hypotension of 90/60 mm Hg and sinus tachycardia of 110 heart rate (HR). She felt weak although physical examination, oxygen saturation, acid-base status, urine output and ECG were normal while blood pressure and HR were normal during an hour. She was transferred to high dependency unit. Blood loss was replaced slowly with infusion of 1000 ml RL and 500 ml of colloids during one hour after delivery and blood tests were taken. She was mildly anemic, hemoglobin (Hgb g/L) was 95, hematocrit (Htc)-0,27 L/L.

Next day she was more anemic, Hgb 80g/L, and Htc 0.22L/L. After transfusion of two packages of red blood cells (RBC) her condition improved and was assessed as sufficient. Mother and baby were discharged from the hospital four days after delivery in good condition.

Summarized patient data, length of stages of labor, local anesthetic dose and fetal outcome are presented in the Table 1.

DISCUSSION

TOF is a relatively common cyanotic congenital heart disease with an incidence of 10% of all reported congenital heart diseases¹. The presented patient belongs to the growing number of females with surgically repaired congenital vascular disease who reached childbearing age. They generally tolerate pregnancy, labor and delivery quite well (1, 2). In patients with repaired TOF, residual hemodynamic and structural abnormalities are common³. Right ventricular dilatation resulting primarily from pulmonary regurgitation is responsible for arrhythmias, exercise intolerance, heart failure, and death (3). Our patient was NYHA I status but there were reports with weak correlations

between right ventricle (RV) and left ventricle (LV) size, RV and LV function, or degree of pulmonary regurgitation (PR) and NYHA class (4). Multidisciplinary team consisting of cardiologist, obstetrician, anesthesiologist, and midwives were included in patient treatment to avoid any adverse event. New findings of cardiac ultrasound during second pregnancy revealed right ventricle enlargement and PR that had not been registered during the first pregnancy. We missed to perform more accurate assessment of cardiac function by cardiac magnetic resonance that is superior method of quantification of cardiac function (5). Vaginal delivery is preferable for most patients with surgically repaired TOF and neuraxial analgesia is common method of pain relief (6, 7). Our patient went through the 1st labor and delivery with epidural analgesia and instrumental delivery without any adverse event. On the cardiac ultrasound before the second pregnancy mild dilatation of RV was noticed while additional deterioration of cardiac function was registered during 2nd pregnancy as mild PR. Clinical researches of TOF surgically repaired population confirmed that every next pregnancy is followed by deterioration of cardiac function (8). The similar blood loss in healthy parturient did not lead to symptoms seen in presented patient. But we cannot exclude aggravation of symptoms caused both with loss of sympathetic tone due to long lasting epidural analgesia followed by blood loss.

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