



## Anesthetic Management of A Patient with Tetralogy of Fallot Undergoing Non Cardiac Surgery

### KEYWORDS

Spinal anesthesia, Tetralogy of fallot, non cardiac surgery

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**ABSTRACT** *Tetralogy of fallot is the most commonly encountered cyanotic congenital heart disease. Uncorrected Tetralogy of fallot is rarely seen in adulthood in recent times. We report a case of 24 year old patient with Tetralogy of fallot , who presented with mid shaft femur fracture posted for intramedullary nailing. Surgery was successfully conducted under spinal anesthesia with a combination of Bupivacaine and Fentanyl. Spinal anaesthesia can be effective and a safe alternative to general anaesthesia in carefully selected patients.*

### INTRODUCTION

Tetralogy of fallot is the most common cyanotic congenital heart defect, accounting for about 10% of all congenital heart diseases[1]. Management of a patient with uncorrected Tetralogy of Fallot undergoing non cardiac surgeries is challenging owing to the effects of hypoxia, decrease pulmonary blood flow, decrease systemic vascular resistance and acidosis. Anesthetic considerations must focus on minimizing the hemodynamic changes that would increase right to left shunt.

### CASE REPORT

A 24 year old male patient with past history of some cardiac disease presented with midshaft femur fracture. He was posted for intramedullary nailing. On pre anesthetic evaluation, the patient had good effort tolerance(NYHA Class I). He did not have any history of cyanotic spells. He gave history of taking some medical treatment in early childhood for the heart disease , of which details were not available. He remained asymptomatic in later life without any medications and was not on any medication presently. On general examination, he did not have cyanosis or clubbing. Examination of cardiovascular system revealed a pan systolic murmur. Rest of the systemic examination did not show any significant finding. ECG showed right axis deviation with sinus rhythm and Chest X-ray showed an increased cardiothoracic ratio. His hemoglobin and hematocrit were mildly elevated(15.9 gm% and 43.7% respectively) with normal coagulation profile. Other lab findings and ABG were normal. Echocardiography findings were suggestive of Tetralogy of Fallot. There was bidirectional shunt across a large VSD(14 mm) and severe Right Ventricular Outflow obstruction( RVOT). Peak gradient across RVOT at infundibular and valvular level was 90 mmHg with good biventricular function. Oxygen saturation (SPO2) at room air was 97%.

High risk informed and written consent was taken. Regional anesthesia was planned, however, an alternative plan of general anesthesia was kept ready. IV lines were deaired and infective endocarditis prophylaxis was given 2 hours prior to the surgery. In the operation theatre, patient was

connected to standard monitors such as ECG, NIBP, pulse oximetry(SpO2). His heart rate was 86/min , blood pressure was 112/65 mmHg ,respiratory rate was 22 breaths/min .50 ml of Inj. Sodabarbonate was added to the iv fluid. A subarachnoid block was given in L3-L4 interspace using 23 G spinal needle with 10 mg (2 ml of 0.5%) of hyperbaric Bupivacaine and 25µg Fentanyl. Surgery was commenced after achieving a T10 level to pinprick sensation. Patient was hemodynamically stable throughout the surgery with the heart rate of 80-90/min and blood pressure varying between 92/60-120/70 mmHg. Two doses Inj phenylephrine 50µg was given for hypotensive episodes. A total of 800 ml of Ringer's lactate was given throughout the surgery guided by CVP and urine output was 300 ml intraoperatively. Blood loss was 100 ml. Total duration of surgery was 90 min. Patient was shifted to ICU for observation and inj paracetamol 1 gm iv was given for pain relief post operatively. Patient was discharged on the 5<sup>th</sup> postoperative day.

### DISCUSSION

Tetralogy of Fallot is characterized by ventricular septal defect(VSD), Right ventricular hypertrophy, Pulmonic stenosis and Overriding of aorta. These 4 characteristics were first described by Fallot in 1888. Without corrective surgery, 10% of patients survive to their thirties while only 3% reach their forties or older [2]. Extra cardiac surgeries carry a much higher risk and the anesthesiologist must obtain information about the heart lesion, its altered physiology and implications under anesthesia [3,4]. The relationship between resistance of blood flow from ventricles into the aorta and into the pulmonary vessels plays a major role in determining the hemodynamic and clinical picture. When the obstruction is severe, the pulmonary blood flow is reduced markedly , and a large volume of desaturated systemic venous blood is shunted from right to left across the ventricular septal defect[5] .Thus, the severity of obstruction to RV outflow is of fundamental significance.

Anesthetic goals of a patient with Tetralogy of Fallot remains to prevent ) acidosis, ) hypoxia, ) hypercarbia, ) hypovolemia, ) maintaining SVR and minimizing PVR

The "tet spell" or hypercyanotic attacks are generally triggered by a decrease in SVR or a spasm of cardiac muscle in the region of the RVOT, resulting in an increase in the magnitude of the R L shunt.

However, a major objective of intraoperative management is to promote tissue oxygen delivery by preventing arterial desaturation, maintaining a balance between pulmonary and systemic flows, and by optimizing hematocrit[6].

General anesthesia is commonly used in these patients. Many of the agents used for induction and maintenance of general anesthesia depress myocardial function and reduce SVR. Also, it is associated with adverse hemodynamic response to laryngoscopy. It can cause rise in PVR due to hypoxia, hypercarbia, acidosis, hypothermia and positive pressure ventilation. Still, general anesthesia is considered a technique of choice as it offers a benefit of better oxygenation.

Regional anesthesia is relatively contraindicated in these patients due to sudden decrease in SVR, which leads to increase in R L shunt and worsening cyanosis. The benefits of regional anaesthesia need to be weighed on an individual basis[7]. It offers advantage of spontaneous respiration and minimal alterations in ventilation perfusion relationship, good post operative analgesia and avoidance of activation of sympathetic nervous system with consequent catecholamine release.

As these patients are susceptible to develop coagulopathy, we avoided the use of epidural anesthesia.

The need for invasive monitoring depends on the type of surgery as well as the underlying cardiac lesion[7]. In our case, as the surgery planned was closed nailing, we did not expect any major fluid shifts. Also, frequent blood gas analysis was not required, hence, we did not consider an invasive monitoring.

The use of regional anesthesia for well compensated patients with congenital heart disease has been reported with no complications[8]. We preferred regional anesthesia for our patient as the patient had good effort tolerance, a bidirectional shunt, normal coagulation profile and normal SpO<sub>2</sub> on room air.

However, a low dose local anesthetic- opioid combination was used to minimize the hypotension.

## CONCLUSION

Patients with cyanotic heart disease presenting for major surgeries are at increased risk of peri-operative complications and should be managed at tertiary care centre. Regional anesthesia can be an effective and a safe alternative to general anesthesia in carefully selected patients.

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