

# THE USE OF REMIFENTANIL IN GENERAL ANESTHESIA FOR CESAREAN SECTION IN A PARTURIENT WITH SEVERE MITRAL STENOSIS AND PULMONARY EDEMA

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## Abstract

Valvular heart diseases have adverse effects on hemodynamic condition in the parturients during pregnancy. Cesarean section with an opioid based general anesthesia has been used to alleviate these deleterious effects. We hereby describe the effective application of remifentanyl, for cesarean section under general anesthesia, in a 30 yr old primigravida suffering of severe multivalvular heart disease and pulmonary hypertension presenting with pulmonary edema who was in active labor and without neonatal respiratory depression.

**Key words:** general anesthesia, cesarean section, remifentanyl, mitral stenosis, pulmonary edema.

## Introduction

Mitral stenosis is the most common valvular heart disease in parturients, with significant effects on the mother and neonate especially during labor. General anesthesia is indicated where regional anesthesia is contraindicated or fails or in case of emergency delivery<sup>1</sup>.

Systemic opioids are used to blunt the hemodynamic responses during endotracheal intubation and hormonal stress response during surgery<sup>2-4</sup>. However, they are associated with unfavorable effects on the neonate and are therefore avoided until after delivery. Remifentanyl might be an excellent choice for cesarean section under general anesthesia<sup>5,6</sup>.

We report the use of remifentanyl for general anesthesia in a parturient in active labor with severe multivalvular heart disease requiring emergency cesarean section.

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## Case Report

A 30 years old woman (gravid 1 para 0) with a fetus of 36 weeks gestation, presented to the hospital with severe respiratory distress and active labor. The patient had a history of severe mitral stenosis, mitral regurgitation, tricuspid regurgitation, and pulmonary hypertension. Her vital signs revealed blood pressure 90/52 mmHg, pulse rate 130bpm, and respiratory rate 35. Her SpO<sub>2</sub> was 85% on room air. She also had bilateral crackles throughout the lungs, and severe diastolic and systolic murmurs.

Following preoxygenation, anesthesia was induced with ketamine 2 mg/kg, remifentanyl 1 µg/kg, and suxamethonium 1.5 mg/kg to facilitate endotracheal intubation. Cisatracurium 0.1 mg/kg was given after endotracheal intubation with remifentanyl infused at 0.1 µg/kg/min until delivery and 0.2-0.4 µg/kg/min with midazolam 0.1mg/kg for maintenance of anesthesia after delivery. The patient received 100 percent oxygen throughout surgery.

Standard monitoring included pulse rate, noninvasive blood pressure, EKG monitoring, respiratory rate, pulse oxymetry, ET CO<sub>2</sub> and noninvasive cardiac output monitoring using NICO (Novametrix, Wallingford, CT, USA). The patient's cardiac index was 1.5 L/min/m<sup>2</sup>. Dobutamine was administered to improve the cardiac output and compensate any decrease in blood pressure. A live 2950g female infant was delivered 4 minutes after skin incision with Apgar score of 8 and 9 at 1 and 5 minutes, respectively with no evidence of respiratory depression. She was transferred to NICU for postoperative care where she had an uneventful stay.

At the end of the surgery, residual neuromuscular block was antagonized with neostigmine and atropine and the mother was transferred to the ICU while intubated. Her stay in the ICU was uneventful, she was extubated at 26 hours and on 3<sup>rd</sup> day was transferred to the postpartum ward. She was discharged on the fifth day postpartum.

## Discussion

Rheumatic mitral stenosis is the most common clinically significant cardiac abnormality seen in pregnant women worldwide<sup>6-8</sup> with increased maternal

and neonatal mortality<sup>9,10</sup>. Stenosis of the mitral valve obstructs left ventricular filling resulting in increased left atrial pressure (LAP) and reduced cardiac output. During pregnancy several hemodynamic changes including increased intravascular volume and increased heart rate exacerbate the cardiovascular aberrations associated with mitral stenosis. During natural labor, cardiac output and blood pressure increase with uterine contractions. Immediately after delivery cardiac filling pressures increase dramatically due to vena caval decompression and return of uterine blood. Critical mitral stenosis occurs when the opening is reduced to 1 cm<sup>2</sup>. As the disease progresses, chronic elevation of LAP leads to pulmonary hypertension, tricuspid and pulmonary valve incompetence, pulmonary edema, and secondary right heart failure.

Vaginal delivery under regional anesthesia, especially epidural anesthesia is the usual approach in patients with valvular heart disease<sup>11,12</sup>. However, since our patient was in active labor with symptoms of severe heart failure, we decided to use general anesthesia instead in order to reduce the labor associated hemodynamic alteration. Moreover, our patient had also mitral and tricuspid regurgitation, and pulmonary hypertension, all of which make her more vulnerable to adverse effects of labor. We used non-invasive cardiac output monitoring to evaluate the patient's hemodynamic condition.

Remifentanyl was used before delivery to attenuate the deleterious effects of endotracheal intubation and surgical pain and to reduce further hemodynamic compromises during surgery. The patient did not show significant hemodynamic changes after induction, before delivery, and throughout the surgery.

Remifentanyl crosses the placenta like other opioids<sup>13,14</sup>. It undergoes esterase metabolism and has extremely short duration of action that is independent of the duration of infusion<sup>15</sup>.

Use of remifentanyl has been associated with stable hemodynamic variables during general anesthesia in high risk patients<sup>16-18</sup>. with no significant respiratory depression in the neonate<sup>6,19,20</sup>. However, some have reported transient neonatal respiratory depression requiring short period of ventilation support<sup>21,22</sup>, transient neonatal chest wall rigidity<sup>23</sup> and severe fetal

bradycardia<sup>24</sup>.

The neonate had no evidence of respiratory depression after delivery probably attributed to the low dose of remifentanil administered and the short incision to delivery time technique used. However, low bolus doses of remifentanil has been associated with respiratory depression<sup>13,22</sup>.

In conclusion, we demonstrated the effective application of remifentanil in general anesthesia in a parturient in active labor with severe multivalvular heart disease, pulmonary hypertension and pulmonary edema requiring cesarean section and without adverse effects on the neonate.

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