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Dr. Sandip Pawar
Resident, MD Anaesthiology, Department of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India

Dr. Manish Kotwani
Associate Professor, Department of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India

Dr. Jyoti Magar
Professor, Department of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India

Dr. Sanjana Mahajan
Senior Resident, Department of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India

Corresponding Author:
Dr. Sandip Pawar
Resident, MD Anaesthiology, Department of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India

Perioperative challenges in a case of rheumatic mitral valve disease with pulmonary hypertension and recent left ventricular failure for elective caesarean section

Dr. Sandip Pawar, Dr. Manish Kotwani, Dr. Jyoti Magar and Dr. Sanjana M

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Abstract
RHD remains the most common cause of maternal cardiac complications in pregnancy. It is of special concern to anaesthesiologist especially in immediate post-partum period with potential risk of severe cardiopulmonary complications requiring stringent hemodynamic monitoring. Our case was a 38 year female (Gravida-2,parity-1,Living -1) with history of previous LSCS, now 35 weeks pregnant, posted for elective LSCS in view of RHD with severe MS (valve area -1.5 cm^2) severe PAH (PASP-66mm Hg), Severe AR and moderate MR with gestational hypertension. Under cardiology standby plan of anaesthesia was low dose combined spinal epidural following Right IJV cannulation for hemodynamic monitoring with patient requiring minimal dose of inotropic support during surgery and 2 days of ICU stay for intensive monitoring. Perioperative anaesthesia management was accomplished with good maternal and neonatal outcome.

Keywords: Pregnancy, RHD, LSCS, Perioperative anaesthesia management

Introduction
Rheumatic Heart Disease remains the most common cardiac comorbidity in pregnancy. It is of special concern to the anaesthesiologist especially in peripartum period considering the need of stringent hemodynamic management.

Case Report
Female aged 38 years 34 weeks pregnancy diagnosed case of Rheumatic Mitral Valve Disease with Past history of Poliomyelites and previous Cesarean delivery now posted for elective LSCS. In her second trimester, she was admitted in ICCU for 7days with history of left ventricular failure requiring mechanical ventilation. Transthoracic Echocardiography revealed severe Mitral Stenosis (area =1.5 cm^2) with severe Pulmonary hypertension (Pulmonary Artery systolic pressure >70 mm of Hg). She received treatment in the form of metoprolol, furosemide, Low Molecular Weight Heparin, sildenafil and penicillin prophylaxis. During preanesthetic evaluation patient was stable with heart rate- 106/minute regular, blood pressure-118/78 mmHg, respiratory rate 18/minute, SPO2-95% on room air. On cardiovascular examination on auscultation S1S2 heard with Loud S2, Pan systolic murmur heardl. Laboratory investigations were within normal limits. 12 lead ECG showed atrial fibrillation with controlled ventricular rate. Standard preperative NPO guidelines were follwed. LMWH was stopped 3 days prior to surgery while Metoprolol and antibiotics were continued on the day of surgery. The patient was taken in the operation theatre. The standard monitors were attached and baseline vitals were recorded. Pre-operatively Central Venous catheter was placed through Right internal jugular vein under Local anesthesia using standard USG guided technique and CVP was monitored. The choice of Anesthesia was combined spinal epidural Anesthesia (CSE) with low dose intrathecal bupivacaine (7.5 mg hyperbaric 0.5% solution). Regular pre-loading with crystalloids was avoided in this patient. With patient in sitting position and following strict asepsis patient epidural catheter was placed between L3 - L4 space using 18G Tuhoy' s needle, and intrathechal injection of Bupivacaine (heavy) 7.5mg was given using 26 G in L3-4 spinal needle. The assent of spinal level of sub- arachnoid block was guarded with highest sensory Level being at T6 level. The intra-operative course was uneventful.

Our patient received 350 ml of crystalloid (ringer lactate) and minimum inotropic support with Noradrenaline infusion @ 2 mcg/min to maintain the MAP > 60 mmHg. After baby delivery intravenous furosemide (0.1mg/kg) was given pre-emptively to avoid volume overload due to auto transfusion following uterine retraction. Postoperatively, patient was shifted to the ICU for intensive monitoring till the Spinal Level receded. Postoperative analgesia was maintained with Epidural bupivacaine topups of 0.0625% and perrectal Tramadol suppository.

Discussion

Rheumatic fever (RF) is an autoimmune disease caused by gram-positive Streptococcus pyogenes bacteria that are prevalent in untreated throat infections in susceptible children and influenced by environmental factors, such as poor living standard and lack of access to health center. Incidence and pathological patterns of the mitral valve in RHD vary with age, currently, clinical examination remains the basis of a diagnosis of RF and carditis, and the role of echocardiography should be considered supportive.

Normal pregnant female under goes drastic cardio vascular changes, Pregnancy produces a 30-50% increase in blood volume and cardiac output. Cardiac output increases during labour and is 50% higher than before delivery. Immediately in the postpartum period, cardiac output increases maximally and reaches 80% over the prenatal period and is approximately 100% above the value when the woman is not pregnant, this is because at the time of uterine contractions there is a placental auto-transfusion of 300-500 mL, each contraction increases the preload and hence, the cardiac output. There is an additional increase in venous return as a result of auto-transfusion from the contracting uterus as well as from the loss of fetal compression of the inferior vena cava.1 Central venous pressure increases 4-6 cmH2O because there is an increase in maternal blood volume. The increased stroke volume and heart rate maintains the increased cardiac output. Incidence and pathological patterns of the mitral valve in RHD vary with age, patients might have Mitral stenosis with regurgitation. Normal mitral valve area 4- 6 cm square, valvular obstruction produces an increase in left atrial volume and pressure. Symptoms usually develop when the mitral valve area is less than 1.5 cm2. As the disease progresses, the pulmonary venous pressure is increased in association with the increase in left atrial pressure an result is transudation of fluid into the pulmonary interstitial space, decreased pulmonary compliance, and increased work of breathing, which leads to progressive dyspnea on exertion. Over time changes in the pulmonary vasculature result in pulmonary hypertension, and eventually, right-sided heart failure may occur.

Anaesthesia goals for pregnant women with MS are focused on the control of the heart rate and left atrial pressure. Oxygen was applied at 2 L/min via nasal cannula to prevent hypoxemia. Hypoxemia can precipitate pulmonary hypertension and right ventricular heart failure due to increased heart rate and pulmonary vascular resistance. Central venous canulation done to judge central venous pressure and fluid management accordingly. The use of neuraxial anaesthesia requires measures to avoid hypotension, maintain adequate preload, and avoid tachycardia. Hyperbaric bupivacaine (0.5%, 5 mg, 1mL) was injected in the L3-L4 interspace to obtain sufficient block height by preventing decreased of systemic vascular resistance. The increased heart rate that occurs as a reflex can lead to a decrease in cardiac output. Liquid restriction (350ml) was considered to prevent excessive perioperative fluid that may increase the central blood volume and precipitate the occurrence of congestive heart failure, injection furesemide 5 mg intravenously to avoid fluid overload and atrial filling. Accordingly, in case of hemodynamic instability, the vasopressor choice should be tailored to these hemodynamics goals. Epinephrine should be avoided as it may induce tachycardia. Phenylephrine may restore stable hemodynamics with little or no unwanted effect on uteroplacental perfusion. The use of norepinephrine may provide additional inotropic support without significant increases in heart rate, while vasopressin relatively spares pulmonary vasculature. To avoid tachycardia due to pain and anxiety that can further decreased left ventricular diastolic filling time paracetmol infused as analgesia is given. Alteration in hemodynamic status continues to occur for the first 24 hours after delivery. The risk of pulmonary edema and right heart failure can still occur until the postoperative period therefore, adequate cardiovascular monitoring must be maintained. For the postoperative period, the patient continued her treatment in the intensive care unit.

Table 1: Shows the events of pre-induction post induction for before baby delivery after baby at closure

Events	Pre-induction	Post induction	Before baby delivery	After baby delivery	At closure
Heart rate	105	103	105	105	106
Blood pressure (mm of Hg)	110/60	108/58	80/40	90/50	114/52
Central venous pressure (Centimetre of water)	2-4	2-4	2-4	4-6	8-10
			Inj Noradrenaline 0.12 mcg/kg/min started	Inj Pitocin 20 IU IV slowly	Inj Lasix 5 mg IV Inj Hydrocortisone 100 mg IV

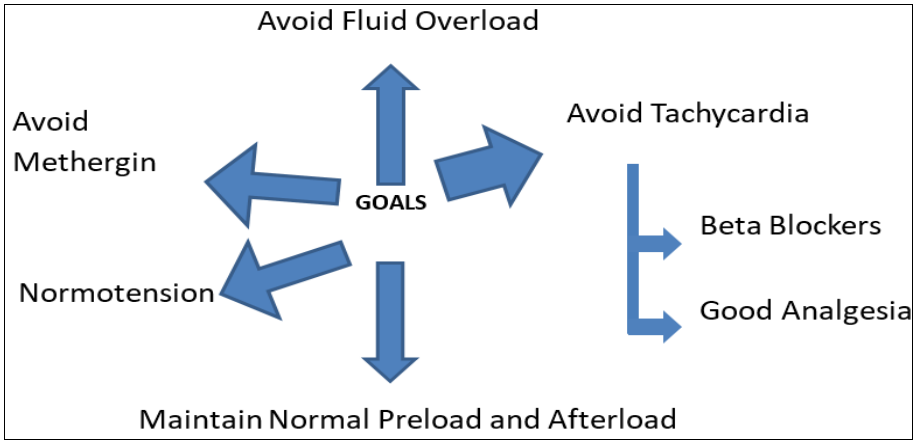

Fig 1: Perioperative goals

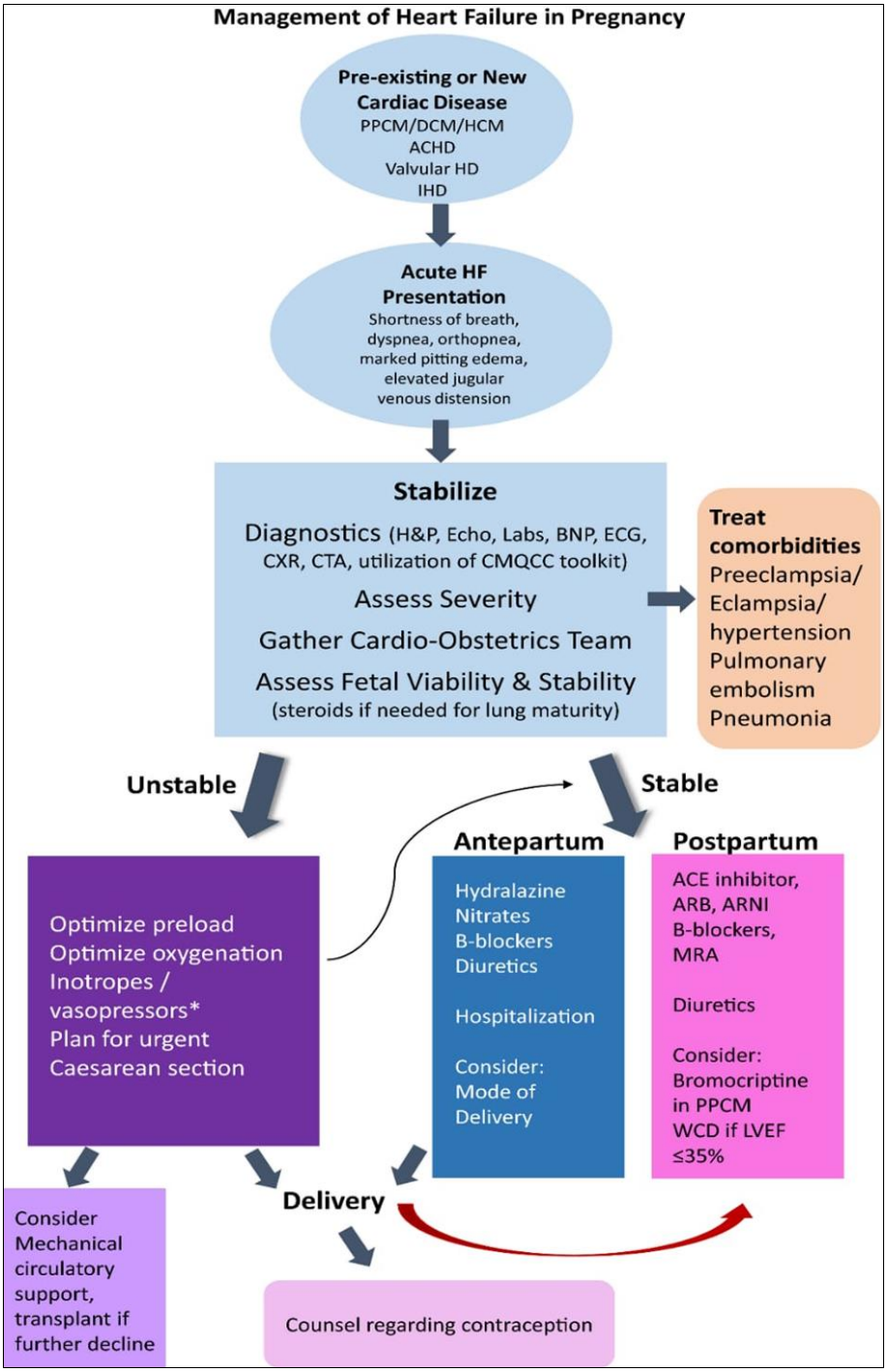

Fig 2: Management of heart failure in pregnancy

Conclusion

RHD remains leading cause of mortality morbidity in pregnant patients Multi-disciplinary practical approach, good planning & clinical understanding is necessary for successful management of Pregnant patient with recent Heart failure for LSCS

Author contributions

DR Sandip pawar contributed to the conception of the work, drafted the manuscript, provided final approval of the version to be published, and agreed to be accountable for all aspects of the work. Dr Manish. k. Contributed to the conception of the work, edited the manuscript, provided final approval of the version to be published, and agreed to be accountable for all aspects of the work. Dr jyoti M. & DR Sanjana. M. contributed to the conception of the work, edited the manuscript, provided final approval of the version to be published, and agreed to be accountable for all aspects of the work.

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