ISSN NO. 2320-5407

Journal homepage:http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

ANESTHESIA FOR EMERGENCY CESAREAN SECTION IN A PATIENT WITH P.D.A.(CONGENITAL ACYANOTIC HEART DISEASE)

Dr.I.J.Namazi (MD)[1] , Dr.AbhishekWadhawan (MBBS)[2].

1. Professor, Department Of Anaesthesiology, D.Y.Patil Medical College, Kolhapur(India)
2. Junior Resident ,Department Of Anaesthesiology, D.Y.Patil Medical College, Kolhapur(India)

Manuscript Info

Manuscript History:

Received: 14 January 2016
Final Accepted: 28 February 2016
Published Online: March 2016

Key words:
Patent DuctusArteriosus; Cesarean section; Spinalanesthesia; Bacterial endocarditis.

Corresponding Author

Dr.I.J.Namazi.

Abstract

We report a case of a pregnant lady with a Patent Ductus Arteriosus (PDA) of small size with left to right shunt and mild pregnancy induced hypertension (PIH), with 36 weeks gestation, admitted to our hospital for delivery. She was prepared for Cesarean section under spinal anaesthesia,as patient was in labour with twin pregnancy. We had to carry out the procedure under spinal anesthesia using 2 ml of 0.5% inj. bupivacaine heavy. Ampicillin and gentamicin were administered for prophylaxis against bacterial endocarditis. Hypotension was treated with bolus doses of injection mephenteramine 6mg along with titrated infusion of intravenous Ringer's lactate solution. Patient was monitored in PACU for 6 hour and then shifted to SICU. The recovery was satisfactory and postoperative stay was uneventful.

Introduction:-

The prevalence of cardiac diseases in pregnancy has remained relatively constant over the past decades and ranges from 0.4-4.1%.[1] Pregnant patient with heart disease is a unique challenge to the obstetrician and the anesthesiologist, dealing with high-risk parturients and requires a thorough understanding of the impact of pregnancy on the hemodynamic response to the patient's cardiac lesion. Pregnancy significantly increases demands on the cardiovascular system. There is a risk of increased peri-partum morbidity and mortality due to pre-existing heart disease.The prevalence of clinically significant cardiac disease in pregnancy is 0.1%-4.1%, of which congenital heart disease (CHD) accounts for 70-80%. This is because more women with CHD now survive to adulthood due to surgical techniques and/or drug therapy.

Common cardiac lesions seen during pregnancy in our population, range from congenital cardiac defects, valvular heart diseases to peri-partum cardiomyopathy. A keen understanding of the underlying pathophysiology, in addition to the altered physiology of pregnancy, is the key to manage such patients. Disease specific goals of management may help to preserve the hemodynamic and ventilator parameters within an acceptable limit. The aim of this review is to discuss the current anesthetic management of parturient with common cardiac conditions, presenting for emergency caesarean section.

Case report:-

A twenty-two years old primigravida with history of congenital cardiac disease with mild pregnancy induced hypertension was admitted in the hospital for safe confinement of pregnancy and delivery after 36 weeks gestation.

Patient was apparently normal and was admitted i.v.o twin pregnancy and known case of PDA with recently diagnosed mild PIH.Patient had no history of palpitation and recurrent episodes of respiratory tract infections. She

consulted a physician in childhood and was diagnosed with PDA and was on no medication .Patient was recently diagnosed with PIH and was on Tab. Labetalol 100mg tds. The course of this pregnancy had been uneventful.
On examination, the patient was thin build with height of 149 cm and weight 57 kg in left lateral position she had pulse rate 84 per minute, blood pressure 150/70 mm Hg, respiratory rate 20 per minute and oxygen saturation was 99% with oxygen flow of 6 liters per minute by face mask. The jugular venous pressure and carotid pulse were normal. There was no pallor, clubbing, pedal edema, icterus, lymphadenopathy or cyanosis and chest was bilaterally clear. The cardiac examination demonstrated no heave or thrill. On auscultation , first heart sound was normal and second heart sound was obscured by continuous machinery murmur grade 3/6, loudest at the left sternal border . The patient's respiratory and neurological examinations showed normal results. Electrocardiogram was normal. 2D-Echo showed congenital acynnotic heart disease- small PDA with normal pulmonary pressure.Preoperative investigations of the patient, including a hemogram, renal and liver function tests, coagulation profile and ultrasonography of the kidney-ureter-bladder, were within normal limits. The cardiologist advised her to continue with pregnancy, regular antenatal checkup, oxygen therapy and antibiotic coverage during labour.

It was decided to deliver the baby by Cesarean section using spinalanesthesia. In the operating room the patient continued to receive oxygen by facemask; ECG leads and pulse oximeter were attached for continuous monitoring. An 18G intravenous cannula was inserted and secured in left forearm vein. The baseline parameters were pulse rate: 92/ min, BP: 130/80 mm Hg and SpO2 98% on oxygen by facemask. Ampicillin and gentamicin were administered for prophylaxis against bacterial endocarditis. Patient was given premedication with inj. Ondansetron 4mg iv and inj. Ranitidine 50 mg in drip and was preloaded with 250 ml of Ringer's lactate solution. With patient in sitting position, quincke's spinal needle 23G was inserted in L3-4 interspace observing aseptic precautions after local infiltration of skin with 2% lignocaine. After clear and free flow of cerebrospinal fluid inj. Bupivacaine 0.5% heavy 2cc was injected. Patient developed hypotension (a fall of more than 25% of the baseline level) at 5 min after institution of spinal anesthesia and it was successfully treated with bolus doses of injection mephenteramine 6mg and titrated intravenous Ringer's lactate solution. First 1.7 kg male baby was delivered with vertex presentation and second 2kg male baby with breech presentation with Apgar score of 6, 7 and 8 at 1, 2 and 5 minute respectively. Subsequently drip of oxytocin 20 IU in 500 ml of crystalloid was infused at a rate of 8-10 drops/min. After surgery, the patient was shifted to post anesthesia care unit for continuous hemodynamic and SpO2 monitoring with oxygen via a face mask. After 6 hours she was shifted from PACU to SICU. Subsequent recovery was uneventful and satisfactory.

Discussion:-

During a normal pregnancy, parturients undergo dramatic physiological changes in multiple organ systems. Changes in the cardiovascular system include decreased systemic vascular resistance (SVR), increased blood volume, and increased cardiac output secondary to increased heart rate and stroke volume. Major hemodynamic alterations occur during pregnancy, labor, and delivery and the postpartum period. In patients with preexisting cardiac disease, cardiac decompensation often coincides with this peak. Cardiovascular stress during pregnancy, labor, delivery and the post delivery period may induce different degrees of cardiac failure in cardiac patient; while concomitant cardiac medication may interfere with the anesthetic management.[2]Young women with small PDA usually tolerate pregnancy well if the shunt is small and if pulmonary artery pressures are normal.[3] It is unusual for women with such left to right shunts to develop pulmonary hypertension during the childbearing age; however, the presence of pulmonary hypertension due to a left to right shunt substantially increases the risk of complications during pregnancy. Problems like arrhythmias, ventricular dysfunction and progression of pulmonary hypertension occur in patients with shunts and/or pre-existing pulmonary hypertension.[4]

Preoperative preparation:-

Parturient with cardiac disease require multidisciplinary planned management pre-, peri-, and postpartum. Following considerations are important in the management of a parturient with heart disease.

Endocarditis prophylaxis:-

Risk of infective endocarditis following vaginal delivery is very low. The American College of Cardiology (ACC) / American Heart Association (AHA) guidelines governing the use of prophylactic antibiotics were revised in 2007 and in 2014, while decisions must be tailored to the individual patient; the guidelines no longer formally support the routine use of antibiotics at the time of vaginal delivery irrespective of the cardiac lesion[7].
When antibiotic prophylaxis is recommended in high-risk patients, the preferred regimen is ampicillin 2 g intravenous or intramuscular plus gentamicin 1.5 mg/kg (maximum 120 mg) intravenous administered within 30

minutes before delivery, followed by ampicillin 1 g intravenous or intramuscular (or amoxicillin 1 g orally) six hours later. If antibiotic prophylaxis is recommended in moderate-risk patients, the preferred regimen is the same, except that the gentamicin and second dose of ampicillin or amoxicillin may be eliminated. In the event of a penicillin allergy, vancomycin 1 g intravenous is recommended instead of ampicillin. [8,9]

Anesthetic considerations:-

Decision regarding type of anesthesia for emergency caesarean section (CS) will be guided by the severity of the cardiac disease of the woman as well as by the urgency of the surgical delivery. Both regional and general anesthesia have been described in most cardiac conditions.[10]Although there is no evidence to support any particular technique, cardiovascular stability is the goal.[11]The aim is for gradual, careful introduction of general or regional anesthesia with invasive monitoring in place. Commonly used local anesthetic agents for regional blockade in caesarean section are lignocaine, levobupivacaine, ropivacaine and bupivacaine.

Oxytocin bolus should be avoided due to tachycardia and hypotension in most cases. Continuous infusion is preferred.[11,12]Ergometrine should be avoided in severe cardiac disease, as it leads to vasoconstriction and hypertension and increases the risks of MI and pulmonary oedema.

Patent ductusarteriosus (PDA) accounts for 15% of all cases of congenital heart disease; most patients with a large PDA (>1 cm) receive early surgical intervention. Patients with a small PDA have typically normal pregnancies, but in those pregnant women with superimposed pulmonary hypertension, maternal mortality may reach 5-6% from ventricular failure. The progressive decrease in SVR development throughout pregnancy can be associated with shunt reversal and peripheral cyanosis.[13]

The effect of increase in cardiac output on the volume loaded right ventricle in atrial septal defect (ASD), or the left ventricle in ventricular septal defect (VSD) and patent ductusarteriosus, is counterbalanced by the decrease in peripheral vascular resistance. Consequently, the increase in volume overload is poorly tolerated as acute hypervolemia may precipitate failure by increasing left ventricular volume work and oxygen consumption. In the absence of pulmonary hypertension, pregnancy, labour and delivery are well tolerated.[14,15]Left-to-right shunts can eventually lead to pulmonary hypertension and reversal of the shunt flow, with resulting cyanosis. So, serial examinations of such shunts with echocardiography are recommended during pregnancy. Arrhythmias, ventricular dysfunction, and progression of pulmonary hypertension may occur, especially when the shunt is large or when there is pre-existing elevation of pulmonary artery pressure. In patients who have had pulmonary hypertension, significant problems can develop in the perioperative period even if they are undergoing non-cardiac surgery. The aim of the management of these patients is to avoid factors that predispose to pulmonary hypertension and to reverse any reversible factors like acidosis, hypercapnia, hypoxia etc. Therefore, we opted for regional anesthesia in our patient, because of the risk of alteration in pulmonary blood flow. Major threat with use of regional anesthesia is reduction in systemic vascular resistance and reversal of left to right shunt, which may results in hypoxia and as well as increase in SVR is not tolerated as proportionate increase in PVR may not occur resulting in increase in left to right shunt. In the management of Cesarian section of a patient with PDA using spinal anesthesia, the primary goal is to minimize a severe fall in SVR and avoiding hypoxemia. Keeping in mind that spinal anesthesia may induce severe decrease in systemic vascular resistance and reversal of left to right shunting of blood, we prepared injection mephentamine6mg/ml and used it as required. Mild decrease in SVR may reduce left to right shunt. If general anesthesia is used, avoid increase in SVR by deepening the depth of anesthesia or by use of vasodilators.[16]

Anesthetic management:-

Goals:-

1. Reduce SVR, reduce RV preload
2. Decrease shunt flow
3. Watch for arrhythmias and pulmonary hypertension.

Patients with any shunt lesions are at risk of systemic air embolization. Due to changes in loading conditions, left-to-right shunts may become right-to-left shunts under labour conditions. Thus, care should be taken to remove all air bubbles from all IV tubing. Loss of resistance to saline rather than air should be preferred when placing an epidural needle.[5,6]

Choice of anesthesia:-

Regionalanesthesia is the preferred technique as it reduces SVR to decrease the shunt flow. General anesthesia can be used but one should avoid changes in SVR and PVR.[6]

Shunt reversal:-
If a right-to-left shunt is already present or develops as a result of shunt reversal(Eisenmenger's syndrome), the outcome for mother and baby is, generally, poor. The anesthetist should be aware of the specific problems of right-to-left shunting which relate to:

1. Central cyanosis
2. Effect of changing the balance between pulmonary and systemic vascular resistances particularly the effect of pulmonary hypertension and/or systemic hypotension on this relationship
3. Effect of a reduction in cardiac output on arterial oxygen saturation
4. Potential for air embolism and
5. Impairment of platelet function which is a feature of cyanotic heart disease.

Eisenmenger's syndrome:-
Eisenmenger's syndrome has a mortality rate of 50% to 65% [17] in good centres where high-risk obstetric care is available. Unfortunately many of these women die in early or mid-pregnancy or during delivery due to the unavailability of sophisticated monitoring or expensive drugs. Although no one type of anaesthetic technique has been found to be superior to any other, the use of general anaesthesia (GA) in this case seemed more risky due to the fact that the patient could not lie flat because of orthopnoea. GA can lower the systemic vascular resistance (SVR) severely after induction thereby worsening the right-to-left shunt in such patients, making weaning off the ventilator and extubation at the end of surgery difficult because of the potential worsening of oxygen saturation levels. Regional anaesthesia can also lower the SVR ; however, a slow onset can lower this effect in a predictable manner and thereby reduce the right-to-left shunting. A graded spinal block is a preferable alternative to epidural alone as this can quickly ensure the faster motor block required for surgical intervention and can lessen the time of SVR reduction in total, as compared with an epidural infusion requiring large volumes of medication to achieve the same block. In addition, an epidural catheter can be put in place for post-operative pain relief or in case the surgery is prolonged; additional small boluses of local anaesthetic can also be given to supplement the block intra-operatively in a more graded manner via the catheter if required.

Postoperative care:-
In postoperative period, patients with severe cardiac dysfunction delivered by Caesarean section should be kept in the high dependency unit / ICU for aggressive monitoring of

1. a)Oxygen saturation
2. b)Haemodynamics
3. c)Fluid therapy

During first 24-72 hours significant fluid shift occurs, which may lead to congestive cardiac failure.
Adequate postoperative analgesia should be provided with opioids or alpha 2 agonists or in combination with opioids and NSAIDS intravenously. Patient controlled analgesia is an adequate alternative in cardiac patients.
Postoperative analgesia can also be provided in the form of continuous epidural analgesia.

Conclusion:-

Management of a parturient with congenital cardiac disease requires an individualised approach with a joint effort by a team of obstetrician, cardiologist and anesthesiologist. With vast advancements in obstetric care, improvements in cardiac surgery, many patients with cardiac disease can now be safely delivered surgically by skillful anesthesiologists by careful preanesthetic evaluationand who are aware of the common potential intra operative problems and the ability to respond to undesired events immediately.

References:-

1. David H Chestnut. Principles and Practice of Obstetric Anesthesia. Elsevier Mosby-Philadelphia, Pennsylvania 2004; 3: 707-33.
2. Gomar C, Errando CL. Neuroaxialanesthesia in obstetrical patients with cardiac disease. CurrOpinAnaesthesiol 2005, 18:507-512.
3. Kuczhowski KM. Labour analgesia for parturient with cardiac disease – what does an obstetrician need to know? ActaObstetGynecolScand 2004; 83: 223-33.
4. Weiss BM, Hess OM. Pulmonary vascular disease and pregnancy: current controversies, management strategies, and perspectives. Eur Heart J 2000; 21:104-115.
5. Naulty JS, Ostheimer GW, Datta S, Knapp R, Weiss JB. Incidence of venous air embolism during epidural catheter insertion.Anesthesiology 1982; 57: 410-2.
6. Miriam H., Lawrence C. T, Cardiovascular disease. In: ChestnutDH. Obstetric Anesthesia.4th ed. Principles and Practice. Elsevier Mosby-Philadelphia, Pennsylvania. 2009;881-912.
7. Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. J Am DentAssoc 2007;138:739–745. 47–60.
8. Dajani AS, Taubert KA, Wilson W et al. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. JAMA 1997;277:1794801.
9. American College of Obstetricians and Gynecologists. ACOG practice bulletin number 47, October 2003: prophylactic antibiotics in labor and delivery. Obstet Gynecol. 2003;102:875-82.
10. Dob DP, Yentis SM. Practical management of the parturient with congenital heart disease. Int J ObstetAnesth. 2006;15:137-44.
11. Burt CC, Durbridge J. Management of cardiac disease in pregnancy. ContinEducAnaesthCrit Care Pain. 2009;9:44-47.
12. Tamhane P, O'Sullivan G, Reynolds F. Oxytocin in parturients with cardiac disease. Int J ObstetAnesth. 2006;15:332-33.
13. Kuczkowski, Krzysztof M. Anesthesia for the parturient with cardiovascular disease: review article. Southern African Journal of Anaesthesia and Analgesia 2003;9:18-25.
14. Shime J, Mocarski EJ, Hastings D, Webb GD, McLaughlin PR. Congenital heart disease in pregnancy: short- and long-term implications. Am J ObstetGynecol 1987;156:313–22.
15. Siu SC, Sermer M, Harrison DA, Grigoriadis E, Liu G, Sorensen S, et al. Risk and predictors for pregnancy-related complications in women with heart disease. Circulation 1997;96:2789–94.
16. Mangano DC. In: Anesthesia for the pregnant cardiac patient, Shnider and Levinson's Anesthesia for Obstetrics. 4th ed. Hughes SC, Levinson G, Rosen MA, editors. Philadelphia: Lipppincott Williams & Wilkins; 2001. pp. 477–478.
17. Makaryus AN, Forouzesh A, Johnson M: Pregnancy in the patient with Eisenmenger'ssyndrome.Mt Sinai J Med 2006, 73(7):1033-1036.