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Perioperative management of a pregnant woman with coarctation of aorta

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Abstract

Heart disease in pregnancy is the leading indirect cause of maternal mortality.¹ Coarctation of aorta is a rare condition found in pregnant mothers and they are at extremely high risk of life-threatening maternal or fetal events at any given time. Management of these mothers should be done at specialized maternity hospitals, under the care of a multidisciplinary team. Anesthetists are involved at various stages of the management of these mothers, especially during the peripartum period.

Here we are presenting a case history of a 20-year-old primipara, who was found to have coarctation of the aorta at first trimester and underwent uncomplicated cesarean section at POA of 31+5.

Keywords: Coarctation of the aorta, oral antihypertensives, namely, nifedipine, physiological

Introduction

Coarctation of the aorta is a rare congenital heart disease in adult population. Most of them are present as young hypertensives, while some are presented with various other non-specific symptoms. The narrowing is mainly involved in descending aorta, which exerts a great afterload to the left ventricle and eventually causes left ventricular hypertrophy and failure [2, 3].

Pregnancy is a time period where many cardiovascular changes take place in order to maintain placental perfusion. Mothers with heart disease poorly tolerate these physiological stresses and they are at high risk of deterioration and DE compensation. Therefore, these mothers should be closely followed up until their delivery, by involving a multidisciplinary team.

Here we are presenting a rare case of a 20-year-old primipara who was found to have coarctation of the aorta and underwent uneventful delivery at POA of 31+5.

Case history

Mrs A, a 20-year-old primipara was found to have high blood pressure during her booking visit at the POA of 8 weeks. There was no significant difference of blood pressure readings between her right and left upper arms whereas there was about a 20 mmHg difference between the right upper arm and lower limb readings. She was admitted and investigated 4 years ago for exceptional dyspnea and CT abdomen has revealed narrowing of mid descending aorta, which was suggestive of arteritis. Unfortunately, she defaulted on follow-up until this presentation. Initially, a multidisciplinary team (MDT) discussion was held at local hospital. As the patient was asymptomatic and the family was extremely willing to have a baby, decision was made to continue the pregnancy with close monitoring of her symptoms and blood pressure. She was started on methyldopa 500 mg tds. Initial 2D echocardiogram at POA of 12 weeks has revealed mild left ventricular hypertrophy with preserved biventricular functions.

With the progression of pregnancy, even though she was asymptomatic, her blood pressure was difficult to control with maximum doses of 3 oral antihypertensives, namely, nifedipine, methyldopa and labetalol. Then she was transferred to a tertiary care maternity hospital at POA of 21+3 for further optimization of her management and safe delivery of the baby.

Another MDT discussion was arranged at POA of 22 and according to the cardiologist's opinion prazosin was added.

They decided to deliver the baby at POA of 32 weeks by an elective cesarean section and if blood pressure is further uncontrollable or if it is affecting fetal growth, planned for a corrective intervention during the pregnancy. She has undergone MRI aortogram which showed coarctation of the descending thoracic aorta, starting at the T6 level with long segment narrowing up to the aortic bifurcation and maximum narrowing at the diaphragmatic region.

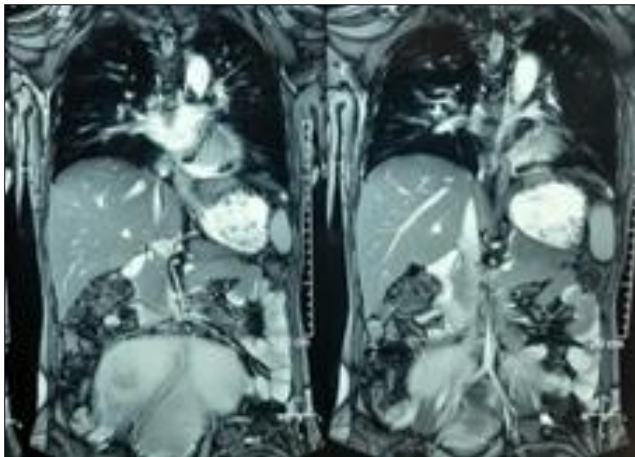
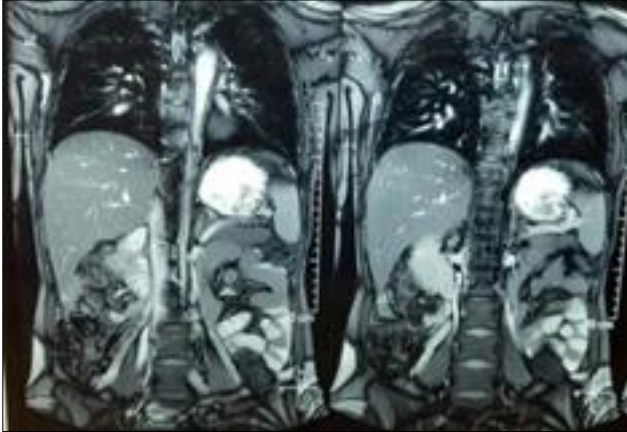


Fig 1: Which showed coarctation of the descending thoracic aorta

Towards the POA of 30 weeks, her blood pressure was uncontrollable with oral antihypertensives and the patient was admitted to the intensive care unit for the close monitoring. R/radial arterial line was inserted and she was started on IV labetalol boluses followed by an infusion, which was titrated targeting for a right-hand systolic blood pressure of 160 mmHg. Repeat 2D echocardiogram did not show a significant difference to the previous echocardiogram.

At POA of 31+2, her blood pressure control became extremely difficult and had to inject intermittent boluses of hydralazine and started on GTN infusion as well. She remained completely asymptomatic and did not have features of preeclampsia or proteinuria. Elective cesarean section was planned at POA of 31+5 weeks.

On the day of surgery, after taking patient to the theatre, combined spinal epidural was performed at L3-L4 level under full aseptic conditions. 0.5% heavy bupivacaine 1.2ml with 25 micrograms of fentanyl was given via a 27G spinal needle and 18G epidural catheter was inserted. With the spinal injection, block was achieved up to T10 level and additional doses of epidural 0.5% plain bupivacaine was given as 2ml aliquots to achieve a block up to T6 level.

Apart from the routine AAGBI monitoring, invasive blood pressure monitoring was continued throughout the procedure. With the delivery of the baby, 5 units of oxytocin bolus was given and 10 units infusion was started. During the surgery, her antihypertensive infusions were stopped temporarily. The baby was intubated and transferred to the neonatal intensive care unit.

During the initial postpartum period, she was recommenced on labetalol infusion combined with other oral antihypertensive, targeting right-hand systolic blood pressure of 160 mmHg. The pain was controlled with epidural 0.1% bupivacaine and fentanyl 12 microgram/ml infusion. Fluid was restricted to 80 ml/hour in the initial postoperative period and oral intake was started as early as possible to avoid fluid overload. Gradually we were able to tail off labetalol infusion and control her blood pressure with oral nifedipine, prazosin and labetalol regular doses. On postoperative day 4, she was discharged to ward and planned to arrange a cardiothoracic referral for the definitive management of her cardiac problem.

Discussion

Coarctation of the aorta accounts for about 10% of adult congenital heart diseases, which can be isolated or associated with other congenital heart diseases or various syndromes [2]. Most of them present with hypertension while others can be presented with limb claudication or other nonspecific symptoms such as headache and chest pain. Narrowing typically occurs in descending part of the aorta, which exposes the left heart into a great pressure load, leading to left ventricular hypertrophy and eventually failure [3].

Diagnosis depends on clinical findings and radiographic imaging. They can typically have delayed or absent femoral pulses and systolic hypertension in the upper extremities. 2D echocardiogram can be used to confirm coarctation and measure pressure gradients to assess the severity. Magnetic resonance imaging (MRI) and computed tomographic angiogram (CTA) are used to identify the exact location of coarctation and to measure the diameter of the narrowest segment [4]. In our patient, the condition was suspected with the blood pressure difference between the upper and lower extremities and the diagnosis was confirmed with a 2D echocardiogram and MRI aortogram.

During the pregnancy, many changes occur in the cardiovascular system, in order to facilitate placental perfusion and fetal growth. These changes are exaggerated towards the term and during the labour [5]. Therefore, pregnant mothers with cardiac diseases are poorly tolerating these changes and are at high risk of deterioration, causing it to be the largest single cause for indirect maternal deaths [1]. The modified World Health Organization (IMHO) pregnancy risk classification tool is the widely accepted risk stratification system used in pregnancy. It classifies pregnant mothers with heart diseases into 4 classes depending on the heart lesion and its severity. However, when deciding on management, the decision should be individualized and should be taken by a multidisciplinary team [7]. In WHO classification, native severe coarctation is in class IV, which carries an extremely high risk of morbidity and mortality, where pregnancy is contraindicated. But in our case, we held a multidisciplinary team discussion and the decision was taken to continue pregnancy depending on her symptoms, clinical findings

and the expectations of the patient and family.

The mainstay of management of these patients is the blood pressure control with antihypertensive. If it fails or symptoms get worse or peak-to-peak coarctation gradient > 20 mmHg in cardiac catheterization, surgical or trans catheter interventions such as balloon angioplasty or stent implantation are indicated.⁴ In pregnancy also, if medical management is failed or maternal or fetal complications occur, these interventions should be considered^[6].

The place and timing of delivery should be planned at early stage of the pregnancy. It is safer to deliver at a place, where all subspecialties are available, including obstetricians, anesthesiologists, intensivists, cardiologists, cardiothoracic surgeons, interventional radiologists and neonatologists.⁷ Timing of delivery depends on individual circumstances and the need to balance the risk for the mother and the fetal risk of preterm delivery^[8, 9]. Mrs. A was also managed at a tertiary care maternity hospital until her delivery and the optimum time of delivery was decided according to her clinical condition and fetal growth.

Mode of delivery is another crucial decision to be taken in the management of these pregnant mothers. Most of them are unable to tolerate physiological changes that occur during normal labour, depending on the severity of their underlying cardiac condition^[10]. If plan for an elective cesarean section, it could be done under general or regional anaesthesia, where it carries its own risks and benefits. However, the most important factor is to minimize haemodynamic fluctuations with the anaesthetic technique and invasive monitoring should be continued throughout^[11]. In our patient, we used a combined spinal epidural and were able to maintain haemodynamic stability throughout the surgery.

Some uterotonic drugs such as ergometrine and carboprost cause severe systemic vasoconstriction and should be avoided in these patients as they can easily go into DE compensation with severe hypertension^[12].

During the initial postpartum period, these mothers need to be monitored very closely, ideally in an obstetric intensive care unit (ICU). Blood pressure control, fluid optimization and providing adequate analgesics are three key factors to prevent the deterioration of their cardiac functions^[6]. We have closely monitored Mrs. A in ICU for 4 days and multidisciplinary care was continued to avoid any complications in the early postpartum period

Conclusion

Heart disease in pregnancy carries a significant risk to pregnant mothers and it is the leading indirect cause of maternal mortality^[5]. Coarctation of the aorta is a rare cardiac condition found in pregnant mothers and most of them present in the first trimester with high blood pressure^[11]. Even though it is categorized as a class IV cardiac disease which has extremely high morbidity and mortality rate⁶, depending on clinical condition and close monitoring of the mother throughout the pregnancy by involving a multidisciplinary team safe delivery is still possible.

Conflict of Interest

Not available

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