

Case Report

Low dose Spinal Anesthesia for Cesarean Section in a Patient with Takayasu's Arteritis: a Case Report with Literature Review

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ABSTRACT

Takayasu's arteritis (TA) is a rare, inflammatory panarteritis involving aorta and its major branches. Anesthetic implications of TA include uncontrolled hypertension, end organ dysfunction and difficulty in the monitoring of arterial pressure.

We are reporting a case of 30 yr. old parturient having TA with schizophrenia and very bad obstetric history, who was managed in high dependency unit from 24 weeks onward under supervision of multidisciplinary team, as lives of both mother and fetus were at stake. She successfully underwent cesarean section in low dose spinal anesthesia using 7.5mg hyperbaric bupivacaine with 25 mcg fentanyl intrathecally.

This report highlights that low dose spinal anesthesia remains a good option if mean arterial pressure is maintained to prevent end organ damage. As the patient remains awake, it allows monitoring of cerebral perfusion without the need of sophisticated cerebral function monitor.

Keywords: Takayasu's arteritis, TA, Hypertension, Low dose spinal anesthesia, Cesarean, Cerebral function.

INTRODUCTION

Takayasu's arteritis (TA) also known as pulseless disease is a chronic, progressive, inflammatory, idiopathic disorder of connective tissue which results in panarteritis, especially affecting the aorta its branches and pulmonary arteries.

^[1] It is a rare disease with an incidence of 2-3 per million, ^[2] more common in women than men (8:1) with the peak incidence in the second and third decades. It typically affects young Asian women of child bearing age. ^[3]

Although anesthetic approach for parturients with this rare disease has not been specified, several reports have documented the use of general ^[4] as well as regional ^[5-7] anesthesia for cesarean delivery.

We present a case of the successful management of a parturient having TA with coexisting schizophrenia and dyslipidemia who underwent cesarean section in low dose spinal anesthesia. Anesthetic and obstetric implications of TA along with literature review are also discussed.

CASE REPORT

A 30 year old, Gravida 6, Para (5) visited our obstetric department in March 2015 with history of 6 months amenorrhea. She had bad obstetric history as all previous pregnancies had fetal demise [2 preterm intrauterine deaths (6-7 months), 1 full term intra uterine death and 2 preterm deliveries (7-8 months and babies died on 2nd day)]. She underwent os tightening in

present pregnancy in third month at some private hospital.

In October 2005 she developed renal failure following 2nd pre term intra uterine death and referred to nephrology unit where she was admitted for 6 days. Here she was diagnosed to have TA with peripheral vascular disease, dyslipidemia and anemia, for which she received treatment for 15 days as Furosemide, Domperidone, Cefixime, Ferrous Sulfate, Amlodipine, Clopidogrel and Atorvastatin.

She was also a known case of schizophrenia with first episode in Jan 2014 for which she was receiving Tab Olanzapine 5mg OD till now.

During present pregnancy (in sixth month of gestation) being a diagnosed case of TA, she was referred to cardiac care unit (CCU) for review. Her color Doppler study showed right carotid occlusion, fundus examination revealed right macular scarring with chorioretinal degeneration and left dull fundal reaction but vision was normal. She also had bilateral renal bruit, left > right on per abdominal examination. She was put on Tab. Iron folic acid (100mg/0.5mg) OD. As she was anti phospholipid antibody (APLA) positive, therefore Inj. Low molecular weight heparin (60 IU s/c OD) and Tab Aspirin 75 mg OD were started for maternal and fetal wellbeing (to prevent any thrombotic episode), which were to be continued till delivery. After six days of admission in CCU, she was shifted to high risk pregnancy ward and remained there till cesarean takes place.

Serial abdominal ultrasound and color Doppler examination at 24, 28 & 36 weeks showed normal fetal development, with recent USG showing cord around the neck and planned for elective cesarean section (June 2015).

Pre- anesthetic evaluation revealed 62kg, 157 cm tall lady with a 38 weeks gestation sized uterus. Her peripheral pulses (right/left radial, brachial, dorsalis pedis) were not palpable, right carotid was feeble and only left carotid, right - left

femoral and popliteal arteries were palpable. Pulse rate was 82/min by palpating femorals. Her blood pressure using manometry was 130/90 mmHg in lower limbs. Her airway, intervertebral disc space and ECG were normal.

Her Investigations including hemoglobin- 10.4 gm. %, Platelets – 1.64 lacs/ mm³, fasting blood sugar - 60 mg%, BT/CT – 1.34/2.40 min , PT/INR – 13.4/1.27 sec, Blood Urea- 16.0 mg %, Serum Creatinine – 0.6 mg % and Liver function test were in normal range. Her significant findings were serum total cholesterol 390mg %, serum triglyceride – 473mg %, HDL – 60mg %, LDL – 225 mg % indicating dyslipidemia and anti-nuclear antibodies (ANA) – 75 IU/ml and APLA-positivity signifying intraoperative risk of thrombotic episode. 2D echo cardiography revealed mild concentric LVH, no RWMA, normal LV systolic function, no vegetation/ pulmonary embolism /clot, LVEF- 60 %. Her color Doppler revealed right carotid occlusion.

She was accepted for anesthesia in ASA class 2. She was advised to take her night dose of olanzapine and to keep overnight fasting.

Weighing risk and benefits surgery was planned under low dose spinal anesthesia with an aim of keeping mean arterial pressure between 80 to 110 mmHg and Systolic BP above 100 mmHg to prevent end organ damage. This mode of anesthesia was chosen since it avoids adverse effects of GA and as the patient remains awake, monitoring of cerebral perfusion is easy without the need of sophisticated cerebral monitors.

In operating room standard monitoring were applied to the patient including noninvasive blood pressure (NIBP) cuff over left upper arm, pulse oximeter over left thumb and five lead ECG. Though radial and brachial pulses were not palpable we were able to record blood pressure with NIBP based on oscillometry and pulse oximetry was also possible (Figure 1).



Figure 1: vitals recorded by noninvasive monitoring.

Baseline vitals were recorded as BP of 125/80 mmHg, PR- 74/min, SpO₂ – 98 %. We made arrangement of invasive arterial BP monitoring via femoral artery cannulation, but it was not done as NIBP was recordable. Two peripheral IV lines (20G) were secured, she was preloaded with 500ml lactated Ringer's solution and premedicated with intravenous injection of Ondansetron 4mg, Hydrocortisone 100mg and dexamethasone 8 mg.

Patient was placed in left lateral position and then taking all aseptic precautions, a 25 G Quincke's spinal needle was introduced via midline approach in L3-L4 interspace and 7.5 mg (1.5 ml of 0.5 %) hyperbaric bupivacaine with 25 mcg (0.5 ml) Fentanyl was injected in sub arachnoid space. Patient was then placed supine with a small pillow under the head and left lateral tilt was maintained with wedge placed under right hip to prevent aortocaval compression. Oxygen 5L/min was administered via facemask. Urinary catheterization was done to monitor urine output.

After 5 min of spinal injection, sensory level of T6 and Bromage score of 3 was achieved and surgery was commenced. A healthy male baby weighing 2.8 kg was delivered after 4 minutes of skin incision, with APGAR score of 9/10. Oxytocin infusion was started (10 units in 200 ml RL). During intraoperative period there was a fall in B.P to 89/61mmHg (Figure 2) after 3 minutes and then 92/62 mmHg at 10

minutes of fetal delivery which were successfully treated with Inj. Mephentermine 6mg IV each time. Otherwise patient remained hemodynamically stable as shown by BP ranging from 100-140/55-95 and HR from 65-110/min. Patient did not have any symptoms of poor cerebral perfusion as evidenced by continuous verbal communication. Surgery lasted for 30 minutes with blood loss of 500 ml approximately. Intraoperatively she received 1000 ml RL and urine output was 100 ml signifying normal renal perfusion. Immediate post-operative state was good with PR- 77/ min, B.P- 119/71 mmHg, SpO₂- 99 %.



Figure 2: Fall in Mean arterial pressure.

She was shifted to obstetric ICU for further management. Post-operative analgesia was maintained with inj. Tramadol 100 mg BD, NSAIDs were avoided in view of past history of renal failure. Her post-operative recovery was uneventful with her vitals within normal limits and discharged on 10th day with an advice of further evaluation of TA with MRI.

DISCUSSION

Takayasu's arteritis (TA) was first described by Japanese ophthalmologist Mikuto Takayasu in 1908, who reported the association of retinal arteriovenous anastomosis and absence of upper extremity pulses. [8]

The disease is of unknown etiology hence multiple factors have been linked to its occurrence like-sex hormones (as common in child bearing age), tuberculosis, streptococcal infection, rheumatic fever, collagen vascular disease, hypersensitivity and genetic predisposition (HLA BW52). But none of these factors have proven an etiological link. [1]

The panendarteritis results from intimal infiltration of lymphocytes and other inflammatory cells with fibrous tissue replacing the elastic tissue of vessel. Making the wall thickened and resulting in stenosis and occlusion of artery there by affecting the regional circulation. Hence the disease is also named as pulse less disease, occlusive thromboaropathy or aortic arch syndrome. However dilatation and aneurysm may occur. [9]

Four types of TA patients can be identified according to anatomical location and extent of the disease (Lupi Herrera et al 1977) [10] as type I – involving aortic arch and its branches, type II – involving descending thoracic aorta and abdominal aorta without involving aortic arch, type III – mixture of type I and II and type IV – additional involvement of pulmonary artery. Our patient was categorized as type III with involvement of carotid and renal arteries.

Ishikawa and Matsuura (1981) [11] noted that in pregnancy, the degree of severity of retinopathy, secondary hypertension, aortic insufficiency and arterial aneurysms were particularly significant indicators of maternal and fetal outcome and they classified TA patients into four groups as group I with none of the above complications, group II a with one complication of mild severity, group II b with one complication of moderate severity and group III having two or more complications. Vaginal delivery could be indicated in group I and II a patients as long as epidural analgesia is used for pain relief and delivery be abbreviated by forceps especially in hypertensive patients. Group II b and III should undergo cesarean

section since increased blood volume and blood pressure during uterine contractions and increased cardiac output during labor may lead to cardiac decompensation. Our case was categorized in group II b (one complication retinopathy), so elective caesarean section was planned for the case.

The disease of TA is classically characterized by a triphasic course. Initial active phase with symptoms similar to any other vasculitis like malaise, weight loss, fever, myalgia, arthralgia associated increase in ESR. The second stage is marked with symptoms of cerebral, visceral, extremity ischemia and finally “Burnt –out” quiescent phase of fibrosis. However these typical features are present in minority of patients. The diagnosis is based on signs and symptoms, inflammatory markers (like ESR, anti-phospholipid antibody titer, anti-leucocyte antibody) and arteriography demonstrating stenosis of aorta and its branches. But the gold standard of diagnosis being biopsy of vessels. [12]

The treatment in the initial phase is with corticosteroids usually for 2-4 years with or without immunosuppressants like methotrexate and azathioprine. This induces remission in approximately 80 % of patients although 50 % may later relapse and require further course of steroid. Subsequent management involves treatment of coexisting diseases and angioplasty or surgical correction of stenosis and aneurysms. [5,13] The survival has been estimated to be approximately 12-16 years [12] after the diagnosis and retinopathy, aneurysm and aortic insufficiency being the worst prognostic factors. Overall 5year mortality rate may range from 3-35 % [14] and the commonest cause of death being heart failure, myocardial infarction and stroke. [10]

Pregnancy does not interfere with disease progression although hypertensive complications like development of pre-eclampsia, exacerbation of chronic hypertension, heart failure, and cerebral vascular accidents have been reported in

60% of cases [15] hence low-dose aspirin for pre-eclampsia prevention should be started before 16 weeks. [16] In 60–90% of cases foetal complications are reported such as miscarriage, growth restriction, and foetal death, most likely attributed to impaired placental blood flow caused by uncontrolled blood pressure. [17] Therefore all parturients with TA should receive regular growth scans (ultrasound and Doppler at 24, 28 and 36 weeks of gestation) to provide a predictor for uteroplacental function, identifying high-risk pregnancies and a means by which fetal wellbeing and growth can be assessed.

In our case also patient had history of fetal demise in all previous 5 pregnancies. However successful outcome in present pregnancy can be attributed to vigilant management of patient in high risk pregnancy ward in last trimester with serial Doppler ultrasound and involvement of other specialties the disease course was compensated with drug therapy. Keeping in mind the positivity of APLA, there is possibility of occurrence of perioperative thrombotic episode, therefore for fetal and maternal wellbeing, on gynecologists and cardiologist's opinion inj. Low molecular heparin and tab aspirin was started in sixth month which was continued throughout pregnancy and stopped one day before surgery. And as there was no thrombotic episode perioperatively they deferred in starting it again.

The anaesthetic goal [7,18] in these patients is the maintenance of blood pressure during perioperative period as anesthesia in these patients can be complicated by severe uncontrolled hypertension leading to end organ dysfunction, stenosis of major blood vessels affecting regional circulation and difficulties in measuring blood pressure. In perspective of end organ damage these patients should have a detailed pre-anesthetic evaluation which is the fundamental for detection and treatment of disease complications. Generally TA

patients are chronically hypertensive and are on antihypertensive medications. The curve for auto regulation shifts to the right in such patients therefore MAP should be maintained in higher range to prevent end organ damage.

Although no specific anesthetic technique has been standardized for TA patients and GA [4] as well as regional [5-7] anesthesia has been used for cesarean section. During general anaesthesia at various steps there can occur significant fluctuations in blood pressure that can lead to cerebral hemorrhage, rupture of aneurysm, myocardial infarction and CCF. [18] Also the cerebral blood flow or function is difficult to assess under GA without the use of EEG or Trans cranial Doppler. [4]

Regional anesthesia on other hand can lead to hypotension, thus inducing cerebral ischemia or infarction, however, it could be the technique of choice if arterial blood pressure is maintained to prevent end organ damage, and it also allows monitoring cerebral perfusion through patient's level of consciousness. It avoids stress response, negative inotropy due to inhalational agents, neonatal depression and decreased venous return due to positive pressure ventilation of general anaesthesia and also lowers the rate of thrombosis. [6,18]

The cases have been reported in which Epidural anesthesia, [5] low dose spinal anesthesia with epidural volume extension technique [6] have been used in order to avoid abrupt fall in blood pressure. However these techniques were avoided in present case as procedure would have taken longer, which might have triggered intra operative psychotic episode, as the patient was a known case of schizophrenia. Instead we used single shot spinal anesthesia using low dose of local anesthetic (7.5 mg hyperbaric bupivacaine) and 25mcg fentanyl was added to potentiate the block, it also avoided acute fall in BP which was our basic aim.

Low dose spinal anesthesia has also been documented as a successful modality for CS in patients with TA by Dutta et al, 2010 (6.5 mg hyperbaric bupivacaine and 25 mcg fentanyl), [18] Gautam S et al (5 mg hyperbaric bupivacaine and 25 mcg fentanyl). [7] We did not opt for such lower doses of bupivacaine in order to prevent inadequate block which may result in forced conversion to GA, which may culminate the advantages of regional anesthesia.

MAP is very important for maintaining normal cerebral blood flow and protecting the cerebral function from any damage. Patient with TA may not tolerate acute decrease in BP because diffuse arteritis result in stenotic and non-compliant vessels, which interfere with compensatory mechanisms to increase BP, hence, attention should be given to the maintenance of preload and the B.P changes should be quickly treated. [19] As our patient was normotensive throughout the pregnancy we aimed to keep the MAP within the range of 80-110 mmHg and systolic BP above 100 mmHg. Adequate preloading with crystalloid along with low dose spinal anesthesia helped us to attain the desired level of block for CS, avoiding precipitous decrease in B.P. There was a small decrease in arterial blood pressure at two instances as observed by others [7] which was promptly corrected with modest amount of intravenous Mephentermine.

Considering the carotid artery occlusion we took two precautions as followed by others, [7] firstly during placing the patient in left lateral decubitus for lumbar puncture block, left lateral flexion of neck was avoided and secondly, while placing supine after the block, small pillow was placed under patient's head in order to prevent the extension of neck which might reduce carotid blood flow by stretching the arteries.

Perioperative steroid replacement is warranted to prevent the occurrence of Addisonian hypotensive crisis, [20] as chronic use of steroids can lead to

suppression of adrenal gland activity with inadequate release of endogenous corticosteroids in moment of stress of surgery. Though our patient was not on long term steroid therapy, we instituted intravenous Hydrocortisone 100 mg before commencement of surgery prophylactically.

We opted not to place an arterial line because it was possible to measure BP consistently from left brachial artery non-invasively using oscillometry, which was quick and effective method considering the short duration of surgery, which was in consistent with previous case reports. [6] As our patient was hemodynamically stable and inflicting arterial trauma in such patient with diffuse arteritis was not justified since there is a theoretical risk of precipitating an occlusion and aneurysm formation in the vessel following cannulation. [21] However provision of invasive arterial monitoring was immediately kept available if needed.

CONCLUSION

We successfully managed a parturient of Takayasu's arteritis with coexisting schizophrenia, dyslipidemia and past history of renal failure using low dose spinal anesthesia for elective caesarean section. We were able to do this because of detailed pre-anesthetic evaluation and active participation of other specialties. One should keep in mind that the cornerstone in these patients is maintenance of arterial perfusion pressures in perioperative period guarded by MAP. The regional anaesthesia is best in the patients with advantage for monitoring cerebral function without need of sophisticated monitors, however the choice of anaesthesia technique to be used should be tailored according to the presentation of the patients with Takayasu's arteritis.

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