Can low dose spinal anesthesia combined with ultrasound guided bilateral ilioinguinal-iliohypogastric nerve blocks avoid use of additional epidural catheter in high risk obstetric cases? Our experience from two cases

P. BHAKTA (*), P. K. SHARMA (**), R. R. DATE (**) and A. K. MOHAMMAD (***)

Abstract: Critical obstetric cases associated with cardiac pathology may pose real challenge for anesthesiologist during Caesarean section. Meticulous perioperative care and suitable selection of anaesthesia technique are the key to successful outcome. Single shot spinal anaesthesia is not used any more because of serious haemodynamic consequence. Progressive and controlled epidural local anaesthetic injection is mostly used in such cases. But recently combined spinal epidural anaesthesia and continuous spinal anaesthesia are suggested due to better precise control of haemodynamics and quicker onset. However, institution of such complex technique may require time which may not be feasible in emergency situations. Use of bilateral ilioinguinal-iliohypogastric nerve block along with low dose spinal anaesthesia may obviate the need of additional epidural catheter in such complicated cases. We hereby present our experience from two cases.

Key words: Low dose spinal anaesthesia; Ultrasound guided ilioinguinal-iliohypogastric nerve block; High risk obstetric cases; Caesarean Section.

Critical obstetric cases complicated with cardiac pathology are major cause of indirect maternal mortality (1). These cases may pose real challenge to anesthesiologist during Caesarean section (CS) (1-3). Meticulous attention to all details in preanaesthetic evaluation and proper choice of safe anaesthetic technique form the key to successful perioperative outcome. Single shot spinal anaesthesia (SSSA) with traditional dose of local anesthetic is usually not selected for harmful haemodynamic consequence and thereby adverse outcome in such cases (2, 4). It is safer to use either progressive and controlled injection of local anaesthetic through an epidural catheter (EA), combined spinal epidural anaesthesia (CSE) or continuous spinal anaesthesia (CSA) to judiciously titrate anaesthesia according to haemodynamic response (1-5). But application of such complex techniques may not be feasible or may fail, especially in emergency situations. Ultra-

Case reports

Case I: A thirty-five-years-old (Gravida, Para) parturient presented for emergency CS at thirty-weeks of gestation due to scar tenderness resulting from previous operation. Her pregnancy was complicated by peripartum cardiomyopathy (PPCM) (already diagnosed in her previous pregnancy), gestational diabetes mellitus (GDM) and nutritional anaemia. She developed postpartum heart failure in her last pregnancy for which she was...
bore intravenous access (16 Gauge) was established and left radial artery was cannulated for invasive blood pressure (BP) monitoring. Routine monitoring (pulse oximetry, electrocardiogram) was used. They were electively preloaded with 0.5 L of Ringer’s lactate solution. CSE was inserted using single space needle through needle technique in L 4-5 interspace with Portex CSEcure set (Portex, Smiths Medical, Dublin, USA) and 5 mg of 0.5% hyperbaric bupivacaine combined with 25 µg of fentanyl was injected intrathecally. Subsequently 18 gauge epidural catheter was threaded epidurally. After positioning the patient supine, a wedge was placed below the right hip joint to prevent aortocaval compression. Additional bilateral ultrasound guided ilioinguinal-iliohypogastric nerve blocks (with 10 ml of 0.5% bupivacaine on each side) were started. Patients were put on prophylactic non-invasive ventilation (IPAP 12, EPAP 6, FiO 2 0.4) to prevent any respiratory distress (auto-transfusion induced sudden pulmonary edema). When block up to T10 level was achieved, surgeons were allowed to proceed with operation. In both cases crying babies were delivered with good Apgar’s score (score of 8/10 at 0 min and 10/10 at 5 min). After the delivery, intravenous oxytocin drip (40 units in 500 mL of normal saline) was started. Right internal jugular vein was cannulated (7 French triple lumen catheter) to monitor the central venous pressure. Surgeons were specifically told not to exteriorize uterus or mop the upper abdominal cavity. Two episodes of hypotension (in one woman) were managed with boluses of phenylephrine. The rest of the intraoperative course was uneventful. Epidural top up was not required. The patients were shifted to ICU for postoperative monitoring and were started on epidural infusion (0.1% bupivacaine and 2 µg of fentanyl, at 4-6 mL/hour) for postoperative pain management. They have had uneventful postoperative course and were discharged from hospital with follow up in cardiology clinic.

admitted in intensive care unit (ICU). Her recent echocardiography also confirmed diagnosis of PPCM (Table 1). She was on standard management (furosemide, digoxin, hydralazine, carvedilol, enoxaparin) for PPCM, insulin for diabetic control and iron plus folic acid for anaemia. With aggressive treatment her cardiac condition improved a bit as revealed by follow up echocardiography (Table 1). She had complains of shortness of breath with moderate exercise. On auscultation she was found to have bilateral basal crepitations and systolic murmur. All her preoperative investigations are mentioned in table 2. Regional anesthesia and antiocoagulation protocol (recommended gap between last dose of enoxaparin and insertion of CSE) was followed.

Case II: A thirty-six-years-old Tanzanian parturient (Gravida 5, Para 3) was scheduled for emergency CS at thirty-nine weeks of gestation for fetal distress. She has had rheumatic heart disease (RHD) complicated with aortic stenosis (AS) and pulmonary arterial hypertension (PAH) as confirmed by echocardiography (Table 3). She was started on digoxin and furosemide for heart failure in her last pregnancy, which she stopped one year before as she improved. In her current pregnancy she had no episode of shortness of breath. She had fair exercise tolerance. There was no history of syncope, palpitation or chest pain. On auscultation there was ejection systolic murmur in the aortic area, without any sign of heart failure. Her perioperative investigations are mentioned in table 2.

**PERIOPERATIVE MANAGEMENT**

In both cases same type of anaesthesia technique was used. They were premedicated with oral sodium citrate (0.3 molar, 30 mL) along with intravenous ranitidine (50 mg), metoclopramide (10 mg) and ampicillin (2 gm). In the operating room large

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Initial Value</th>
<th>Follow up Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEDD</td>
<td>5.75 cm</td>
<td>4.9 cm</td>
</tr>
<tr>
<td>LVESD</td>
<td>4.55 cm</td>
<td>3.6 cm</td>
</tr>
<tr>
<td>LVEF</td>
<td>42%</td>
<td>54%</td>
</tr>
<tr>
<td>LVFS</td>
<td>21%</td>
<td>28%</td>
</tr>
<tr>
<td>Valve pathology</td>
<td>Mild thickened MV, moderate to severe MR, mild TR and PR</td>
<td>Moderate MR, trivial TR and PR</td>
</tr>
</tbody>
</table>

LVEDD : Left ventricular end diastolic diameter, LVESD : Left ventricular end systolic diameter, LVEF : Left ventricular ejection fraction, LVFS : Left ventricular fractional shortening, MR : Mitral regurgitation, TR : Tricuspid regurgitation, PR : Pulmonary regurgitation.

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left heart failure with increased risk of thromboembolic complications. PPCM is diagnosed by excluding other common causes of heart failure in pregnancy (2). Echocardiography is now the most confirmatory diagnostic modality though cardiac magnetic resonance imaging is increasingly becoming important as well (2). Management of PPCM is similar to any heart failure with special consideration to drug safety in pregnancy and lactation.

**DISCUSSION**

PPCM is defined as occurrence of any myocardial disease having echocardiographic features of left ventricular dysfunction without any demonstrable cause which appears in the last month of pregnancy or in the first five months after delivery (table 4) (2). Exact etiology of PPCM is still unknown (2). Clinical presentation of PPCM is like that of any

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**Table 2**

Investigations of the cases

<table>
<thead>
<tr>
<th>Parameters</th>
<th>First Case</th>
<th>Second Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red cell count (4.1-5.4 x 10^12/L)</td>
<td>4.06</td>
<td>3.52</td>
</tr>
<tr>
<td>Haemoglobin (11-14.5 g/dL)</td>
<td>9.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Haematocite (0.34-0.43 L/L)</td>
<td>0.34</td>
<td>0.27</td>
</tr>
<tr>
<td>Platelet Count (150-450 x 10^10/L)</td>
<td>214</td>
<td>240</td>
</tr>
<tr>
<td>White Cell Count (2.4-9.5 x 10^9/L)</td>
<td>5.4</td>
<td>5.6</td>
</tr>
<tr>
<td>PT (10.4-12.3 sec)</td>
<td>10.0</td>
<td>9.4</td>
</tr>
<tr>
<td>INR (0.91-1.08)</td>
<td>0.88</td>
<td>0.86</td>
</tr>
<tr>
<td>APTT (28-38 sec)</td>
<td>33</td>
<td>33.3</td>
</tr>
<tr>
<td>Sodium (135-145 mmol/L)</td>
<td>133</td>
<td>134</td>
</tr>
<tr>
<td>Potassium (3.5-5.1 mmol/L)</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Chloride (98-107 mmol/L)</td>
<td>107</td>
<td>101</td>
</tr>
<tr>
<td>Creatinine (45-84 umol/L)</td>
<td>42</td>
<td>63</td>
</tr>
<tr>
<td>Urea (2.1-7.1 mmol/L)</td>
<td>1.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Alanine Aminotransferase (0-31 IU/L)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Aspartate Aminotransferase (0-31 IU/L)</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Alkaline Phosphatase (35-104 U/L)</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>Albumin (34-48 g/L)</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Protein, Total (64-83 g/L)</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Bilirubin, Total (0-17 umol/L)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Fasting Glucose (3.5-5.5 mmol/L)</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Postprandial Glucose (mmol/L)</td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td>Glycosylated Haemoglobin (4.5-5.7%)</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>NT.proBNP (&lt; 5 pg/mL)</td>
<td>130</td>
<td></td>
</tr>
</tbody>
</table>


**Table 3**

Echocardiography report of second case

<table>
<thead>
<tr>
<th>Vascular pathology</th>
<th>Grading of severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic Stenosis</td>
<td>Moderate, Valve area: 1.2 cm²</td>
</tr>
<tr>
<td>Transaortic pressure gradient</td>
<td>Peak: 56 mmHg, Mean: 36 mmHg</td>
</tr>
<tr>
<td>Aortic regurgitation</td>
<td>Mild</td>
</tr>
<tr>
<td>Mitral stenosis with thickened valve cusps</td>
<td>Mild, MVA 2 cm²</td>
</tr>
<tr>
<td>Tricuspid regurgitation</td>
<td>Mild</td>
</tr>
<tr>
<td>LVEF</td>
<td>57%</td>
</tr>
<tr>
<td>Pulmonary arterial hypertension</td>
<td>Mild to moderate</td>
</tr>
</tbody>
</table>

MVA: Mitral valve area, LVEF: Left ventricular ejection fraction.
Heparin in antepartum and heparin/warfarin in postpartum is often included in combination therapy to prevent occurrence of thromboembolism (2).

Perioperative management of PPCM patient often requires multidisciplinary approach involving cardiologist, obstetrician, anaesthesiologist and intensivist (2). General anaesthesia (GA) is not recommended due to associated adverse cardiac events. It is however used in emergency situation or when regional anaesthesia (RA) is contraindicated (2). The sympatholysis with RA is associated with a decrease in pre and afterload. This could improve haemodynamics in case of PPCM (2). SSSA is no more recommended in PPCM because of adverse cardiac events due to uncontrolled sympatholysis (2). Progressive and controlled injection of local anaesthetic through an epidural catheter has been used in parturients with PPCM. But now increasingly CSE and CSA are being used in severe PPCM cases. Advantages of both spinal and catheter technique can be combined with lesser drug requirement, quicker onset of excellent anaesthesia and precise control on haemodynamics (2, 5).

Moderate to severe aortic stenosis (AS) is another cardiac condition which complicates pregnancy. Degenerative calcification, rheumatic heart disease and congenital bicuspid aortic valve are the most common aetiology (3, 6). AS presents significant problem to the anaesthesiologists due to fixed cardiac output state with serious challenge in case of caesarian section (1, 3). The classical triad are : exertional dyspnoea, angina and syncope (6). AS is most commonly diagnosed by presence of ejection systolic murmur in aortic area and confirmed by echocardiography, which is the gold standard diagnostic tool (3, 6). Symptomatic AS is associated with high rate of sudden cardiac death (6). Medical management is used to give temporary symptomatic relief but to prevent complications main management is surgical (6).

Anaesthetic management depends on severity of AS. All patients should be thoroughly evaluated preoperatively and severity assessed by echocardiographic examination or cardiac catheterization (6). Intraoperative goal is to maintenance of adequate preload, stable haemodynamics, prevention of fall in systemic vascular resistance, maintenance of normal heart rate and sinus rhythm and avoidance of any myocardial depression (1, 3, 6). Hypotension should be treated with alpha adrenergic agonist to maintain coronary perfusion (1, 3, 6). Invasive haemodynamic monitoring should be used in all cases (1, 3, 4, 6). Recommendations support the use of GA instead of RA in severe AS due to better control on haemodynamics (1, 3, 4). But GA has its own limitation due to potential haemodynamic changes during intubation, risk of gastric aspiration and neonatal depression (4). Similarly SSSA is mostly contraindicated in severe AS because of uncontrolled fall in BP (4). Recently, use of CSE and CSA has increased because of above mentioned advantages (1, 3, 4).

Our patients had moderate grade of PPCM and AS (Table 2, 3). After thorough preoperative evaluation, we discussed with the obstetrician, cardiologist and explained the risk as well as benefit to the patient. We selected CSE over progressive and controlled injection of local anesthetic through EA catheter for quicker onset of excellent anesthesia, higher success rate, better analgesia and precise control on haemodynamics and greater patient satisfaction (1, 3, 4). Although progressive and controlled injection of local anesthetic through an epidural catheter has been mostly used for haemodynamic stability, it can cause 20% or more fall in BP (7). Moreover high spinal blockade with usual dose of local anaesthetic can lead to lower intercostals nerve paralysis which can lower the respiratory capacity further crippling patients with cardiac and respiratory problems. CSE with use of low dose local anaesthetic by intrathecal route helps in better maintenance of haemodynamic as seen in our cases. Though CSA gives the best control of haemodynamics, we did not have the facility and expertise of

<table>
<thead>
<tr>
<th>Non echocardiographic criteria</th>
<th>Heart failure within last month of pregnancy or six month postpartum</th>
<th>Absence of prior heart disease</th>
<th>No determinable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echocardiographic criteria</td>
<td>LVEF &lt; 45%</td>
<td>LVFS &lt; 30%</td>
<td>LVEDD &lt; 2.7 cm/m² body surface area</td>
</tr>
</tbody>
</table>

LVEF : Left ventricular ejection fraction, LVFS : Left ventricular fractional shortening, LVEDD : Left ventricular end diastolic diameter.
this kind of anaesthesia in our hospital. We elec-
tively used bilateral ilioinguinal-iliohypogastric
nerve blocks to supplement low dose spinal an-
esthesia to cover the skin (classical Pfannenstiel) inci-
sional pain. We avoided the use of epidural catheter
intraoperatively which can lead to more fall in BP.
Classically any CS operation requires block of at
least up to T₇-T₉ to cover the usual surgical field,
pressure on upper abdomen and lower thorax for de-
ivery and occasional exteriorisation of uterus for
surgical closure. But this level of block may be very
detrimental in parturients complicated with PPCM
or AS. We selectively opted for low dose spinal an-
esthesia to prevent harmful haemodynamic conse-
quences. With this technique the block height was
restricted up to T₉. Iliouinguinal-iliohypogastric
blocks cover the T₁₀–L₁ dermatomal area in the ante-
rior abdominal wall. We used ilioinguinal-iliohypo-
gastric nerve block with low dose spinal anaesthesia
to add on over the T₁₀ level. Sometimes the block in
the upper segments with low dose spinal anaesthesia
may not give adequate surgical anaesthesia. It blocks
the incisional pain in CS. But it cannot be used as a
sole technique for CS as it does not provide any an-
esthesia for incision of the uterus.

In our cases we used ilioinguinal-iliohypogastric
blocks for supplementing low dose spinal an-
esthesia for initial surgical incision for CS and also
to add postoperative analgesia. Operation was pos-
sible with T₁₀ level of block as we avoided exteri-
orisation of uterus and mopping of upper abdominal
cavity. We specially instructed obstetricians not to
mop the under surface of diaphragm or to exterio-
rise uterus. These maneuvers may lead to retching,
nausea and vomiting and will require block as high
as T₇. Delivery was accomplished with only T₁₀ lev-
el of block with use of forceps which avoided use of
excessive pressure on upper abdomen. None of our
cases required any intraoperative supplement using
epidural catheter. A low dose spinal anaesthesia is
often insufficient for CS. Adding ilioinguinal-ilio-
hypogastric nerve block may be helpful. Even bilat-
eral ilioinguinal-iliohypogastric nerve block with local
infiltration has been used in a parturient with
severe PPCM for CS. But this technique is cum-
bersome and not always suitable and acceptable as a
sole surgical anaesthesia.

We used epidural catheter for postoperative pain
management. But postoperative pain of CS can
be easily managed with conventional parenteral or
oral opioid technique without requiring any neuro-
axial technique which has haemodynamic conse-
quences. So the question arises whether we can ac-
tually avoid epidural catheter in such cases when we
combine low dose spinal anaesthesia with bilateral
ilioinguinal-iliohypogastric nerve block. Even in-
sertion of a catheter for CSE or CSA may not be
always possible in “time pressure” situation like ur-
gent CS. It is really difficult for us to answer to this
point based on experience from only two cases.
Study on a large population is needed.

To our knowledge this is the first report of this
block (ilioinguinal-iliohypogastric nerve block with
low dose spinal anaesthesia) for CS in patients with
cardiac disease like PPCM and AS.

Conclusions

Low dose spinal anaesthesia combined with
bilateral ultrasound guided ilioinguinal-iliohypog-
astric nerve blocks can possibly be used for
Caesarean section in critical obstetric cases compli-
cated with cardiac problems. Avoiding epidural
catheter is possible. Application of this technique in
a large population is needed to firmly comment on
this issue.

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