Case Report

Elective cesarean delivery in non-dialyzed parturient with chronic renal failure

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Abstract

Chronic renal failure is rare in pregnancy and often results in significant maternal and neonatal morbidity. When possible, preoperative dialysis is useful to optimize fluid and electrolyte balance. We describe the perioperative management of a parturient who persistently refused dialysis, had an uneventful cesarean delivery under graded epidural anesthesia.

Key words: Anesthesia, cesarean delivery, chronic renal failure, epidural, obstetric

Introduction

Chronic renal failure (CRF) in pregnancy is relatively rare with an incidence of 0.03-0.12% of all pregnancies.[1,2] It is associated with higher maternal and fetal complications such as pre-eclampsia, anemia, chronic hypertension and prematurity.[3] This report describes the anesthetic management of a parturient with CRF secondary to adult polycystic kidney disease (ADPKD) who persistently refused dialysis.

Case Report

A 37-year-old, 34 week parturient (Weight: 60 kg; Height: 165 cm) with singleton pregnancy was scheduled for elective cesarean delivery. She had ADPKD for 15 years duration and was on oral nifedipine 20 mg daily for hypertension. She had undergone uneventful cesarean delivery under general anesthesia 10 years ago. Over the past five years, her kidney function had deteriorated. She was on oral calcitrol, calcium carbonate, ferrous fumarate, oral nifedipine 20 mg daily and on a low protein diet.

A multidisciplinary case conference was held, which included an obstetrician, anesthesiologist, neonatologist and nephrologist to develop a management plan. At 32 weeks of gestation, she was hospitalized to monitor her blood pressure, renal function and fetal wellbeing. Early intervention was planned if she had maternal or fetal complications during her stay. The treatment plan, including anesthetic management, was discussed with the patient. She persistently refused dialysis.

At 34 weeks of gestation, she noted discomfort while breathing. Physical examination revealed mild pallor with a respiratory rate of 20 breaths/min, pulse of 82/min and a blood pressure of 138/74 mmHg. There was no facial puffiness, periorbital edema or bruises of the skin. Systemic examination, including airway and spine examination, was unremarkable. Laboratory investigations done prior to the cesarean delivery are given in Table 1. Abdominal ultrasonogram revealed bilateral cortical and medullary cysts consistent with polycystic kidney disease,

| Lab investigations                  | Results (normal range) |
|-------------------------------------|------------------------|
| Hb (g/L)                            | 92 (115-165)           |
| Serum sodium (mmol/L)               | 138 (135-147)          |
| Serum potassium (mmol/L)            | 4.7 (3.5-5.0)          |
| Platelet count (×10^9/L)            | 179 (150-460)          |
| PT (INR)/APTT sec                   | 0.91/28.6              |
| Blood urea (mmol/L)                 | 18 (3-7)               |
| Serum Creatinine (mcmol/L)          | 706 (44-106)           |
| AST/ALT/ALP                         | 13/20/76               |
| Serum albumin (g/L)                 | 31 (35-50)             |
| 24 hr Urinary-Cr Cl (ml/sec)        | 0.1 (1.5-2.1)          |
singleton intrauterine pregnancy and severe polyhydramnios. The electrocardiogram and a transthoracic echocardiogram revealed no abnormalities.

In the operating room, baseline monitors including pulse oximetry, non-invasive blood pressure, and electrocardiogram were instituted. Using aseptic technique, an epidural catheter was sited at L4-L5 space and its position was confirmed. Adequate surgical blockade was achieved with a total of 15 ml of 2% lidocaine with epinephrine 5 mcg/ml; administered in fractionated doses of 3-5 ml each given over 15 minutes. Fentanyl 100 mcg was also administered through epidural route after the local anesthetic top up. The parturient’s blood pressure was monitored every minute till the delivery of fetus, then every five min till the end of surgery as per our institutional practice. The drop in blood pressure with epidural anesthesia was managed with careful titration of intravenous crystalloids and aliquots of phenylephrine.

A live neonate was delivered weighing 1800 g with Apgar scores of seven and eight at 1 and 5 min, respectively. Intravenous oxytocin was administered by slow infusion. She had an uneventful perioperative course and monitored in high dependence unit. She had an uneventful stay, resumed her routine medications and was discharged on 5th postoperative day. She was advised regular follow up and dialysis with possible renal transplantation in the postoperative period.

## Discussion

CRF in pregnancy poses a great challenge to anesthesiologists. CRF may complicate type 1 diabetes, hypertension, glomerulonephritis, and polycystic kidney disease.[4] Parturients with preexisting ADPKD have higher incidence of maternal complications such as hypertension, edema and preeclampsia when compared to non ADPKD parturients (35 vs. 19%, P < 0.001) with 3% of them progressing to renal failure.[5]

Women have amenorrhea or anovulatory menstrual cycles when their baseline plasma creatinine concentration is above 265 µmol/L and do not normally conceive.[6] Our patient was unusual that she not only conceived spontaneously despite her baseline creatinine of 490 µmol/L and had an uneventful course throughout pregnancy without any clinical symptoms despite a continuous rise in creatinine levels. Parturients with underlying CRF may need dialysis prior to elective cesarean delivery, to optimize volume status and correct electrolyte disturbances. Parturients with CRF, with associated pre-eclampsia, have a worsened prognosis with a successful delivery rate of only 60% versus 92.9% (P = 0.02), an extremely premature delivery rate of 77.8% versus 3.3% (P < 0.001), and lower gestational age (P < 0.001), and birth weight (P < 0.001).[7]

Surprisingly, despite elevated creatinine levels throughout her pregnancy and without any dialysis, our patient delivered a baby at 34 weeks of gestation.

When parturients with underlying CRF, present to elective surgery the goals of management should include: Preservation of renal function, maintenance of fluid balance, avoidance of nephrotoxic drugs and avoidance of drugs that depend on renal elimination.[8]

Care should also be taken to preserve blood flow to fetus and to avoid drugs that cross the placenta. Inhalational anesthetic decreases renal blood flow by decreasing renal perfusion pressure which is further exaggerated by hypovolemia, painful surgical stimuli and positive pressure ventilation.[9]

Coagulation abnormalities, peripheral neuropathy secondary to CRF must be ruled out prior to administration of a regional anesthetic technique.[10] Epidural anesthesia is preferred over spinal anesthesia to achieve stable hemodynamics by titration of fluids and vasopressors.[11] The administration of epidural anesthesia suppresses cortisol release and thereby attenuates catecholamine induced renal vasoconstriction. The use of epidural epinephrine at low doses (75-100 mcg), as used by us, has shown to have predominant beta adrenergic effect, thereby reducing mean arterial pressure.[12]

Predominance of alpha receptors in capacitance vessels causes more vasoconstriction when compared to arterial constriction in a dose-related manner when phenylephrine is administered.[13] The net effect of phenylephrine with intermittent boluses at timely intervals results in an increase in blood pressure, cardiac output and thereby preserves renal blood flow. The choice of hemodynamic monitoring should be individualized. Parturients with renal diseases undergoing high-risk procedures often need invasive hemodynamic monitoring with arterial and central venous catheters.[14] We successfully managed our patient with standard non-invasive monitors though our threshold to place invasive hemodynamic monitoring was low.

To conclude, parturients with chronic renal disease often undergo dialysis prior to elective procedure. Graded epidural anesthesia with non-invasive monitoring along with titrated fluid and vasopressor administration may be considered for the successful outcome when dialysis is not possible or refused by such parturients.

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