

# Safe spinal anesthesia in a woman with chronic renal failure and placenta previa

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**Background:** Chronic renal failure is strongly associated with poor pregnancy outcome. Women dependent on hemodialysis before conception rarely achieve a successful live birth.

**Case presentation:** A 31-year-old multiparous Turkish woman was scheduled for cesarean section under spinal anesthesia at 37 weeks and five days' gestation because of hemorrhage due to secondary placenta previa. Spinal anesthesia with 8 mg of hyperbaric bupivacaine was successfully performed. Invasive blood pressure, central venous pressure, and heart rate were stable during the surgery. The mother returned to regular hemodialysis on the first postoperative day.

**Conclusion:** Pregnancy is uncommon in women with chronic renal failure requiring chronic dialysis. Rates of maternal hypertension, pre-eclampsia, anemia, and infection in the pregnant chronic dialysis patient are high. However, our findings suggest that with careful, close, and effective monitoring preoperatively and intraoperatively, spinal anesthesia can be safely performed for cesarean section in patients undergoing hemodialysis.

**Keywords:** chronic renal failure, pregnancy, spinal anesthesia, hemodialysis, placenta previa

## Introduction

Fertility is reduced in patients with renal disease, so pregnancy in patients with end-stage renal failure is uncommon. However, Confortini et al in 1971 reported the first case of a 35-year-old end-stage renal failure patient on hemodialysis (HD) who achieved a full-term pregnancy.<sup>1</sup>

The major issues to be dealt with in this type of patient are the possible complications of pregnancy, including onset or exacerbation of systemic arterial hypertension which may evolve into pre-eclampsia or even eclampsia, premature delivery, or failure of the fetus to grow. Another important point to define is that of full-term pregnancy in patients on dialysis.<sup>2</sup>

The placenta usually implants in the upper uterine segment. However, in some cases, it implants in the lower uterine segment, either covering the internal cervical os, or lying in close proximity to it. This abnormal implantation into the lower segment, called placenta previa, is an important cause of bleeding in the second half of pregnancy and during labor, and is associated with significant maternal and perinatal morbidity and occasionally mortality.<sup>3</sup>

There are many reports outlining the safe and successful use of peripheral regional blocks in dialysis-dependent patients if there is no platelet dysfunction or coagulation abnormality. In fact, peripheral regional anesthesia techniques have been used

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in patients with chronic renal failure (CRF) for the creation of arteriovenous fistulae. In this paper we share our experience of spinal anesthesia in a pregnant woman with CRF on dialysis and needing an emergency cesarean section due to placenta previa.

## Case report

A 31-year-old woman with seven gravidas, four paras, two abortions, and three live children was referred to us at 37 weeks and five days' gestation. She weighed 68 kg and was 168 cm tall. She had suffered from CRF since the age of 29 years, and had been undergoing hemodialysis three times per week.

The patient had had a medical abortion one year earlier when she was five months' pregnant due to an intrauterine ex-fetus that developed secondary to her renal disease and the patient was recommended not to become pregnant again. Having noticed the current pregnancy too late, the patient was then undergoing four hours of dialysis three times a week, and increased to four hours per day for the previous seven months.

One hour after her last dialysis, she was hospitalized in gynecology services due to vaginal bleeding and cramps. The patient was being monitored for delivery and upon an increase in the amount of vaginal bleeding and detection of placenta previa during ultrasonographic examination, it was decided to perform an emergency cesarean section. Preoperative laboratory values for the patient are summarized in the Table.

In the preoperative preparation room, central venous catheterization was performed under local anesthesia via the right internal jugular vein. Invasive arterial catheterization was performed from the right radial artery (because an arteriovenous fistula was being used for dialysis on the left side). The patient had been taking methyldopa as an antihypertensive during the preoperative period but had severe hypertension at presentation (180/110 mmHg), so nitroglycerin infusion was started. Her activated partial thromboplastin time being normal (Table 1), six hours having elapsed since her last dialysis (ie, the dialysis-dependent antiaggregant effect having receded), and considering the risks of anesthesia, it was decided to use spinal anesthesia in view of its additional antihypertensive effect.

Spinal anesthesia with 8 mg of hyperbaric bupivacaine was successfully performed using a 27-gauge spinal needle at the L3/4 intervertebral space in the sitting position. Spinal anesthesia level having reached the T5 and T6 dermatomes, the operation was started at the third minute. A 2220 g baby

**Table 1** Preoperative, postoperative and discharge laboratory values

	Preoperative*	Postoperative (six hours)	Discharge**
Hemoglobin (g/dL)	8.21	9.08	10.28
Platelet count ( $\times 10^9/L$ )	141	129	172
INR	0.9	0.88	–
Bleeding time (minutes)	4.5	4.0	–
PT (seconds)	27	29	–
aPTT (seconds)	30	27	–
Urea (mmol/L)	27	49	40.2
Creatinine (mg/dL)	2.92	3.06	2.74
Potassium (mEq/L)	4.42	5.02	4.37

**Key:** \*Preoperative values (six hours after HD); \*\*Discharge values (four days postoperatively and six hours post-HD).

**Abbreviations:** HD, hemodialysis; INR, international normalized ratio; PT, prothrombin time; aPTT, activated partial thromboplastin time.

with an Apgar score of 6 in one minute and 8 in five minutes was delivered four minutes after the beginning of surgery. Invasive blood pressure (BP), electrocardiography (ECG), heart rate (HR), and pulse oximetry ( $S_pO_2$ ) were monitored during surgery. Monitoring of central venous pressure (CVP) was useful for fluid management. Invasive BP, CVP, and HR were stable during surgery.

Hypotension, probably related to sympathetic blockage, developed following spinal anesthesia, so the nitroglycerin infusion was terminated without the need for sympathomimetic medication. The cesarean section and subsequent tubal ligation procedure lasted for 50 minutes. Thereafter, the patient was taken to the intensive care unit (ICU) with a BP of 119/71 mmHg, a HR of 83 beats per minute, and a sensory spinal anesthesia level at the T9 and T10 dermatomes. During the operation, the patient was not given any liquids other than 1 U of erythrocyte suspension due to her anemia.

The patient was monitored in collaboration with the nephrology clinic during the postoperative period. She was given an additional 2 U of erythrocyte suspension while she was kept in the ICU. She recovered without any problems, returned to regular hemodialysis on the first postoperative day, and was discharged from the hospital four days after the operation after adjustment of her antihypertensive therapy and on a dialysis program of four-hourly sessions three days a week.

Clinical assessment on the day of discharge revealed no complications of spinal anesthesia, such as headache, nausea, change in BP (in particular, hypotension) or neurological deficit. Meanwhile, the baby was taken for ventilator treatment

in the Neonatal Intensive Care Unit due to respiratory distress syndrome. Having been treated for ABO isoimmunization and neonatal jaundice, the baby was discharged from hospital 32 days after delivery.

## Discussion

Childbearing is an important issue in women with renal disease.<sup>4</sup> Although not common, pregnancy in chronic dialysis patients does occur. In fact, the percentage of successful pregnancies in women on chronic dialysis may be increasing.<sup>5</sup> However, pregnancy has generally been regarded as very risky in these women.<sup>4</sup>

Maternal complications associated with CRF include pre-eclampsia, worsening renal function, preterm delivery, anemia, chronic hypertension, and cesarean delivery.<sup>6</sup> Hypertension is the most common life-threatening problem in these patients.<sup>4</sup>

In preparation for elective surgery, patients with CRF should receive dialysis the day before the operation. This is essential to achieve a volume status as close to normovolemic as possible, to allow the patient to tolerate fluid loads associated with surgery, and to obtain normal electrolyte concentrations. Otherwise, patients have to be managed medically and receive dialysis after the operation.<sup>7</sup> Our patient had to be operated on six hours after her last dialysis, at which time her volume and electrolyte balance could not be fully established.

The preoperative evaluation of the patient with CRF should focus on the comorbidities associated with kidney disease and on the signs and symptoms of uremia, fluid overload, and inadequate dialysis. Laboratory studies should be aimed at assessing electrolyte concentrations, acid-base status, urea and creatinine levels, hematocrit, platelet count, and coagulation.<sup>7</sup> Blood gas values were also monitored in our patient as part of her preoperative laboratory examination. Particular attention was paid to serum bicarbonate levels, which were in the 18–20 mEq/L range.<sup>8</sup>

Electrolytes should not be measured immediately after dialysis due to incomplete equilibration between plasma and intracellular fluids. Potassium levels above 5.5 mEq/L are usually considered a contraindication to elective surgery because tissue trauma and cell death can cause potassium to increase to life-threatening levels. An ECG is usually obtained as well to screen for changes caused by electrolyte abnormalities.<sup>7</sup> No indications of hyperkalemia were observed in our patient's laboratory data or on her ECG.

Platelet dysfunction is not related to a low platelet count, and can be detected only by the bleeding time, measured

as the time to cessation of hemorrhage after a standardized skin incision.<sup>9</sup> However, this test seems to have a limited predictive value for clinical bleeding and is not commonly used. Patients who are receiving adequate dialysis are less likely to have significant platelet dysfunction and their risk of bleeding should not be excessive.<sup>7</sup>

Control of anemia is important because this is a significant cause of left ventricular hypertrophy, heart failure, and angina. Hematocrit should be optimized before surgery. For ambulatory CRF patients, a hemoglobin of 11 to 12 g/dL is considered optimal,<sup>10</sup> and this value is also used as a target before surgery, although this practice is not supported by clinical evidence. Correction of anemia also helps to improve the platelet dysfunction associated with renal failure.<sup>11</sup> Our patient was given 1 U of erythrocyte suspension during the operation and 2 U after the operation due to the presence of anemia (see Table). She was also given erythropoietin, and was discharged from the hospital on the fourth postoperative day with an acceptable hemoglobin value.

The choice of anesthesia should be made on an individual basis. If fluid balance is likely to be a problem, central venous monitoring may be useful, but the need for invasive arterial monitoring should be considered carefully before potentially damaging an artery that may be used later to form an arteriovenous fistula. When positioning patients for surgery, care should be taken to protect shunts or fistulae.<sup>12</sup>

Delayed gastric emptying may increase the risk of aspiration during general anesthesia. There is no absolute contraindication to regional blocks in women with CRF. If anticoagulants have been used during hemodialysis, at least six hours should elapse before siting a regional block. It is wise to confirm that clotting is normal by checking the activated partial thromboplastin time. When performing a block it is essential to use aseptic technique. Presence of any peripheral neuropathy should be documented if regional blocks are to be used.<sup>12</sup>

Intravenous access is usually difficult in patients with CRF, and central venous access is often needed. The veins and arteries of the nondominant upper extremity should be spared from vascular cannulation, because they may be needed for dialysis access in the future. Subclavian vein cannulation should also be avoided because this procedure is frequently complicated by thrombosis, which compromises dialysis access. Therefore, we opted to do central venous cannulation via the internal jugular vein in our patient. We also carried out invasive arterial monitoring via the right radial artery because there was an arteriovenous fistula on the left side for dialysis. During all these procedures, we

were extremely careful to maintain sterile conditions due to the risk of infection in this type of patient.

Intraoperative hemodynamic management of the renal patient is important. There are no definite recommendations guiding the choice of monitoring techniques. The choice of hemodynamic monitoring technique should be based on the history and characteristics of the individual patient and should be directed towards specific hemodynamic goals. Patients with renal diseases undergoing high-risk procedures often need invasive hemodynamic monitoring with arterial and central venous catheters.<sup>7</sup> We considered it appropriate to carry out preoperative arterial and venous monitoring in view of our patient's clinical condition (ie, anemia, dialysis six hours earlier, and severe hypertension, along with normal bleeding tests).

Hypertension in CRF patients is usually volume-dependent and responds to adequate dialysis, but most patients will also require pharmacologic therapy. BP should be optimized before surgery. Current recommendations for long-term CRF management set a BP goal of lower than 130/80 mmHg.<sup>13</sup> Preoperative BP in our patient was high (180/110 mmHg). Nitroglycerin infusion was started at the initiation of invasive arterial monitoring, and the infusion rate was adjusted (0.25–1.0 µg/kg/min) until the target BP (130/80 mmHg) was reached. Nitroglycerin infusion was preferred because of its rapid onset and offset, its cardiac protective effect, its lack of vasodilatory properties, and its low risk to the baby.

## Conclusion

Improvements in dialysis and medical treatment have increased the number of dialysis-dependent CRF patients being considered for surgery, including obstetric procedures. In patients with CRF necessitating dialysis, mortality rates of 4 to 10% have been reported, with morbidity rates approaching 50%.<sup>14</sup> This increased rate of complications is probably due to the low renal reserve of patients with CRF and their reduced ability to respond to the stress, fluid load, and tissue trauma caused by surgery. However, additional morbidity is created by organ dysfunction and the coexisting

diseases frequently encountered in these patients. Pregnancy adds further risks, including pre-eclampsia, polyhydramnios, intrauterine growth retardation, preterm delivery, low birth weight, and the potential for a stillbirth.

Intensive vigilance and prudence is warranted in the management of CRF parturients. We believe that pregnant CRF patients requiring dialysis can be urgently and safely operated on using a careful anesthesia method after a detailed renal and hematological preoperative assessment and rapid but detailed preparation.

## Disclosure

The author report no conflicts of interest in this work.

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