Haemodialysis in Pregnancy

A Case Report

L. LEADER, E. R. STRASBURG, P. BAILLIE, R. D. KEETON

SUMMARY

A successful outcome of haemodialysis in a pregnant patient with chronic glomerulonephritis is reported. After a stable period of 9 years, pregnancy resulted in a definite deterioration of renal function. The importance of establishing biological maturity in preference to gestational maturity is stressed.


Chronic renal disease and pregnancy do not combine well. It is uncertain, however, whether pregnancy affects the long-term course of established renal disease. In addition, the place of haemodialysis in the management of the pregnant patient with chronic renal disease is not clear.

This article describes a patient with stable chronic renal disease successfully treated by dialysis during pregnancy. However, deterioration in maternal status was noted.

CASE REPORT

The patient was a 23-year-old multiparous woman who was referred from the renal clinic on 5 March 1974. Her current anti hypertensive therapy was methyldopa (250 mg twice a day) and chlorothiazide (1 tablet daily). Her history of renal disease began in 1960 at the age of 9 years with Henoch-Schönlein nephritis and 2 years later she developed the nephrotic syndrome. She was initially treated with prednisone (60 mg daily) for 2 months and this was reduced to 5 mg twice a day and continued for 12 months. Renal biopsy a year after this episode showed progressive focal glomerulonephritis with hyaline of some glomeruli. In 1970, when renal function had been stable for 9 years, creatinine clearance was 60 ml/min and serum creatinine 123.756 \( \mu \text{mol/l} \), the patient had a therapeutic abortion at 10 weeks’ gestation.

In 1972 she married and became pregnant. The creatinine clearance at 10 weeks’ gestation was 69 ml/min, serum creatinine was 123.76 \( \mu \text{mol/l} \) and she was normotensive.

By 28 weeks, in the absence of severe hypertension, her creatinine clearance had fallen to 16.1 ml/min, with serum creatinine 318.24 \( \mu \text{mol/l} \), and her blood urea had risen to 15.60 mmol/l. Labour was induced and fetal distress ensued. At caesarean section a 780-g infant was delivered which died of hyaline membrane disease, prematurity and intraventricular haemorrhage. The patient’s renal function improved after delivery, the creatinine clearance increasing to 35.9 ml/min and serum creatinine falling to 159.12 \( \mu \text{mol/l} \). Two weeks later her hypertension was easily controlled on methyldopa.

Two months later, the patient’s renal function was reassessed because she was keen to have a child in spite of the risks involved. Her creatinine clearance at this stage was 36 ml/min, serum creatinine 185.64 \( \mu \text{mol/l} \), and blood urea 14.11 mmol/l.

She attended her first antenatal clinic at 9 weeks’ gestation. Her blood pressure was 105/55 mmHg, urinalysis showed proteinuria and a creatinine clearance of 43.8 ml/min, with a serum creatinine of 167.96 \( \mu \text{mol/l} \). She was seen weekly at the antenatal clinic and her renal function was monitored. She remained normo-tensive. There was, however, no increase in her creatinine clearance, as is usual in pregnancy, and this initially remained stable at 40 ml/min with a serum creatinine of 167.96 \( \mu \text{mol/l} \). At 24 weeks’ gestation her blood pressure rose to 140/90 mmHg and she was admitted to hospital.

Concurrent with the rise in blood pressure, her creatinine clearance fell to 21 ml/min and serum creatinine rose to 309.4 \( \mu \text{mol/l} \). Her blood urea rose to 17.09 mmol/l. Preceding the fall in creatinine clearance, there was an increase in proteinuria from 1.4 g/24 hours to 8.2 g/24 hours. In spite of large doses of methyldopa, clonidine and intravenous hydralazine the patient’s diastolic blood pressure ranged between 90 and 139 mmHg. In view of the outcome of the previous pregnancy and the patient’s determination to see out this pregnancy, it was decided to undertake prophylactic haemodialysis in an attempt to prolong it. An arteriovenous shunt was created and the patient was dialysed on a recirculating single pass dialysis machine with an Ultraflow II dialyser coil for 4 hours daily, 5 days a week.

The patient was heparinized to maintain shunt patency but in spite of this the shunt blocked 4 times. The total period of heparinization was 37 days, the average daily dose being 13,000 units. The amount of heparin was titrated to achieve a clotting time of between 10 and 20 minutes. Careful attention was paid to producing minimal fluctuations of fluid balance. Mean weight change before and after dialysis was 0.5 kg and hypertension was carefully controlled. The patient was given a high protein diet and no attempt was made to maintain the blood urea...
below a given level. She was given ferrous sulphate and folic acid supplements and her haemoglobin was maintained by transfusion. Her serum calcium was assessed regularly. She was given calcium in the form of Titralac 12 tablets per day (each tablet contains 420 µg calcium), which was started after the 13th episode of dialysis. Fetal growth was monitored by biparietal ultrasound cephalometry. At 33 weeks of gestation the patient had some vaginal bleeding associated with backache. No local cause was found and it was thought that this was probably due to accidental haemorrhage. The amount of heparin was reduced. Amniocentesis the day after the bleeding showed a foam score of 1+. As there was no further bleeding and the uterus was not irritable and not tender, it was decided to allow the pregnancy to continue. Two weeks later, at 35 weeks of gestation, the patient's membranes ruptured spontaneously. An elective caesarean section was performed. The baby weighed 1310 g. The paediatric gestational score was 34.6 weeks. The placenta weighed 290 g and had a 3×3-cm area of retroplacental clot.

Postoperatively, the patient required 3 more haemodialyses. Upon discharge on the 11th postoperative day her serum creatinine was 601.12 µmol/l and her blood urea was 27.39 mmol/l. Ten days later the shunt was removed because her blood urea had fallen to 17.59 mmol/l on a Giovanetti diet. She was reassessed 6 months later and her creatinine clearance was 13.3 ml/min; at follow-up 2 years later it was 11 ml/min, with a serum creatinine of 539.24 µmol/l.

**DISCUSSION**

The effects of pregnancy on existing renal disease remain unresolved. Mackay found that 27% of 142 patients with chronic renal disease deteriorated in pregnancy. Kincaid-Smith et al. found that 10 out of 11 pregnant patients whose blood urea exceeded 8.3 mmol/l suffered a deterioration in renal function, and seriously questioned the wisdom of allowing such pregnancies to continue. Progressive loss of renal function is, however, common in many forms of renal disease and this cannot be ascribed to the effects of pregnancy unless the natural course of the disease is known (including a clinical diagnosis supported by histological or radiological findings) and a sufficient period of time has elapsed to establish the natural progression or stability of renal function.

Accordingly, Strauch and Hayslett have suggested that the course of renal disease in pregnancy relates to the natural course of the underlying renal pathology. The course of our patient, who had stable renal function for 9 years and a focal glomerulonephritis which is known to progress slowly or not at all, clearly demonstrates the deleterious effect of pregnancy on renal function. Over 2 pregnancies there was a fall in creatinine clearance from 60 to 11 ml/min. In view of the natural history of focal nephritis and the prolonged period of stable renal function before the patient's second pregnancy, we can confidently state that the loss of renal function in our patient was related to the pregnancy.

Fetal survival would seem to be the main indication to dialyse a pregnant woman, although the procedure has been undertaken for severe pre-eclamptic toxaemia. The very high fetal mortality in earlier studies was largely due to hyaline membrane disease after inappropriately early delivery. Perusal of such reports indicates that a fetal loss of 10 - 20% appears to be directly related to the disease process, i.e. 'placental insufficiency' and accidental haemorrhage. Indeed, early dialysis also resulted in neonatal death from hyaline membrane disease. This was due to adherence to gestational age as an indication for delivery rather than fetal well-being, which is relatively independent of gestational age. This is illustrated by the comparative approach in our case, despite an accidental haemorrhage. It is unlikely that heparin administration ensured or, alternatively, prolonged fetal survival.

The exact indications for dialysis are uncertain. Tenney and Dandrow have suggested that fetal death invariably followed a maternal blood urea level of greater than 21.58 mmol/l for 1 week. This appears to be incorrect. Pepperell et al. suggested that a blood urea greater than 16.6 mmol/l or a creatinine clearance of less than 10 ml/min is an indication for dialysis. Ackrill et al. tried to maintain a blood urea of less than 16.60 mmol/l during dialysis, while Unzelman et al. suggested that a blood urea of less than 12.45 mmol/l should be the aim of haemodialysis. Our management of dialysis was similar to that of Ackrill et al. - frequent short periods of dialysis in an attempt to prevent large fluctuation of fluid balance, but no attempt to control the level of blood urea.

In conclusion it may be stated that the safety of dialysis in pregnancy is established. Ideal patients for dialysis are those in whom a stable renal status has been established by renal biopsy and functional tests over a long period of time. Nevertheless, the ethics of such a decision, resulting in a live child but prolonging pregnancy to an extent which ultimately leads to a deterioration in the condition and early death of the mother, is open to question. When the procedure is undertaken, application of physiological principles rather than slavish adherence to gestational age can increase fetal survival to an acceptable level. On the other hand, our findings of clear maternal deterioration in stable renal disease do suggest that dialysis in pregnancy should be used with great circumspection.

**REFERENCES**