Case Report

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Umbilical and Arcuate Uterine Artery Flow Velocity Measurements during Acute Hemodialysis

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Key Words

Hemodialysis
Pregnancy complications
Doppler

Abstract

Dialysis during pregnancy is a rare event associated with a poor outcome. The acute fluid volume shifts during hemodialysis are suspected to be one of the reasons for the high rate of complications during the procedure. This is the first report of uteroplacental and fetoplacental perfusion assessment during acute hemodialysis in pregnancy. The results of the Doppler measurements suggest that the [maternal-fetal](#) circulation can successfully tolerate acute volume shifts provoked by hemodialysis.

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Introduction

Dialysis in pregnancy is a relatively rare event with a poor outcome. Acute fluid volume shifts during hemodialysis are thought to be dangerous to the fetus and are suspected to be one of the reasons for the high rate of complications during this procedure [1-3]. Recently, we had the opportunity to assess, for the first time, flow velocity waveforms in the umbilical and arcuate arteries during acute hemodialysis in a pregnant woman.

Case Report

A 29-year-old gravida 2, para 0, with known juvenile diabetes, complicated by severe retinopathy, nephropathy and chronic hypertension was in our care since 15 weeks of gestation. At 32.5 weeks gestation she was readmitted because of rapid weight gain and huge and painful vulvar edema. During the next 2 days she developed oli-gourea resulting in pulmonary edema, confirmed by chest x-ray and

blood gases. The blood pressure was well controlled at 150/90 mm Hg. The blood albumin level was 2.3 g/dl, the daily protein excretion 7.2 g and serum creatinine level 2.2 mg/dl. No other metabolic disturbances were noted.

Since intravenous administration of furosemide and human albumin failed to produce sufficient diuresis; acute hemodialysis via a subclavian vein catheter was commenced in order to reduce volume overload. Three consecutive daily sessions were performed, each consisting of 3 h of isolated ultrafiltration followed by 1 h of acetate dialysis. At each session, approximately 3,000 ml of water were removed while no intravenous fluids were added (total 9,000 ml). Maternal

blood pressure was very well maintained during dialysis. Improvement in pulmonary and peripheral edema was observed following 3 days of dialysis. At 33.2 weeks gestation a cesarean section was performed and a healthy 1,660-gram (30th percentile) newborn was delivered. During the dialyses the fetus was continuously monitored by external cardiotocography and remained reactive during the procedure. Uterine contractions were not observed. Umbilical and arcuate artery blood flow velocity waveforms were measured abdominally by an image-directed pulsed-wave Doppler system (Aloka SSD 680, Tokyo, Japan) with a 3.5-MHz transducer. Measurements were per-

formed at the beginning, after 2 h, at the end and 12 h following dialysis. The resistance index, defined as the difference between the peak systolic and the end-diastolic velocity divided by the peak systolic velocity, was calculated. The values of the resistance index remained in the normal range, decreasing slightly from 0.64 to 0.62 in the umbilical artery, and from 0.60 to 0.58 in the arcuate artery.

Discussion

Dialysis in pregnancy is a relatively rare event and therefore the reported experience is limited and based mainly on case reports. Acute fluid volume shifts during hemodialysis are thought to be dangerous for the fetus and associated with a high rate of complications during this procedure [1-3]. In a recent case report and review of the literature [4], it was suggested that the more gradual volume shifts might be one of the theoretical advantages of continuous ambulatory peritoneal dialysis over hemodialysis.

In another pregnant woman managed by hemodialysis, improvement in the uteroplacental and fetoplacental perfusion following each course of hemodialysis was observed, suggesting that impaired flow in these vascular beds might be related to metabolic factors as well [5].

In the present case we report, for the first time, Doppler studies of the uteroplacental and fetoplacental perfusion during acute hemodialysis. This case is unique because dialysis was performed for the purpose of water removal only, without significant metabolic disturbances in the mother. Our results suggest that acute fluid shifts during hemodialysis, at least in the quantities described, does not significantly impair the uteroplacental and fetoplacental perfusion. Fetal distress associated with hemodialysis, frequently reported in the literature [1-3], might be mainly the result of the impaired metabolic and clinical condition of the mother needing dialysis and might only be related to a lesser extent or not at all to the acute fluid shifts caused by the hemodialysis.

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