



Delivery Method in Patients After Liver or Kidney Transplantation

A. Madej^{a,*}, N. Mazanowska^a, M. Szpotańska-Sikorska^a, B. Kociszewska-Najman^a, D. Warzecha^a, F. Dąbrowski^a, Z. Jabiry-Zieniewicz^a, A. Cyganek^a, J. Pazik^b, M. Wielgoś^a, and B. Pietrzak^a

^a1st Department of Obstetrics and Gynecology, Medical University of Warsaw, Poland; and ^bDepartment of Transplantation Medicine and Nephrology, Medical University of Warsaw, Poland

ABSTRACT

Pregnancy following renal or liver transplant is safe for the mother, fetus, and allograft if standard practice guidelines are strictly followed. Cesarean delivery is often required for the safety of the mother and child. The aim of this paper was the evaluation of delivery method in patients after liver (G1) and kidney transplantation (G2) in comparison with the population of healthy pregnant women (G0).

Materials. Retrospective analysis included 51 (G1) and 59 (G2) women who delivered between 2000 and 2016. Control group (G0) consisted of 170 nontransplanted patients, who delivered between 2014 and 2016. The results were compared using nonparametric and parametric tests (Fisher exact test, *t* test). The SAS 9.2 was used for the analysis.

Results. The rate of cesarean delivery was high in all pregnancies following kidney (G1 = 80.4%) or liver transplantation (G2 = 67.8%) compared with control group (G0 = 44.1%; $P < .05$). The most common indication for cesarean delivery in G1 was gestational hypertension/preeclampsia ($n = 18$; 43.9%), threatening intrauterine asphyxia ($n = 12$; 29.3%), and failure to progress ($n = 2$; 4.9%). The most common indications for cesarean delivery in G2 were threatening intrauterine asphyxia ($n = 14$; 35%), failure to progress ($n = 9$; 22.5%), and gestational hypertension/preeclampsia ($n = 2$; 5%).

Conclusion. Cesarean delivery in patients after kidney or liver transplantation is performed mainly for obstetric reasons. The reported incidence of cesarean delivery in pregnancy following transplant is high, reflecting the high degree of clinical caution exercised in these patients.

INFERTILITY is common in women with end-stage liver or kidney disease, and with successful transplantation, recipients have the ability to successfully carry a pregnancy. The first known posttransplant pregnancy occurred in 1958. Dr. Murray's patient gave birth to a child 2 years after kidney transplantation. The donor was a monozygotic twin sister, so there was no need for immunosuppressants. The patient gave birth to a healthy boy weighing 3300 g. Both during and after pregnancy, no deterioration of the transplanted kidney was observed [1]. The first successful pregnancy in a liver graft recipient was reported in 1978. The recipient, who was maintained on prednisone and azathioprine, delivered a healthy boy at 40.5 weeks' gestation weighing 2400 g [2]. Both neonate births were elective cesarean deliveries because of the fear of damage to the transplanted organ during birth [1,2].

Obstetric, perinatal, hepatologic, and nephrologic care has improved since the first registered pregnancy in an organ recipient. However, many questions still remain about how pregnancy following organ transplant affects the mother, child, and allograft. Most pregnancies in organ recipients have successful outcomes for the mother and child. However, an increased risk of complications, including prematurity, low birth weight, hypertension, and cesarean delivery, has been reported. The high incidence of these complications supports the high-risk classification of posttransplant pregnancies. The aim of this paper was the

*Address correspondence to Anna Madej, Starynkiewicza 1/3, 02-015 Warszawa, Poland. Phone: +48 515169761. E-mail: anna.madej@yahoo.com

evaluation of delivery method in patients after liver and kidney transplantation in comparison with the population of healthy pregnant women.

MATERIAL AND METHODS

We retrospectively analyzed the data of 106 women after renal or liver transplantation, who had delivered in the 1st Department of Obstetrics and Gynecology of the Medical University of Warsaw between 2000 and 2016. Some of them delivered twice, increasing the number of cases to 110 pregnancies and deliveries. The study group was divided into 2 groups: patients after renal transplantation (G1) and patients after liver transplantation (G2).

The G1 group consisted of 47 patients, 4 of which delivered twice, giving 51 deliveries. The G2 group comprised 59 patients. We evaluated the data on 110 deliveries and compared them with the control group (CG), which consisted of 170 nontransplanted patients, who delivered between 2014 and 2016, also in the 1st Department of Obstetrics and Gynecology of the Medical University of Warsaw.

The results of the studies were compared with those of nonparametric and parametric tests. (Fisher exact test, *t* test). We used SAS 9.2 to perform the analyses. The level of significance was set at $P < .05$.

RESULTS

Mean age of patients after kidney transplantation and patients after liver transplantation was 29.6 years (range 22–40) and 28.9 years (range 17–40), respectively. Maternal mean age in control group was 26.8 years (range 18–42). The mean BMI of the kidney transplant recipients, liver transplant recipients, and nontransplant patients was 26.9, 26.3, and 25.3, respectively.

Causes of kidney and liver failure are illustrated in [Table 1](#). The rate of cesarean delivery was high in all pregnancies following kidney (G1 = 80.4%, $n = 41$) or liver

transplantation (G2 = 67.8%, $n = 40$) compared with control group (G0 = 44.1%, $n = 75$; $P < .05$).

The most common indications for cesarean delivery among patients after kidney transplantation were gestational hypertension/preeclampsia ($n = 18$; 43.9%) and threatening intrauterine asphyxia ($n = 12$; 29.3%). The most common indication for cesarean delivery among patients after liver transplantation was fetal distress ($n = 14$; 35%). The leading indication for cesarean delivery was fetal distress, whereas the minority were performed due to other indications. The cesarean delivery rate in the control group was 44.1%. Indications for cesarean delivery are demonstrated in [Table 2](#).

Hypertension prevalence among the group of pregnancies after renal or liver transplantation was 77.8% and 35.7%, respectively, while only 4.3% of pregnancies from the control group were complicated by hypertension. Sixteen women (31.4%) in the kidney group and 2 (3.3%) in the liver group were diagnosed with preeclampsia. Only 1 patient in the control group developed preeclampsia (0.6%). In the group of renal transplantation recipients, prevalence of cesarean deliveries was 85.7% in patients with hypertension and 50% in patients without hypertension. In the group of liver transplantation recipients, prevalence of cesarean deliveries was 70% in patients with hypertension and 66.7% in patients without hypertension.

Preterm labor occurred in 71.1% of kidney transplant patients and in 42.8% of liver transplant patients, which differed significantly in comparison with the control group (3.7%). Preterm births among patients after kidney transplantation were related to maternal hypertension. In the group of preterm neonates born to a patient after kidney transplantation, hypertension was diagnosed in 78% of mothers. Sixty-four percent of preterm deliveries among patients after kidney transplantation followed induction of labor. The most common indications for preterm iatrogenic delivery were preeclampsia and worsening hypertension. Over 93% of preterm iatrogenic deliveries were cesarean births.

After delivery, 10 kidney transplant recipients had deterioration in renal function. In 2 cases kidney function was sustained after intensifying immunosuppression. Eight patients needed hemodialysis. Three patients were diagnosed with biopsy-confirmed acute rejection episode within the first year after delivery.

Among liver transplant recipients, only 3 patients were classified into the deterioration organ function group. The first 2 patients with liver failure died in later years. The third patient in this subgroup suffered a failure 6 months after delivery, followed by another liver transplant. The cause of deterioration was the recurrence of underlying primary sclerosing cholangitis. There was no episode of acute transplant rejection during the year after delivery. There were also 2 patients who had an episode of acute transplant rejection during pregnancy.

[Tables 3](#) and [4](#) present the function parameters of the transplanted organ (eg, creatinine levels and transaminase

Table 1. Transplantation Reasons

Kidney Transplantation Reasons ($n = 47$)	
Glomerulonephritis	35
Pyelonephritis	5
Systemic lupus erythematosus	2
Polycystic kidney disease	2
Toxic damage	2
Interstitial nephritis	1
Liver Transplantation Reasons ($n = 59$)	
Autoimmune hepatitis	15
Wilson's disease	12
Primary sclerosing cholangitis	6
Viral cirrhosis	6
Idiopathic liver failure	5
Budd-Chiari syndrome	4
Toxic liver failure	4
Biliary atresia	3
Parasitic hepatitis	2
Chronic hepatitis C	
Chronic hepatitis B	1

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