Feasibility of Autologous Blood Donation in Patients with Placenta Previa

Michael E. Toedt, MD
Baltimore, Maryland

BACKGROUND. Debate continues as to whether autologous blood donation is feasible in patients with placenta previa. A recent study in a university setting concluded that routine autologous donation in patients with placenta previa is not indicated. In our study we assessed the feasibility of autologous blood donation for patients with placenta previa in a community-hospital setting.

METHODS. We performed a chart review over a 5-year period of all patients admitted with placenta previa. A theoretical model was then applied to this data. To be eligible for autologous donation, the patient would need to be asymptomatic and have a hemoglobin level of 11 gm/dL or higher at 32 weeks' gestation.

RESULTS. Fifty-nine patients were admitted with uncomplicated placenta previa, 34% (20) of whom were eligible for autologous donation. We found that 20% (4) of patients who met eligibility criteria for autologous blood donation would have benefitted from predonation, and 10% (2) of patients meeting eligibility criteria might have become anemic at delivery because of the donation.

CONCLUSIONS. Autologous donation is not feasible in most patients with placenta previa. However, the proportion of patients eligible for autologous blood donation in a community-hospital setting is 2.5 times the proportion of eligible donors in a university hospital setting ($P = .003$). Asymptomatic patients with placenta previa diagnosed by 32 weeks, who have a hemoglobin level of 11 gm/dL or above, may be safely offered this option.

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From the Department of Family Practice, Franklin Square Hospital Center. Reprint requests should be addressed to Michael E. Toedt, MD, Department of Family Practice, Franklin Square Hospital Center, 9101 Franklin Square Drive, Suite 205, Baltimore, MD 21237.

Many physicians advocate autologous blood donation for patients preparing to undergo any elective surgery that carries an increased risk for requiring blood transfusion. Patients are frequently concerned about the possible infectious complications associated with blood transfusion, although the actual risk is quite low. It is estimated that the incidence of human immunodeficiency virus transmission in this manner is between 1 in 40,000 and 1 in 225,000.[1] Specific testing for hepatitis C virus has lowered the risk of posttransfusion hepatitis C to approximately 3 in 10,000.[2]

Patients given the diagnosis of placenta previa have been identified as being at increased risk for requiring postpartum blood transfusion.[3,4] The safety of autologous blood donation for both mother and fetus in near-term gestations is well established.[5] However, debate continues on the issue of whether autologous blood donation is feasible in patients with placenta previa.[5,6,7] Autologous donation in this population should be confined to patients without preexisting anemia or active bleeding. Donated packed red blood cells may be stored for 42 days.[8] During pregnancy, it is recommended that no more than 2 units of blood be donated every week. Donations should cease at least 2 weeks before anticipated delivery, to allow time for replacement of red cell mass. It is also suggested that autologous donation not be performed if the mother's hemoglobin or hematocrit levels are lower than 11g/dL or 34%, respectively.[5]

A 1995 study by Dinsmoor and Hogg from the Medical College of Virginia concluded that autologous donation is not feasible for the majority of patients with placenta previa. However, they suggested that a larger proportion of patients cared for at community hospitals might be eligible for autologous donation. We applied the study methods established by Dinsmoor and Hogg to a patient population with the diagnosis of placenta previa at a community hospital. We ascertained eligibility for autologous blood donation and determined whether eligible patients would have benefitted from the availability of autologous units.

METHODS

This study was performed at Franklin Square Hospital Center in suburban Baltimore, Maryland. Franklin Square is a 405-bed community teaching hospital, with 2900 deliveries performed each year. It is the sixth largest hospital in Baltimore and serves a demographically and economically diverse population. We searched the hospital billing records for patients admitted with a diagnosis of placenta previa or suspected placenta previa (antepartum bleeding), between January 1, 1993, and January 1, 1998. We then reviewed the hospital charts of these patients and obtained information on maternal characteristics, the diagnosis of placenta previa, antepartum bleeding episodes, laboratory data, blood donation and transfusion information, and pregnancy outcome. Only those patients

who had placenta previa confirmed by ultrasound after 20 weeks' gestation were included in this study.

Assumptions for this study paralleled those used by Dinsmoor and Hogg.[6] It was assumed that elective delivery would occur at approximately 36 to 37 weeks in most cases of placenta previa. It was also assumed that 2 autologous donations would be performed at 32 and 33 weeks, to be completed before 34 weeks. To be eligible for the theoretical donation at 32 and 33 weeks, we required that the patient must have a confirmed diagnosis of persistent placenta previa, be asymptomatic (not actively bleeding), and have a hemoglobin level of at least 11 g/dL or a hematocrit level of 34% or higher. On the basis of these assumptions, patients were evaluated for their theoretical eligibility for autologous donation. Epi Info, version 6.0,[9] was used for statistical data analysis.

RESULTS

Sixty-one patients were identified as having placenta previa during the 5-year review. One patient had placenta previa complicated by placenta accreta and another had placenta percreta. These patients were not included in the study; however, since these diagnoses were made at the time of delivery, the decision whether to offer autologous donation would not have been affected. An additional 6 patients were lost to follow-up, 2 previous to 32 weeks and 4 after. These patients were included in the analysis as applicable.

The demographics of the study population (n = 59) are shown in Table 1. As expected, the mean age, gravidity, and parity are high. Outcome of all 59 pregnancies complicated by placenta previa are shown in Table 2. Placenta previa had resolved in 6 patients (before 32 weeks in 4 women and after 32 weeks in 2). Most cesarean sections for placenta previa were scheduled procedures on the basis of the known diagnosis of placenta previa (n = 23); most of the remaining patients were delivered by cesarean section because of acute bleeding or spontaneous labor. One patient underwent cesarean section for prolonged premature rupture of membranes with a marginal previa and one for nonreassuring fetal status. In another patient, placenta previa was diagnosed intraoperatively at the time of scheduled repeat cesarean section. The route of delivery is not known for the 6 patients lost to follow-up.

At 32 weeks' gestation, 2 women had been lost to follow-up, and 1 woman had delivered. Patients who were given the diagnosis of placenta previa after 32 weeks' gestation (n = 4, 7%) were considered ineligible for autologous donation because it could not be completed 2 weeks before delivery. The most common reason for exclusion was resolution of placenta previa before 32 weeks (n = 4, 7%). This left 48 patients with known persisting placenta previa at 32 weeks. Fourteen of these patients experienced active bleeding at 32 weeks, leaving 34 asymptomatic patients. Following exclusion for a hemoglobin level less than 11 gm/dL, 20 patients (34%) were deemed theoretically eligible for autologous donation. Of the eligible group, 4 patients (20%) ultimately required blood transfusion at the time of delivery. These patients would have potentially benefitted from autologous blood donation. Two patients (10%) who were eligible for autologous donation delivered at 34 weeks' gestation. These patients, had they donated at the recommended times, could potentially have been made anemic at delivery because of the donation. The difference was not statistically significant ($P = .59$).

TABLE 1

Characteristics of Patients with a Diagnosis of Placenta Previa (N = 59)

Characteristic	no. (SD)
Maternal age, years	30 (5.7)
Gravidity	3.2 (1.5)
Parity	1.2 (1.0)
Nulliparous	15
Gestational age at diagnosis of placenta previa, weeks	23 (6.0)

SD denotes standard deviation.

TABLE 2

Outcome of 59 Pregnancies Complicated by Placenta Previa

Outcome	
	Week (SD)
Gestational age at delivery	37 (2.3)
	n (%)
Lost to follow-up before delivery	6 (10)
Placenta previa resolved	6 (10)
Indications for cesarean section	
Scheduled cesarean section for known previa	23 (39)
Active bleeding with known previa	17 (29)
Spontaneous labor with known previa	4 (7)
Other indications	3 (5)
Intrapartum or postpartum transfusion	14 (24)
≤ 2 units of blood	8 (14)

SD denotes standard deviation.

TABLE 3

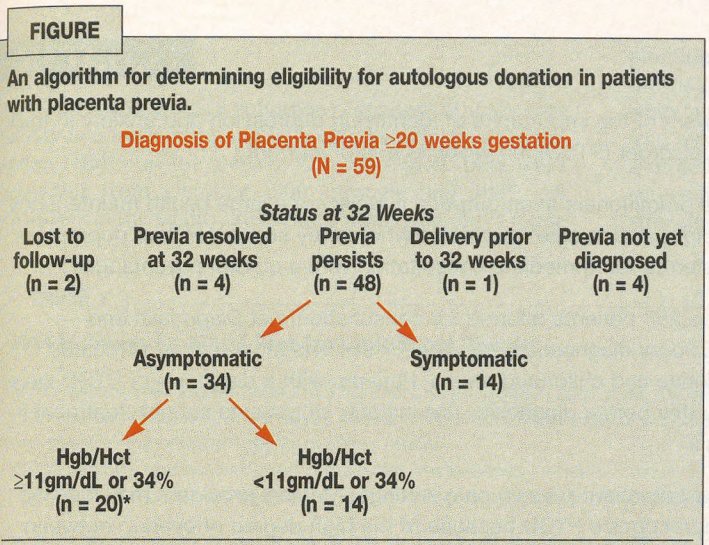
Outcomes of Patients with Placenta Previa Who Are Eligible for Autologous Blood Donation

	Eligible autologous blood donors % (no)	Eligible donors who delivered at 33-34 weeks % (no)	Eligible donors who required transfusion at delivery % (no)
MCV	14 (12 of 88)	33 (4 of 12)	25 (3 of 12)
FSH	34 (20 of 59)	10 (2 of 20)	20 (4 of 20)
Total	22 (32 of 147)	19 (6 of 32)	22 (7 of 32)

MCV denotes data from the study of Dinsmoor and Hogg[6] at the Medical College of Virginia; FSH, data from our study at Franklin Square Hospital.

FIGURE

An algorithm for determining eligibility for autologous donation in patients with placenta previa.



*Eligible for autologous donation.

DISCUSSION

The frequency of intrapartum or postpartum blood transfusions in our population of patients with placenta previa was 24% (14 of 59). In those patients who were eligible for autologous blood donation, 20% (4 of 20) required transfusion at delivery. These figures are comparable with those in previous reports, which range from 17% to 31%.[4,6,7]

Interesting comparisons can be made between the population at our community hospital and the university setting population studied by Dinsmoor and Hogg. We had similar proportions of patients with placenta previa at 32 weeks who were asymptomatic (71% in our study vs 74% in the university setting). Of the asymptomatic patients, we had only a slightly higher proportion of those with favorable hemoglobin or hematocrit levels (59% vs 48%).

We found 20 of 59 patients (34%) to be eligible for autologous blood donation. In the university setting, 44 of 88 patients (50%) with placenta previa were eliminated from eligibility because they had either delivered before 32 weeks or the previa was not yet diagnosed at 32 weeks. We eliminated only 5 of 59 patients (8%) because of those 2 factors (P <.001). Largely because of these eliminations, the previous study found only 12 of 88 patients (14%) to be eligible for autologous blood donation at 32 weeks' gestation. The proportion of eligible patients in our study was 2.5 times the number in that study (P = .003).

Since only approximately 50% of asymptomatic patients at 32 weeks are eligible for autologous donation because of the threat of anemia, we may be able to increase the number of eligible patients by improving nutritional status or access to prenatal care. Some authors have suggested that erythropoietin may optimize maternal red blood cell mass in anemic patients with placenta previa, thus allowing an even greater proportion of patients to become eligible for autologous blood donation.[10]

Our study was limited by the small size of the population and by its design as a retrospective chart review with application of a theoretical model. In addition, the limitations imposed by the theoretical model might not be strictly adhered to on a case-by-case basis. No attempt was made to undertake a cost-benefit analysis, nor did we attempt to stratify patients according to race, socioeconomic status, nutritional status, or prenatal care.

CONCLUSIONS

We found a statistically significant greater proportion of patients with placenta previa cared for in a community-hospital setting would be eligible for autologous donation than those in a university setting. We confirm the small number of all patients with placenta previa that would benefit from this procedure. The available data does not seem to support the routine endorsement of autologous blood donation for all patients with placenta previa. However, in asymptomatic patients with known placenta previa by 32 weeks' gestation who have a hemoglobin level of at least 11 gm/dL and a hemocrit level of at least 34%, autologous donation may be offered safely. The possibility exists that by improving access to prenatal care and good nutrition, we may increase the numbers of eligible patients, and ultimately improve maternal and neonatal outcome.

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