

Pregnancy After Uterine Artery Embolization

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BACKGROUND: Uterine artery embolization is an increasingly popular alternative to hysterectomy and myomectomy as a treatment for uterine leiomyoma. Whether this procedure is safe for women desiring future fertility is controversial.

CASES: A primigravida who had previously undergone uterine artery embolization had premature rupture of membranes at 24 weeks. She had a cesarean delivery at 28 weeks, which was followed by uterine atony requiring hysterectomy. A primigravida who had previously undergone uterine artery embolization delivered appropriately grown dichorionic twins at 36 weeks. An analysis of the 50 published cases of pregnancy after uterine artery embolization revealed the following complications: malpresentation (17%), small for gestational age (7%), premature delivery (28%), cesarean delivery (58%), and postpartum hemorrhage (13%).

CONCLUSION: Women who become pregnant after uterine artery embolization are at risk for malpresentation, preterm birth, cesarean delivery, and postpartum hemorrhage. (*Obstet Gynecol* 2002;100:869–72. © 2002 by The American College of Obstetricians and Gynecologists.)

Uterine artery embolization is an increasingly popular alternative to hysterectomy and myomectomy as a treatment for uterine leiomyomata. It was first reported as an effective primary treatment for symptomatic leiomyomata in 1995.¹ Whether this procedure is safe for women desiring future fertility is controversial. There are very few data regarding the outcomes of pregnancies after embolization. We present two cases of pregnancy in women who had previously undergone uterine artery embolization.

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CASE 1

A 33-year-old primigravida at 24 weeks' gestation experienced premature rupture of membranes. Her antenatal course was complicated by uterine leiomyomata. She had undergone an abdominal myomectomy 6 years prior because of pain and menometrorrhagia. With continued symptoms and additional leiomyomata documented on ultrasound, a uterine artery embolization was performed the following year, 5 years before the described pregnancy. Her symptoms resolved after the embolization.

At the time of the present admission, with no evidence of infection, the patient received two doses of betamethasone (12 mg intramuscularly). Intravenous ampicillin and erythromycin were administered for 48 hours, followed by oral amoxicillin and erythromycin for 7 days. She was managed expectantly as an inpatient for 4 weeks, until she developed evidence of chorioamnionitis at 28 weeks' gestation. Because of her history of myomectomy, as well as a breech presentation, a cesarean delivery was performed. No residual leiomyomata were noted. A 1673-g male fetus was delivered, with Apgar scores of 7 and 8 at 1 and 5 minutes, respectively. The placenta was delivered manually and noted to be slightly adherent. We noted significant bleeding from the endometrial lining, which appeared necrotic and ragged. Uterine atony developed and did not respond to vigorous uterine massage, oxytocin, methylergonovine, prostaglandin F_{2α}, or misoprostol per the rectum. A supracervical hysterectomy was performed. Estimated blood loss was 8000 mL. In treating the disseminated intravascular coagulopathy that developed, the patient was transfused 15 U of fresh frozen plasma, 14 U of packed red blood cells, and 8 U of platelets. Pathology of the uterus and placenta showed residual necrotic placental tissue with acute inflammation extending into the myometrium and acute chorioamnionitis with funisitis. The patient did well postoperatively and was discharged home on postoperative day 8. The infant also did well and was discharged home at 8 weeks of life.

CASE 2

A 42-year-old primigravida with dichorionic twins presented at 26 weeks with preterm labor and cervical dilation of 2 cm. Her antenatal course was complicated by uterine leiomyomata and infertility. Three years before conception she had undergone uterine artery embolization for symptoms of pain and menometrorrhagia.

Table 1. Published Cases of Pregnancy After Uterine Artery Embolization

Case	Reference	Indication for embolization	Pregnancy outcome	Birth weight	Comments
1	Forssman (1982) ³	AVM	Term CD	AGA	Elective CD
2	Chapman (1985) ⁴	GTD/AVM	32-wk, CD	AGA	Previa, PTL, postpartum hemorrhage
3	Poppe (1987) ⁵	AVM	35-wk, SVD	AGA	PTL
4	Tacchi (1988) ⁶	GTD/AVM	30-wk, CD	AGA	Fetal distress, listeriosis
5	Pattinson (1994) ⁷	Cervical pregnancy	Term SVD	AGA	IVF
6	Chow (1995) ⁸	AVM	Term SVD	AGA	Postpartum hemorrhage
7	Gaens (1996) ⁹	AVM	34-wk, delivery	AGA	
8	McIvor (1996) ¹⁰	GTD	"Infant"	NA	
9	McIvor (1996) ¹⁰	GTD	"Infant"	NA	
10	McIvor (1996) ¹⁰	GTD	"Infant"	NA	
11	Stancato-Pasik (1997) ¹¹	Previa/accreta	Term SVD	NA	
12	Stancato-Pasik (1997) ¹¹	Accreta/abruptio placentae	Term SVD	NA	
13	Bradley (1998) ¹²	Leiomyomata	NA	NA	
14	Ravina (2000) ¹³	Leiomyomata	28-wk, SVD	AGA	AIDS, streptococcal septicemia
15	Ravina (2000) ¹³	Leiomyomata	SAB	NA	AMA (41 y old)
16	Ravina (2000) ¹³	Leiomyomata	35-wk, CD	AGA/SGA	Twins, preeclampsia
17	Ravina (2000) ¹³	Leiomyomata	SAB	NA	AMA (40 y old)
18	Ravina (2000) ¹³	Leiomyomata	SAB	NA	AMA (41 y old)
19	Ravina (2000) ¹³	Leiomyomata	SAB	NA	AMA (42 y old)
20	Ravina (2000) ¹³	Leiomyomata	SAB	NA	AMA (42 y old)
21	Ravina (2000) ¹³	Leiomyomata	Term CD	AGA	Elective CD
22	Ravina (2000) ¹³	Leiomyomata	Term SVD	SGA	
23	Ravina (2000) ¹³	Leiomyomata	Term CD	AGA	Elective repeat CD
24	Ravina (2000) ¹³	Leiomyomata	Term CD	AGA	Failed induction at 42 wk
25	Ravina (2000) ¹³	Leiomyomata	Term SVD	AGA	
26	Vashisht (2001) ¹⁴	Leiomyomata	Term CD	AGA	
27	Ciraru-Vigneron (2001) ¹⁵	Leiomyomata	Term SVD	NA	
28	Ciraru-Vigneron (2001) ¹⁵	Leiomyomata	Term SVD	NA	
29	Ciraru-Vigneron (2001) ¹⁵	Leiomyomata	Term CD	NA	Elective CD
30	Ciraru-Vigneron (2001) ¹⁵	Leiomyomata	SAB	NA	
31	Ciraru-Vigneron (2001) ¹⁵	Leiomyomata	TAB	NA	
32	McLucas (2001) ¹⁶	Leiomyomata	Term SVD	AGA	
33	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	CPD
34	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	Breech, preeclampsia
35	McLucas (2001) ¹⁶	Leiomyomata	Term SVD	AGA	
36	McLucas (2001) ¹⁶	Leiomyomata	Term SVD	AGA	
37	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	CPD
38	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	Breech
39	McLucas (2001) ¹⁶	Leiomyomata	32-wk, CD	AGA	Previa, abruption
40	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	Breech
41	McLucas (2001) ¹⁶	Leiomyomata	Term CD	AGA	Prior myomectomy
42	McLucas (2001) ¹⁶	Leiomyomata	SAB	NA	
43	McLucas (2001) ¹⁶	Leiomyomata	SAB	NA	
44	McLucas (2001) ¹⁶	Leiomyomata	SAB	NA	
45	McLucas (2001) ¹⁶	Leiomyomata	SAB	NA	
46	McLucas (2001) ¹⁶	Leiomyomata	SAB	NA	SAB at 16 wk
47	McLucas (2001) ¹⁶	Leiomyomata	NA	NA	
48	McLucas (2001) ¹⁶	Leiomyomata	NA	NA	
49	Goldberg (2002) (current case)	Leiomyomata	28-wk, CD	AGA	24-wk PPROM, breech, prior myomectomy, hysterectomy for uterine atony
50	Goldberg (2002) (current case)	Leiomyomata	36-wk, CD	AGA/AGA	AMA (42 y old), IVF, prior myomectomy, twins, PTL, breech/vertex presentation

AVM = uterine arteriovenous malformation; CD = cesarean delivery; AGA = adequate for gestational age; GTD = gestational trophoblastic disease; PTL = preterm labor; SVD = spontaneous vaginal delivery; IVF = in vitro fertilization; NA = not available; AIDS = acquired immunodeficiency syndrome; SAB = spontaneous abortion; AMA = advanced maternal age (>35 y); SGA = small for gestational age; TAB = therapeutic abortion; CPD = cephalopelvic disproportion; PPROM = preterm premature rupture of membranes.

Table 2. Pregnancy Complication Rates After Uterine Artery Embolization

	Spontaneous abortion rate	Postpartum hemorrhage rate	Premature delivery rate	Cesarean delivery rate	Smallness for gestational age rate	Malpresentation rate
Pregnancy after UAE	22% (11/49)	13% (4/31)	28% (9/23)	58% (18/31)	7% (2/29)	17% (5/29)
Pregnancy after UAE for leiomyomata	32% (11/34)	9% (2/23)	22% (5/23)	65% (15/23)	9% (2/22)	22% (5/23)
Pregnancy in the general population	10–15%	4–6%	5–10%	22%	10%	5%

UAE = uterine artery embolization.

Later that same year she underwent a myomectomy secondary to persistent symptomatic leiomyomata.

The patient then underwent in vitro fertilization, which resulted in the dichorionic twin gestation. She was admitted to the hospital for magnesium sulfate tocolysis and a course of betamethasone. After successful tocolysis, she was placed on prolonged bedrest. At 36 weeks labor began and an uncomplicated cesarean delivery was performed for breech/vertex presentation. Her twins were appropriately grown at 2359 g and 2469 g. The patient had an uncomplicated recovery, and she and the twins were discharged from the hospital on postoperative day 4.

COMMENT

Uterine artery embolization has been shown to be an effective treatment for symptomatic uterine leiomyomata, although no long-term studies have been published. Spies² reported improvement in heavy bleeding in 90% (95% confidence interval [CI] 86%, 95%) and bulk symptoms in 91% (95% CI 86%, 95%) at 1 year. Outcomes data regarding women who desire future fertility are less clear and very limited.

In our case 1, because of contributing factors, such as chorioamnionitis, prior myomectomy, and nonvisualized residual leiomyomata, neither the premature rupture of membranes nor the uterine atony requiring hysterectomy can be definitively attributed to the prior uterine artery embolization. Nonetheless, it is important to be aware of the possible relationship between these complications and prior uterine artery embolization because of the increasing number of women desiring future fertility who are electing to undergo this therapy. Theoretically, devascularization of the myometrium resulting from the embolization procedure could affect its ability to successfully contract following delivery.

Our case 2 is the second reported twin gestation after uterine artery embolization. Although she experienced preterm labor, the patient did not ultimately deliver until 36 weeks' gestation.

Table 1 summarizes all published cases of pregnancies after uterine artery embolization.^{3–16} We used the MeSH terms “uterine artery embolization” and “embolization.” All articles were checked also for related references. A compilation and analysis of the 48 previously published cases, plus our two cases, shows a 22% (11 of 49) rate of spontaneous abortion, a 17% (five of 29) rate of malpresentation, a 7% (two of 29) rate of small for gestational age infants, a 28% (nine of 32) rate of premature delivery, a 58% (18 of 31) cesarean delivery rate, and a 13% (four of 31) rate of postpartum hemorrhage. If the analysis is limited to only women whose indication for embolization was symptomatic leiomyomata (eliminating those with procedures performed for uterine arteriovenous malformation, gestational trophoblastic disease, cervical pregnancy, placenta previa, placenta accreta, or abruptio placentae), there is a 32% (11 of 34) rate of spontaneous abortion, a 22% (five of 23) rate of malpresentation, a 9% (two of 22) rate of small for gestational age infants, a 22% (five of 23) rate of premature delivery, a 65% (15 of 23) cesarean delivery rate, and a 9% (two of 23) rate of postpartum hemorrhage. Reported rates in the general population for these events are 10–15% for spontaneous abortion, 5% for malpresentation, 10% for smallness for gestational age, 5–10% for premature delivery, 22% for cesarean delivery, and 4–6% for postpartum hemorrhage.^{17,18} Table 2 compares these three groups. In interpreting these rates, it should be taken into consideration that the cesarean delivery rate was affected by elective cases as well as two patients whose prior myomectomies necessitated operative delivery. The increased rate for malpresentations was possibly influ-

enced by the presence of residual leiomyomata. Additionally, information was not complete for each published pregnancy. The limited number of pregnancies after uterine artery embolization reported in the literature may reflect a reporting bias. Because many women have already undergone this procedure, it would seem logical that many other unreported conceptions have occurred.

Before uterine artery embolization can be regarded as a safe procedure for women desiring future fertility, additional studies must be performed. Based on the few available data, women becoming pregnant after uterine artery embolization may be at significantly increased risk for postpartum hemorrhage, preterm delivery, cesarean delivery, and malpresentation.

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