Contraception 99 (2019) 285–287

Contents lists available at ScienceDirect

Contraception

journal homepage: www.elsevier.com/locate/con

Original research article

Pregnancy outcomes after removal of osmotic dilators in patients who presented for second-trimester abortion☆

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ARTICLE INFO

Article history:
Received 27 March 2018
Received in revised form 20 September 2018
Accepted 25 September 2018

Keywords:
Osmotic dilators
Laminaria
Abortion
Termination

ABSTRACT

Objective: The objective was to report pregnancy outcomes and potentially related complications among 13 patients who had osmotic dilators placed for second-trimester dilation and evacuation (D&E) followed by subsequent removal with the intention to continue their pregnancies.
Study design: We reviewed billing and scheduling data between 2005 and 2017 to identify the total number of women seen for D&E and to identify the individuals who had dilators placed without a subsequent scheduled dilation and evacuation. We then performed chart reviews to determine pregnancy outcomes.
Results: Between 2005 and 2017, we treated 2532 patients who presented for second-trimester abortions by D&E and received osmotic dilators for cervical preparation. Twenty (0.8%) of these women had cervical dilators removed with the intention of continuing their pregnancies. We could obtain outcome data for 13 of these pregnancies; one of these women ultimately elected to have an abortion. Eight of the remaining 12 women (66%) experienced complications which included premature preterm rupture of membranes, preterm delivery, maternal infection and hemorrhage. Six (50%) pregnancies ended in spontaneous abortion or fetal or neonatal death.
Conclusion: Continuation of pregnancy after placement and removal of osmotic dilators may increase the risk of adverse pregnancy outcomes.
Implications: Of the women who had outcome data available, 50% who had cervical dilators removed experienced spontaneous abortion or fetal or neonatal death. Conservatively assuming that all women lost to follow-up had healthy pregnancies, 30% of women experienced fetal or neonatal death and 40% had an adverse pregnancy outcome.

1. Introduction

Annually, over 100,000 second-trimester abortions are performed in the United States [1]. Dilation and evacuation (D&E), the main second-trimester abortion technique, typically include cervical preparation using osmotic dilators up to 24 h prior to the procedure to decrease surgical risks and complications [2]. Examples of osmotic dilators include laminaria, a dried and compressed seaweed stalk, or Dilapan-S® (MEDICEM, Czech Republic) a polyacrylate-based hydroscopic cervical dilator. In rare cases, patients request dilator removal in order to continue the pregnancy. Providers may counsel patients, based on existing literature and medical opinion, that dilator removal may increase the risks of pregnancy complications such as infection, preterm labor or preterm premature rupture of membranes (PPROM); however, limited data exist to support these claims.

Three case series have reported the outcomes of continued pregnancy after cervical osmotic dilator placement, specifically laminaria, with subsequent removal. Van Lee et al. [3] described outcomes for two women who had osmotic dilators removed at 22 weeks and subsequently had uncomplicated term deliveries of healthy newborns. In 1991, Schneider et al. [4] reported a case series of 17 patients who decided to continue their pregnancies after dilator removal, of which 14 (82%) went on to have term deliveries, 1 had a spontaneous abortion at 10 weeks' gestation, and 2 (12%) had late preterm births [5]. That case series included patients who had received dilators in the first or second trimesters, had received few osmotic dilators (one before early abortions and two or three before later cases) and did not specify gestational age in describing pregnancy outcomes. In 2009, Seidoff et al. [6] described four women at 12 to 18 weeks' gestation who had between 3 and 11 dilators removed. Although two women had uncomplicated deliveries [6], the other two developed chorioamnionitis and had subsequent preterm births at 22 and 26 weeks' gestation, the former resulting in neonatal death.

The limitations of these data limit the clarity of the impact of osmotic dilator removal on pregnancy outcomes. We report the pregnancy

☆ The authors have no financial disclosures.

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https://doi.org/10.1016/j.contraception.2018.09.007
0010-7824/

complications and outcomes in 13 cases that underwent osmotic dilator removal in the second trimester.

2. Study design

This case series arises from a 2005 to 2017 chart review approved by the Institutional Review Board at the University of Maryland School of Medicine. The research team queried billing data and archived schedules to determine the total number of women seen for D&E, and the subset of patients who had osmotic dilators placed and subsequently did not undergo their scheduled D&E procedure. We abstracted the charts for demographic information as well as information relating to pregnancy outcome. In the cases of live births, we ascertained infant outcomes from review of the maternal and associated infant charts from the time of delivery through the end of the baby's hospital stay.

At this clinical site, a trained nurse along with a nurse practitioner or physician provides options counseling for all patients presenting for abortion. D&E patients receive counseling regarding procedure risks and that the cervical dilator placement begins the termination process. All patients provide written informed consent for placement of cervical dilators and D&E.

As part of usual care, providers perform an abdominal ultrasound to measure the biparietal diameter and calculate gestational age using the Hadlock scale. Approximately 18 to 24 h prior to the scheduled D&E, providers insert cervical osmotic dilators without prior mechanical dilation or cervical preparation. Clinicians counsel any patient who requests osmotic dilator removal about their pregnancy options and that removal would result in an increased risk of adverse maternal and fetal outcomes compared to women who had never had dilators placed. Providers prescribe doxycycline 100 mg twice daily starting the night of dilator insertion; patients who had dilators removed were instructed to discontinue the antibiotic.

3. Results

Of 2532 patients who had osmotic dilator placement during the observation period, 20 (0.8%) had dilator removal prior to the D&E procedure with the intent to continue the pregnancy. We had follow-up data for 13 women. In all but one of these pregnancies, clinicians removed the dilators successfully. In the remaining patient, the clinician could not remove one of the dilators, which was noted via transvaginal ultrasound to be in the lower uterine segment.

The characteristics and outcomes of the 13 women who had the dilators removed and outcome data available are presented in Table 1. Most of these women received laminaria exclusively; two who had eight or more laminaria also received one or two Dilapan-S dilators. One woman changed her mind again and opted to have a D&E 1 week after dilator removal; the providers placed a new set of osmotic dilators and the procedure was performed the following day. Of the remaining 12 pregnancies, 6 (50%) ultimately delivered after 24 weeks, 2 (17%) delivered between 22 and 23 weeks, and 4 (33%) delivered before 22 weeks. The median time between removal of osmotic dilators and adverse outcome was 3 days (range 1–35 days).

The most common complication experienced by women who had dilators removed was preterm PPROM, which occurred in five pregnancies (38%). Two women (Table 1: cases 4 and 5) had PPROM within 48 h of dilator removal. Both of these women experienced PPROM before 20 weeks and chose to terminate their pregnancies, one by D&E and the other by labor induction. While undergoing induction, the woman with the retained dilator (Table 1: case 5) developed chorioamnionitis requiring intravenous antibiotics and a 4-day hospital admission. The retained dilator was ultimately delivered with the fetus. Two additional women (Table 1: cases 6 and 7) experienced PPROM 3 to 4 weeks after dilator removal. Case 7 had a spontaneous vaginal delivery within 24 h of PPROM of a nonviable fetus at 23 weeks 0 day. Case 6 had rupture of membranes at 22 weeks 3 days. At that time, she was admitted to the hospital, underwent a course of latency antibiotics and received betamethasone for fetal lung maturity at 23 weeks 5 days per hospital protocol. She ultimately went into spontaneous preterm labor at 23 weeks 6 days and delivered a live neonate. The infant subsequently died at age 4 months.

One woman (Table 1: Case 2) had a spontaneous abortion 1 day after osmotic dilator removal. She presented to the hospital complaining of heavy vaginal bleeding and abdominal pain and subsequently delivered a nonviable fetus. She required a transfusion of 2 U of packed red blood cells due to hemorrhage.

Table 1
Characteristics, complications and pregnancy outcomes after removal of cervical dilators in women initially planning second-trimester abortion

Case	Age	Parity	Prior preterm birth	Gestational age at time of osmotic dilator placement	Total osmotic dilators placed	Complications	Mode of delivery	Pregnancy outcome	Gestational age at time of outcome	Days to outcome from osmotic dilator removal
Elective termination after osmotic dilator removal										
1	20	3	1	16w4d	LAM 5	None	D&E	Elective AB	16w5d	1
Fetal/infant death after osmotic dilator removal										
2	20	1	0	16w3d	LAM 5	Hemorrhage	SAB	SAB	16w4d	1
3	24	1	0	16w5d	LAM 10	Chorioamnionitis	D&E	Abortion	18w5d	14
4	22	0	0	18w4d	LAM 8, DIL 2	PPROM	D&E	Abortion	19w0d	3
5[b]	27	2	0	18w6d	LAM 11	PPROM, chorioamnionitis	IOL	Abortion	19w1d	2
6[a]	25	2	2	18w6d	LAM 12, DIL 1	PPROM, PTL	SVD	Neonatal death	23w6d	35
7	35	0	0	19w6d	LAM 10	PPROM, PTL	SVD	Neonatal death	23w0d	22
Living child										
8	26	2	0	15w2d	LAM 7	None	CD	Live birth	38w0d	159
9	24	2	0	15w5d	LAM 6	None	SVD	Live birth	41w0d	177
10	24	1	1	16w3d	LAM 10	None	SVD	Live birth	38w2d	153
11	22	1	0	17w1d	LAM 10	PTL	SVD	Live birth	36w0d	132
12	31	2	0	17w4d	LAM 10	None	CD	Live birth	39w3d	153
13	24	2	0	18w4d	LAM 14	PPROM, PTL	CD	Live birth	33w3d	104

LAM, laminaria; DIL, hydroscopic cervical dilator (Dilapan-S); PTL, preterm labor; SVD, spontaneous vaginal delivery; IOL, induction of labor; SAB, spontaneous abortion; CD, cesarean delivery.

[a] Infant died at age 4 months.

[b] Patient with one retained dilator after removal.

4. Discussion

Removal of cervical osmotic dilators after insertion for planned termination of pregnancy is a rare occurrence. We found that among women who had osmotic dilators removed between 15 and 20 weeks' gestation, about one quarter delivered at term and half had live infants that were discharged from the hospital. Overall, these women experienced a range of adverse outcomes including preterm delivery, maternal infection and spontaneous abortion with hemorrhage. Although most serious adverse outcomes happened within 3 days of removal of dilators, some patients experienced rupture of membranes and preterm labor several weeks after removal. This case series provides the most robust information to date regarding outcomes of pregnancies after removal of osmotic dilators in second-trimester patients.

Although van Lee and Darney [3] and Scheider et al. [4] previously reported favorable outcomes after laminaria removal, our findings are more similar to those reported by Siedhoff et al. [6], in which half of pregnancies resulted in neonatal demise. All 3 previous case series were small in numbers, including only 2, 14 and 4 second-trimester patients, respectively [3,4,6], making meaningful comparisons between our results and previous findings challenging, especially for the larger series by Scheider et al. [4] in which women had received relatively few dilators.

Our case series has some notable limitations. First, we did not have pregnancy outcome data for one third of the women who underwent osmotic dilator removal, which may bias the results. However, even if all women who were lost to follow-up had term, healthy deliveries, this still would result in 30% of women experiencing fetal or neonatal death and 40% experiencing an adverse pregnancy outcome such as fetal or neonatal demise, PPROM or chorioamnionitis prior to 20 weeks' gestation. Given the relatively small number of cases, we could not analyze the relation of specific variables such as length of time of retention of dilators, type of dilators or gestational age at placement to pregnancy outcomes. It was also not possible to control for other confounding factors that may increase the risk of adverse pregnancy outcomes such as history of preterm birth, medical comorbidities or tobacco use. Most women received laminaria exclusively; as such, these findings may not be applicable to women who are treated only with Dilapan-S. Lastly, the number of dilators placed in women in this series was higher than what is reported in other studies, which may have influenced the risk of adverse outcome with continuation of pregnancy [2,7].

Our findings suggest that removal of cervical dilators results in a risk of adverse pregnancy outcomes higher than the baseline population risk [5]. These risks include not only fetal and neonatal demise but also maternal complications and preterm birth, both of which can have long-term health consequences for the mother and child as well as incurring significant health care costs. Counseling for those women who desire cervical osmotic dilator removal should include information about increased pregnancy risks.

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