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GENERAL GYNECOLOGY

Evaluation of outcomes after transabdominal cervicoisthmic cerclage

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Abstract
Purpose To evaluate maternal and neonatal outcomes after transabdominal cerclage.
Methods Retrospective analysis of 15 patients receiving transabdominal cerclage. Using the patient's prior pregnancy as her own control, we assessed the effect of this procedure on gestational age and neonatal survival.
Results All patients had experienced a prior pregnancy loss. Twelve out of the 15 patients (80%) had at least one prior failed vaginal cerclage. The median gestational age at surgery was 14 (range 12–16) weeks. There was one case of surgical site infection. After cerclage, the proportion of women delivered beyond 32 weeks was significantly higher [11/15 (73.3%) vs. 1/15 (6.7%), $P = 0.0016$], as was neonatal survival [12/15 (80%) vs. 1/15 (6.7%), $P = 0.0009$].
Conclusions While transabdominal cerclage is a major surgical procedure, subsequent pregnancy outcomes were improved.

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Introduction

Cervical incompetence is an infrequent but potentially serious impediment to a successful pregnancy. Felt to be due to an inherent or acquired mechanical weakness of the cervix, dilation occurs without overt contractions, leading to pregnancy loss(es) in the second and third trimester [1].

Incompetent cervix is a historical diagnosis, and treatment frequently consists of placing a cerclage in subsequent pregnancies. Ideal candidates for surgery remain a matter of contention [2]. A major evolution in our understanding of the cervix occurred when endovaginal ultrasound was performed in a large observational study of pregnant women at 22–24-week gestation. While historically felt to be an "all or nothing" categorical variable, a woman's risk for preterm birth was progressive and continuously increased with shorter cervical measurements [3].

Traditional transvaginal cerclage placement is not without risks, and pregnancy loss can recur. Morbidities associated with cerclage include an increased relative risk of maternal infection, tocolytic use, and cesarean delivery [4]. An incompetent cervix can also be treated with a cerclage placed at the cervicoisthmic junction via a transabdominal incision. Termed an "abdominal cerclage", this reinforcement appears to be the most physiologically important, but also requires a laporotomy and a subsequent cesarean section for delivery [5].

As the morbidities are formidable, the abdominal cerclage is typically reserved for one of two groups. The first group is women who have suffered a recurrence despite a transvaginal cerclage. The second group has a congenitally

or surgically inadequate cervix to allow for the vaginal technique. These indications make the procedure relatively rare, and published data on outcomes is limited [1, 5, 6].

Our aim was to summarize maternal and neonatal outcomes with abdominal cerclage and assess the effect of the procedure by using the patient's prior pregnancy as her own control.

Materials and methods

This was a retrospective chart review. Appropriate Institutional Review Board approval was obtained to review the maternal and neonatal records. In our population, the abdominal cerclage was performed at one of two institutions in Oklahoma City, OK, USA. Billing for both institutions goes to a central location which has computerized records dating to 2001. The time frame of our study went back to January 2001 and extended to October 2008. A database search using the current procedural terminology (CPT®) code for abdominal cerclage in pregnancy (59325) revealed 19 patients. Four patients delivered elsewhere and both obstetrical neonatal records were unavailable for review. Subsequent attempts to contact the patients were also unsuccessful. The remaining 15 patients had adequate records and were included in the review and analysis.

All patients carried a diagnosis of incompetent cervix. The diagnosis required a prior loss at 16–24 weeks, and a history of painless progressive dilation of the cervix. Patients were not offered an abdominal cerclage if other potential mid-trimester causes of pregnancy loss were identified. These included genetic or structural fetal abnormalities, uterine anomalies, placental abruption, and/or chorioamnionitis. All patients required documentation of either a failed vaginal cerclage or an amputated cervix. A failed vaginal cerclage was defined as a cerclage that either did not prolong the gestational age at delivery or result in a viable neonate. An amputated cervix was defined as one that on digital cervical exam was flush with the vaginal vault.

All 15 patients had surgeries by one of the two authors (EK, JS). The technique followed has previously been described [1]. An ultrasound was performed to verify dates and viability. Patients are typically offered first trimester screening for aneuploidy, or diagnostic testing if there is a standard obstetrical indication, such as advanced maternal age. Surgery is scheduled shortly after completion of the first trimester. All patients were placed under general endotracheal anesthesia and preoperative antibiotics are given. Entry is made into the abdominal cavity by midline or Pfannensteil incision at the discretion of the surgeon. A bladder flap is created from the visceral peritoneum and pushed below the palpable cervicoisthmic junction. The uterus is then gently lifted out of the pelvis and an avascular space is created with lateral traction of the uterine vessels. A 40-cm long, 5-mm wide, double needle Mersilene tape (Ethicon Piscataway, NJ, USA) is used. Figure 1 demonstrates the anatomical landmarks and proper placement when the tape is passed on both sides through the avascular plane and tied posteriorly. Patients receive routine post-laporotomy care and 3 days of indomethacin. They are discharged home when ambulating, voiding, and tolerating oral feeds. Recommendations regarding bed rest and return to work were at the discretion of the physician, and this information was not available for review.

Data collected by chart review included patient's age, race, gravidity, and parity. Past obstetrical history was categorized into deliveries ≥32, 20–32, <20 weeks and elective terminations. We determined the number of prior failed vaginal cerclage(s), as well as any surviving neonates and neonatal deaths. A neonatal death was one that occurred within the first 28 days of life. Operative data included the following: estimated gestational age at surgery, reported blood loss in cc's, post-operative hospital stay in days, and the presence of any surgical site infections. Outcome data was delivery at ≥32, 20–32, <20 weeks and whether the pregnancy resulted in a surviving neonate.

We then selected the prior pregnancy as the patient's own control and ensured that none were first trimester miscarriages (<12 weeks). A McNemar Chi square was used to compare the likelihood of delivery ≥32 weeks and neonatal survival before and after the abdominal cerclage. A P value of <0.05 was considered statistically significant.

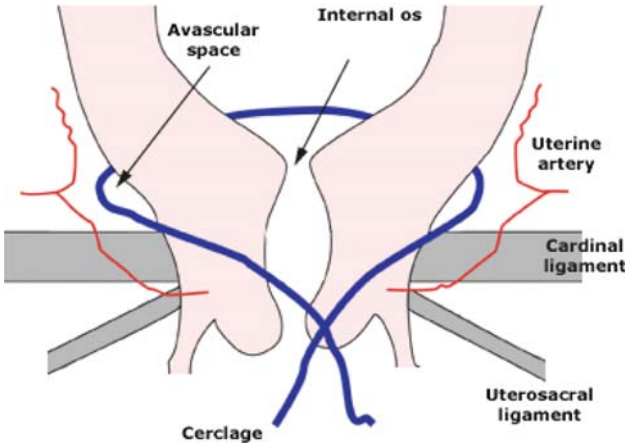

Fig. 1 Transabdominal cerclage placement. Reproduced with permission from: Norwitz, ER. Transabdominal cervical cerclage. UpToDate©, Basow, DS (Ed), UpToDate, Waltham, MA, 2009, UpToDate, Inc. www.uptodate.com

Table 1 Characteristics of 15 patients selected for transabdominal cervicoisthmic cerclage

	n (%)
Maternal age	
21–25	6 (40)
26–30	5 (33)
≥31	4 (27)
Race/ethnicity	
White	10 (67)
Black	3 (20)
Hispanic	2 (13)
Gravidity	
2	3 (20)
3	3 (20)
4	5 (33)
≥5[a]	4 (27)
Duration of pregnancy for all previous deliveries[b]	
<20 weeks	30 (55)
20–32 weeks	16 (29)
32 weeks	9 (16)

[a] Includes one twin pregnancy

[b] Two elective abortions were excluded from analysis of previous pregnancies

Results

Table 1 shows historical data for our study population. The obstetrical history of the 15 patients showed a total of 55 previous pregnancies (excluding two elective terminations), resulting in 11 surviving infants among 5 patients. Twelve patients had a prior failed vaginal cerclage. Ten out of 12 had one failed cerclage and pregnancy loss, and 2/12 patients had two failed cerclages (and pregnancy losses) apiece. The remaining three had an amputated cervix that made vaginal placement unfeasible. The amputated cervix in all cases was a result of treatment for cervical dysplasia. Of the three patients with an amputated cervix, one had a surviving neonate delivered after 32 weeks in the preceding pregnancy.

All past failed vaginal cerclages were prophylactic in nature, and had been performed by skilled personnel via the McDonald technique. Additionally, all past failed cerclages had received comparable perioperative care with prophylactic antibiotics, discharge instructions and follow-up.

The median gestational age at surgery was 14 weeks (12–16 weeks). One patient had a surgical site infection that was treated with opening and packing of the wound and intravenous antibiotics. Median blood loss associated with abdominal cerclage was 200 cc's (range 50–500).

Table 2 Pregnancy outcomes of 15 patients receiving transabdominal cervicoisthmic cerclage compared to outcomes of the preceding pregnancy

Prior pregnancy without abdominal cerclage	Pregnancy with abdominal cerclage		
Gestational age at delivery	≤32 weeks	>32 weeks	Total
≤32 weeks	4	10	14
>32 weeks	0	1	1
Total	4	11	15
			$P = 0.0016$*
Neonatal survival	No	Yes	Total
No	3	11	14
Yes	0	1	1
Total	3	12	15
			$P = 0.0009$*

* McNemar chi-square test

There were no cases involving laceration of the uterine arteries. Median post-operative hospitalization stay was 3 days (range 2–6), and overall there were no major surgical or anesthetic complications.

Table 2 compares pregnancy outcomes with and without abdominal cerclage. In the 15 pregnancy pairs, the abdominal cerclage was effective in changing pregnancy outcomes in the direction of increased gestational age at delivery ($P = 0.0016$) and improved neonatal survival ($P = 0.0009$). Ten (71.4%) of the 14 women with a prior delivery before 32 weeks delivered after 32 weeks following the abdominal cerclage. Eleven (78.6%) of the 14 women who did not have a surviving neonatal in the preceding pregnancy had a surviving neonate after the abdominal cerclage. Overall, neonatal survival increased from 7% (95% CI 0.1–32.0) in the previous pregnancy to 80% (95% CI 51.9–95.7) after abdominal cerclage. As those with an amputated cervix may be expected to have different outcomes, we repeated the analyses after removing these three patients. The conclusions regarding the favorable direction of change following abdominal cerclage did not differ (0% surviving before abdominal cerclage compared to 83% surviving after abdominal cerclage; 0% delivered >32 weeks before abdominal cerclage compared to 75% delivered >32 weeks after abdominal cerclage).

Discussion

An incompetent cervix has traditionally been understood as one that lacks the mechanical strength to retain a pregnancy past the mid trimester. To prevent recurrence, clinicians frequently place a cerclage, which is designed to provide a

mechanical reinforcement. While relatively common, the efficacy of this procedure has been debated [4]. There is also a small risk of complications, and some patients have no improvement in outcome [7, 8].

For patients who have no improvement in outcome, or in whom vaginal placement is precluded secondary to a markedly shortened cervix, a transabdominal cerclage can be performed. The original technique has been credited to Benson and Durfee [9] who published their description in 1965. The technique entails a laporotomy and placement of the cerclage at the level of the cervicoisthmic junction. While success rates have been reported to be good, two major surgeries are required, and no randomized trial has ever evaluated the procedure.

Our study of 15 patients undergoing the procedure showed a marked improvement in obstetrical and neonatal outcomes. Our series was generally similar in terms of obstetrical histories and outcomes compared to other published data [1, 10]. However, there are many notable limitations of this analysis, in particular the small sample size and retrospective time frame.

It is unclear why an abdominal cerclage would improve outcomes beyond what would be seen with a vaginal cerclage. It is possible that the vaginal technique introduces pathologic microorganisms not present at the time of laporotomy, or that an abdominal cerclage provides the greatest mechanical reinforcement due to its location and technique. It is also possible that interventions given as part of the abdominal cerclage such as antibiotics, tocolytics, etc., are responsible for some of the effects.

This study describes our experience with the abdominal cerclage. It must be remembered that there is significant morbidity associated with this procedure. Two major surgeries are required, each with its associated risks. In our population, major complications were rare, but one patient did have a surgical site infection. Using the patient's prior pregnancy as her own control has the benefit of controlling for personal characteristics that may influence procedure selection and pregnancy outcomes. However, it does not effectively control for beneficial changes in patient characteristics or clinical practices that may have occurred since the prior pregnancy. Since patient management for incompetent cervix has not changed substantially during the study period, it is unlikely that our results could be explained by this factor. In this study, obstetrical and neonatal outcomes were significantly improved, even in women with multiple past losses or cerclage attempts.

This study contributes to the evidence supporting the value of abdominal cerclage for improving pregnancy outcomes in patients with a history of failed vaginal cerclage or amputated cervix. Given the paucity of published data on transabdominal cervicoisthmic cerclage, replication of previous findings is imperative, as a randomized trial will be unlikely due to the rarity of the procedure and difficulty of finding an appropriate control group.

Conflict of interest statement None.

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