Abdominal versus vaginal cerclage after a failed transvaginal cerclage: A systematic review

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OBJECTIVE: The purpose of this study was to compare the outcomes of pregnancy after transabdominal cerclage versus after transvaginal cerclage in patients with a failed transvaginal cerclage during a previous pregnancy.

STUDY DESIGN: MEDLINE and EMBASE were searched in English. We included studies that reported perinatal and/or maternal outcomes in women who had a transabdominal cerclage or a transvaginal cerclage placed at or before 20 weeks of gestation, after having had a failed nonemergent transvaginal cerclage in a previous pregnancy. Data were included for individual patients if they met the inclusion criteria, and their outcomes were reported separately. We excluded patients with cervical amputation because transvaginal cerclage is not an option for these women because of technical difficulty.

RESULTS: Fourteen studies met the inclusion criteria. Thirteen of the studies were case series (12 retrospective and 1 prospective), and one study was a retrospective cohort study. In total, 157 women in the studies had a failed vaginal cerclage in a previous pregnancy; 117 women had a subsequent transabdominal cerclage; 40 women had a subsequent transvaginal cerclage. The likelihood of perinatal death or delivery at <24 weeks was 6.0% (95% CI, 3.8%-8.2%) after transabdominal cerclage and 12.5% (95% CI, 2.7%-22.7%) after transvaginal cerclage. The likelihood of serious operative complications after transabdominal cerclage was 3.4% (95% CI, 0.01%, 6.8%). There were no serious operative complications after transvaginal cerclage.

CONCLUSION: Transabdominal cerclage may be associated with a lower risk of perinatal death or delivery at <24 weeks of gestation, but it may be associated with a higher risk of serious operative complications. A multicenter randomized controlled trial should be conducted to address this question. (Am J Obstet Gynecol 2002;187:868-72.)

Key words: Cervical incompetence, transvaginal cerclage, transabdominal cerclage, systematic review

Cervical incompetence is diagnosed on the basis of a history of repeated painless midtrimester losses or preterm deliveries. The surgical treatment for this condition in most cases consists of a vaginal placement of a cervical suture. First described by Lash and Lash[1] in 1950, later by Shirodkar[2] in 1955 and McDonald[3] in 1957, the vaginal placement of the cervical suture is widely used, despite very limited evidence to prove its ability to prevent preterm birth.[4-6]

Transabdominal placement of the cervical suture was first proposed by Benson and Durfee[7] in 1965 as an alternative in that small subset of women in whom transvaginal placement of the suture is technically difficult or not possible. Novy[8] in 1982 further expanded the indications of the surgery to include women who have had a preterm delivery or a midtrimester loss despite a transvaginal cerclage (TVC) in a previous pregnancy.

There is considerable debate as to whether transabdominal cerclage (TAC) is the most prudent treatment in subsequent pregnancies if there has been a previous loss because of cervical incompetence even after the placement of a TVC. Despite the lack of clear evidence from randomized controlled trials of the advantage of one method of treatment over the other, the most common indication that can be found in the published literature for the placement of a TAC now is a previously failed TVC.[9]

We therefore undertook a systematic review of the studies that have been published in the English literature to determine which method of suture placement is the most prudent treatment if there has been a failed TVC in a previous pregnancy.

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Table I. Demographic characteristics and obstetric history

Study	*No. of patients in the study (No. eligible)*	*Mean age of patients (y ± SD)*	*Weeks of gestation at cerclage placement in the previous pregnancy (range)*	*No. of previous pregnancies (range)*	*First trimester losses, -≥2 (No.)*	*Second -trimester losses, ≥2 (No.)*	*Previous failed cerclages, ≥2 (No.)*
TAC							
Anthony et al[12] (1997)	13 (10)	30.4 ± 5.7	12-14	2-9	2	9	1
Benson and Drufee[7] (1965)	10 (2)	34.0 ± 7.1	16-17	3-4	NS	NS	0
Cammarano et al[10] (1995)	23 (13)	31.8 ± 4.6	12-17	1-6	3	11	7
Craig and Flieghner[11] (1997)	12 (9)	30.6 ± 2.9	10-11	2-9	NS	7	3
Davies et al[9] (2000)	40 (40)	34.0 ± 4.2	11.9 ± 1.6*	NS	NS	NS	1.8 ± 1.0†
Herronand Parer[14] (1988)	9 (5)	30.8 ± 5.9	13-17	1-4	0	4	2
Mahran[16] (1978)	10 (3)	29.8 ± 4.5	10-18	5-12	NS	NS	2
Novy[8] (1982)	16 (8)	27.1 ± 3.9	13-19	2-10	2	7	4
Sidhu et al[17] (1997)	12 (6)	NS	11-13	2-5	NS	NS	1
Topping and Farquharson[18] (1995)	6 (6)	35.0 ± 4.5	10-12	1-7	3	6	4
Turnquest et al[19] (1999)	11 (8)	31.3 ± 7.3	12-14	2-5	1	5	3
Van Dongen and Nijhuis[20] (1991)	6 (7)	30.6 ± 3.2	14-17	1-2	NS	1	2
TVC							
Davies et al[9] (2000)	24 (24)	31.3 ± 4.6	12.7 ± 1.3*	NS	NS	NS	1.1 ± 0.3†
Frieden et al[14] (1990)	46 (9)	NS	13-18	NS	NS	NS	NS
Shiffman[13] (2000)	10 (7)	31.9 ± 5.5	14-15	NS	NS	7	4

All the studies were retrospective case series, except Davies et al[9] (a retrospective cohort) and Shiffman[13] (a prospective case series).
NS, Not specified.
*This figure was given as the mean ± SD, rather than a range.
†This figure was given as the mean ± SD, rather than a number.

Material and methods

We identified relevant studies by performing computer searches of English-language abstracts using MEDLINE for the years 1966 to 2001 and EMBASE for the years 1980 to 2001. A variety of searches was conducted with combinations of the terms *cervical incompetence* with *cerclage* and *transabdominal cerclage* to identify all related articles in English concerning human subjects. We also supplemented our searches through manual cross-references of MEDLINE, extracted articles, and references that appear in obstetric textbooks. No formal attempt was made to identify unpublished studies.

We included all full articles in which outcome data were reported for women who had either a TVC or TAC placed in a subsequent pregnancy for whom a previous pregnancy had resulted in a midtrimester loss or a preterm delivery at <34 weeks of gestation, despite a TVC placed in that pregnancy. The obstetric history in these patients had to be consistent with a history of cervical incompetence (ie, previous midtrimester losses or preterm deliveries after painless labor). Patients who had an emergency cerclage placed ≥20 weeks of gestation were excluded from the review. This was primarily because emergency sutures, which are associated with higher failure rates, would be placed vaginally and therefore would make this group unsuited for comparison with TAC, because TAC is generally placed under elective conditions <20 weeks of gestation.

For inclusion in the review, the outcomes had to be available directly or by calculation (ie, women in the study were included if they were eligible and the outcome data were reported). In some studies, we separated the data for women who met our criteria thereby, including only a part of the study. If it was not possible to separate the data, we excluded the study. We also excluded patients who had a cervical amputation, because it is technically impossible to place a TVC in this group, which makes them unsuitable for comparison with TVC. We also excluded isolated case reports, because there is a tendency toward reporting successful cases, which leads to bias.

Outcomes of interest were gestational age at delivery after the placement of TVC and TAC, neonatal death and morbidity as a result of preterm birth, and complications of surgery that included blood loss that required transfusion, maternal death, and morbidity that resulted from infections and venous thromboembolism.

Two authors (V. Z., F. A.) independently reviewed all the articles and abstracted the data; any differences were resolved by discussion.

The observed proportion of outcomes in the two groups was compared descriptively but not statistically because the obstetric history for the TVC cases was not specified in detail in all of the studies.[10-13]

Results

From 39 possible studies, 14 studies met the inclusion criteria (Table I)[7-20]; 25 studies were excluded[21-45] for the following reasons: patients did not have previous failed cerclage,[21-27] cerclage was not placed <20 weeks of gesta-

Table II. Neonatal outcomes

Study	*Weeks of gestation at delivery (mean ± SD)*	*No. of perinatal deaths or deliveries at <24 weeks of gestation (%)*
TAC		
Anthony et al[12] (1997)	36.7 ± 1.5	0/10
Benson and Durfee[7] (1965)	31.5 ± 12.0	1/2 (50%)
Cammarano et al[10] (1995)	35.9 ± 4.0	1/13 (8%)
Craig and Flieghner[11] (1997)	34.9 ± 2.8	0/9
Davies et al[9] (2000)	36.3 ± 4.1	1/40 (3%)
Herron and Parer[15] (1988)	35.3 ± 5.2	1/5 (20%)
Mahran[16] (1978)	39.0 ± 2.0	0/3
Novy[8] (1982)	34.3 ± 8.2	1/8 (13%)
Sidhu et al[17] (1997)	35.5 ± 3.2	0/6
Topping and Farquharson[18] (1995)	NS	1/6 (17%)
Turnquest et al[19] (1999)	35.9 ± 4.2	1/8 (13%)
Van Dongen and Nijhuis[20] (1991)	38.0 ± 0.3	0/7
Total		7/117 (6%)
TVC		
Davies et al[9] (2000)	32.8 ± 8.6	4/24 (17%)
Frieden et al[14] (1990)	≥37	0/9
Shiffman[13] (2000)	33.1 ± 5.0	1/7 (14%)
Total		5/40 (12.5%)

NS, Not specified.

Table III. Maternal complications

Study	*Endometritis (No.)*	*Operative complications (No.)**
TAC		
Anthony et al[12] (1997)	0/10	0/10
Benson and Durfee[7] (1965)	0/2	0/2
Cammarano et al[10] (1995)	NS	2/13 (15%)
Craig and Flieghner[11] (1997)	0/9	NS
Davies et al[9] (2000)	0/40	0/40
Herron and Parer[15] (1988)	0/5	2/3 (40%)
Mahran[16] (1978)	NS	Unclear
Novy[8] (1982)	1/8 (12.5%)	Unclear
Sidhu et al[17] (1997)	0/6	0/6
Topping and Farquharson[18] (1995)	NS	NS
Turnquest et al[19] (1999)	NS	0/8
Van Dongen and Nijhuis[20] (1991)	NS	NS
Total	1/117 (0.9%)	4/117 (3.4%)
TVC		
Davies et al[9] (2000)	0/24	0/24
Shiffman[13] (2000)	Unclear	NS
Frieden et al[14] (1990)	0/9	0/9
Total	0/40	0/40

No maternal death or thrombophlebitis was reported in any studies. *NS,* Not specified.
*Complications included bleeding that required transfusion, injury to the bowel or bladder or uterine artery, and complications of anesthesia.

tion,[28-31] single case reports,[32-36] outcomes of interest were not reported,[31,37-40] or outcome data for eligible women were not reported separately from the rest of the data.[24,25,27,41-44]

Of the 14 included studies,[7-20] 13 studies were case series (12 retrospective studies, 1 prospective study[13]) and one study[9] was a retrospective cohort study. From the included studies, there were 258 patients, of which 157 patients were eligible for the analysis. Of the 157 women with a failed vaginal cerclage in a previous pregnancy, 117 women had a subsequent TAC, and 40 women had a subsequent TVC. The age of the patients ranged from 18 to 40 years. The gestational age at the placement of cerclage ranged from 10 to 19 weeks. The range of previous pregnancies was 1 to 12. The number of previous pregnancies was not specified in the TVC studies (Table I).

The likelihood of perinatal death or delivery at <24 weeks of gestation was 6.0% (95% CI, 3.8%-8.2%) after TAC and 12.5% (95% CI, 2.7%-22.7%) after TVC (Table II). The likelihood of a preterm delivery between

24 and 28 weeks of gestation was 1.7% (95% CI, 0.7%-4%) after a TAC compared with a 2.5% (95% CI, 2.3%-7.3%) after a TVC.

The likelihood of serious operative complications (bleeding that required transfusion, injury to the bowel or bladder or uterine artery, and complications of anesthesia) after TAC was 3.4% (95% CI, 0.01%, 6.8%) (Table III). There were no serious operative complications after TVC. There was just one case of infection (endometritis) that was reported in the TAC group, but no infections were reported in the TVC group.

Comment

The best treatment for patients with a history of cervical incompetence that had resulted in a preterm delivery or a midtrimester loss despite the placement of a cervical suture is uncertain. There are no randomized controlled trials in the published literature to guide clinical decision making.

The most common indications for TAC are an abnormally short cervix and previous failed cerclage.[8,11,15,19,24,38,40] There is very limited evidence to prove the efficacy of vaginal cerclage as such.[4-6,42] Most case series of abdominal cerclage have reported excellent success rates (85% to 90%). A review of the literature by Novy[38] in 1991 suggested a combined success rate of 89%.

A prerequisite for combining the data from separate trials is that each trial is of sufficient methodologic quality.[46] Most of the studies on abdominal cerclages are case series. The inclusion criteria into some of the bigger studies on vaginal cerclage are varied and vague, which suggests the potential for bias of the obstetrician involved.[42]

So far there has been only one retrospective cohort study that compared TAC versus TVC for pregnant women with previous failed cerclages in the published literature.[9] The reason for the better success rate of the abdominal suture may be that the suture is placed at the level of the internal os and is therefore physiologic and strengthens the defect at the internal os. There are obvious disadvantages to the transabdominal placement of the cervical suture. It requires two laparotomies, one for the placement of the suture and the second for the delivery of the baby by cesarean delivery. The former may be overcome by placing the suture laparoscopically, as suggested in various reports.[33] In addition, the placement of the suture abdominally results in an increased risk of intraoperative injury to the uterine arteries that could result in hemorrhage with the consequent risks of blood transfusion and the rare yet real risk of maternal death. Other intraoperative risks include an increased chance of injury to surrounding viscera. After the operation, there may be an increased risk of infectious morbidity and/or venous thromboembolism. The increased length of the hospital stay that is associated with abdominal cerclage compared with vaginal cerclage means higher costs. In addition, a greater technical expertise is required to perform the TAC. Last, the treatment of a woman who is in preterm labor with an existing transabdominal suture is not straightforward. In cases with an abdominal cerclage in which preterm labor ensues, a decision must be made whether to observe the labor or attempt tocolysis or proceed with caesarean delivery. If cesarean delivery is undertaken too soon, the risks of preterm birth may be increased. If cesarean delivery is not undertaken soon enough, the suture may tear through the maternal tissues, thereby increasing the risks of maternal morbidity. Although most women with an abdominal suture usually have an elective cesarean delivery after 37 weeks of gestation, there may be a need for some women to undergo an amniocentesis to determine fetal lung maturity before early elective delivery.

This systematic review found that TAC may be associated with a lower risk of perinatal death or delivery at <24 weeks of gestation, but it may also be associated with a higher risk of serious operative complications than TVC. However, we must be cautious about concluding from this review that there is a significant benefit with TAC because the 95% CI about the rate of perinatal death or delivery at <24 weeks of gestation after TVC was wide, with a lower limit of 2.7%. We recommend that multicenter randomized controlled trials with sufficient numbers of subjects be undertaken to provide more reliable and unbiased estimates of benefits and risks.

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