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Effect of 2 stitches versus 1 stitch on the prevention of preterm birth in women with singleton pregnancies undergoing cervical cerclage

Karlijn Woensdregt, M.D., Errol R. Norwitz, M.D., Ph.D., Michael Cackovic, M.D., Michael J. Paidas, M.D., and Jessica L. Illuzzi, M.D., M.S.

Department of Obstetrics, Gynecology & Reproductive Sciences, Yale University School of Medicine, New Haven, CT

Abstract

Objective—This study investigates whether two cerclage stitches are more effective than one stitch in preventing preterm birth.

Study Design—This is a retrospective cohort study of 150 singleton pregnancies that underwent cervical cerclage. Gestational age (GA) at delivery and clinical characteristics were compared.

Results—112 patients (74.7%) received one stitch and 38 (25.3%) received 2 stitches. There were no baseline differences between the groups. Analysis showed no significant difference in GA at delivery between the 1 vs 2 cerclage groups overall (38.0 vs 38.3 weeks, respectively [median; $P=0.356$]) or for a given GA cut-off (<37 weeks: 37.4% vs 34.2% [$P=0.727$]; <34 weeks: 16.8% vs 18.4% [$P=0.823$]; <28 weeks: 9.4% vs 2.6% [$P=0.179$]).

Conclusion—This study shows no measurable benefit to placement of two stitches over one stitch during cervical cerclage in singleton pregnancies; however, further study of preterm birth <28 weeks of gestation and post-cerclage outcomes among a larger cohort is merited.

Keywords

Cervical cerclage; cervical insufficiency; preterm birth; pregnancy

Introduction

Cervical insufficiency (cervical incompetence) – defined as the inability to support a pregnancy to term due to a functional defect of the cervix – complicates 0.1 % to 1% of all pregnancies, and is responsible for approximately 15% of habitual immature deliveries between 16 and 28 weeks' gestation.¹⁻⁴ It is characterized clinically by acute, painless dilatation of the cervix usually in the mid-trimester culminating in prolapse and/or premature rupture of the membranes (PROM) with resultant preterm and often previable delivery.

Correspondence: Jessica Illuzzi, M.D., M.S., Department of Obstetrics, Gynecology & Reproductive Sciences, PO Box 208063, New Haven, CT 06520-8063. Tel: 203 / 785-4294. Fax: 203 / 737-1883. jessica.illuzzi@yale.edu.
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Condensation: This study reveals no measurable benefit to two versus one stitch at cervical cerclage placement in women with a singleton pregnancy.

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Although cervical cerclage remains the treatment of choice for women with cervical insufficiency with a view to preventing the 15-30% incidence of recurrent cervical insufficiency and pregnancy loss,³ the ideal technique and timing for cervical cerclage placement has yet to be established. For example, placement of an elective (prophylactic) cerclage at 13-14 weeks' gestation is generally preferred over emergent (salvage) cerclage placement at 18-20 weeks once cervical effacement and dilatation has already occurred,^{3,5-7} but there is limited data in support of this assertion. Similarly, while it is generally accepted that the two most common types of stitches (McDonald and Shirodkar) are equally effective,^{3,8} there have been no head-to-head studies comparing the efficacy of these two techniques. Some obstetric care providers choose to place two stitches rather than one at the time of initial cervical cerclage placement, although this approach has not previously been systematically examined. To this end, the current study investigates whether placement of two stitches is more effective than a single stitch in preventing preterm birth in singleton pregnancies undergoing non-emergent cervical cerclage placement.

Materials and Methods

A retrospective cohort study was performed involving consecutive singleton pregnancies undergoing non-emergent cervical cerclage placement for a history of cervical insufficiency or sonographic cervical shortening (<25mm) at Yale-New Haven Hospital from January 1995 to December 2005. Emergent cervical cerclage was defined as cerclage placement in the setting of visible chorioamniotic membranes due to dilation and effacement of the cervix and were therefore excluded. Only cerclages placed <24 weeks of gestation were eligible for inclusion. The study protocol was approved by the Human Investigation Committee at Yale University School of Medicine. All patients who had cervical cerclage placement (either Shirodkar or McDonald cerclage) during the study period were identified using the hospital's billing code system. If more than one pregnancy per patient was identified, the first pregnancy that met study criteria was selected.

Demographic information was abstracted from the maternal and neonatal medical records. Maternal demographic factors included maternal age, self-reported race/ethnicity, gravity, parity, prior obstetric history (prior cervical insufficiency, prior cervical surgery including cerclage placement, DES exposure, uterine abnormalities, abortions [delivery <20 weeks] and prior preterm births [delivery <37 weeks], very preterm births [<34 weeks], and extremely preterm births [<28 weeks]), details of the index cerclage (gestational age [GA] at placement, cervical examination at placement, cervical length within 7 days of placement, type of cerclage, complications, number of stitches, GA at removal), current obstetric history (medical complications, preterm PROM), and details of delivery (type of delivery, indication for cesarean). Complications after cerclage placement are reported as short-term or ≤ 7 days (including artificial rupture of membranes, excessive blood loss defined as ≥ 200 -mL, abortion, intrauterine infection, and complications of anesthesia requiring hospital admission, such as severe headache, unstable blood pressure, hypoxia, or inability to void) and long-term or > 7 days (cervical laceration or stenosis, chorioamnionitis remote from placement, abortion, preterm PROM, and migration of the suture). Neonatal demographic factors included gender, Apgar scores, and birth weight.

After data extraction, only patients who met criteria were included in the final analysis. Inclusion criteria included non-emergent cervical cerclage, singleton gestation, and delivery at Yale-New Haven Hospital. Women who underwent transabdominal cerclage placement and those who had inadequate follow-up data were excluded. The primary outcome of interest was the difference in GA at delivery between women who received two versus one stitch at the time of cervical cerclage placement. Secondary outcome measures included complications

after cerclage placement, indications for cerclage removal, GA at removal, GA at ROM, route of delivery, and neonatal outcome.

Primary and secondary outcome measures were compared between women with singleton pregnancies who received two versus one stitch at the time of cerclage placement using SAS 9.1 Statistical Software. Demographic data were characterized using descriptive statistics. Univariate analyses were performed to characterize the distribution of the data. Data were expressed as mean $\pm$ standard deviation (SD) if normally distributed, and Student's *t* test was used for statistical comparison. Non-normally distributed data were expressed as median (interquartile range) and analysis performed using the Mann-Whitney-Wilcoxon test. Categorical variables were analyzed using χ^2 and/or Fisher's exact test. Logistic regression was used to investigate the association between cerclage number and pregnancy outcome. Statistical significance was defined as $P < 0.05$.

Results

Study population

The study population is summarized in Figure 1. A total of 320 cervical cerclage procedures were performed at Yale-New Haven Hospital from January 1995 to December 2005. Of these, 18 (6%) were unavailable for review. Of the 302 procedures available for review, 153 (50.7%) were excluded from the final analysis because of multiple pregnancies ($n=23$), emergent cervical cerclage ($n=38$), repeat cervical cerclage procedure during the same pregnancy ($n=2$) (initial procedures were included in the analysis and repeat procedures were identified as a complication), repeat cervical cerclage procedure in a subsequent pregnancy in the same subject ($n=36$), and incomplete follow-up data on the delivery and/or neonatal outcome, usually due to planned delivery at an outside hospital ($n=53$).

Subjects who received two versus one cervical cerclage

Of the 150 patients who met criteria for inclusion in the final analysis, 112 (74.7%) received one stitch and 38 (25.3%) received 2 stitches. There were no demographic differences between the two groups (Table 1). Specifically, rates of DES exposure, prior obstetric history (including abortions, terminations, and preterm births), prior cervical operations (including cervical cerclage), and prior cervical insufficiency did not differ. A history of cervical insufficiency was reported in 71.4% (80/112) of women who received one stitch and 71.1% (27/38) of women who received two stitches in the index pregnancy ($P=0.965$).

Table 2 summarizes the details of cerclage placement in both groups. No differences were noted between the two groups regarding the stated indication for cervical cerclage placement, the GA at placement, and residual cervical length and funnelling at placement. Overall, more McDonald cerclages were placed than Shirodkar cerclages (54.7% vs 45.3%), but there was no significant difference in distribution between the two groups ($P=0.118$) (Table 2).

Effect of two versus one cervical cerclage on post-cerclage complications

Overall, 31.3% (47/150) of women had complications after cerclage placement, but there were no statistically significant differences in complication rates between the two groups regarding the incidence, timing, or nature of complication (Table 3). In one case, the cerclage had to be removed at 23-4/7 weeks because of cervical laceration with excessive vaginal bleeding and, in another case, the cerclage fell out spontaneously at 23-0/7 weeks; both of these cases occurred in the single stitch group. Two (1.8%) women in the one stitch group underwent repeat cerclage placement, while no women in the two stitch group underwent repeat procedure ($p=1.000$), and seven (6.3%) women in the single stitch group experienced cervical stenosis compared to none in the two stitch group ($p=0.192$). However, 3/38 (7.9%) women in the two

stitch group suffered cervical laceration compared to 2/112 (1.8%) in the one stitch group ($p=0.104$). (Table 3)

Effect of two versus one cervical cerclage on pregnancy outcome

Pregnancy loss prior to 20 weeks gestation occurred in 5 (4.5%) women in the single stitch group and 0 women in the two stitch group ($p=0.330$). Pregnancy outcome was further analyzed for all deliveries ≥ 20 weeks' gestation ($n=145$) (Table 4). The primary outcome measure (namely, GA at delivery) did not differ significantly between the two versus one cerclage groups: 38.3 weeks (median, interquartile range 34.6-39.7 weeks) vs 38.0 weeks (median, interquartile range 35.7-39.1 weeks), respectively ($P=0.356$). There was also no statistically significant difference in GA at delivery when analyzed for the subgroups <37 weeks, <34 weeks, and <28 weeks' gestation (Table 4); however, 10 (9.4%) delivered at <28 weeks in the single stitch group compared to 1 (2.9%) in the double stitch group ($p=0.179$). Although there were no significant differences in the route of delivery, slightly more women with double rather than single stitches who delivered by cesarean had their surgery performed for the indication of failure to progress / failed induction (27.3% [3/11] vs 5.0% [2/40], respectively; $P=0.055$); however, prior cesarean delivery was the most common indication in both groups (36.4% [4/11] vs 62.5% [25/40]) (Table 4).

The only two pregnancy outcome variables that did show a significant difference between women who received two versus one cerclage were duration of ROM (453 min [median, interquartile range 250-764 min] vs 223 min [median, interquartile range 9-579 min], respectively; $P=0.009$) and duration on the labour floor (559 min [median, interquartile range 385-923 min] vs 326 min [median, interquartile range 124-661 min], respectively; $P=0.003$) (Table 4).

Logistic regression analysis showed no significant differences in the relative risks for preterm birth between the two and one stitches groups. After excluding pregnancy losses prior to 20 weeks' gestation, the relative risks (95% confidence interval) for delivery at <37 weeks, <34 weeks, and <28 weeks are 0.87 (0.40-1.89), 1.12 (0.43-2.93) and 0.26 (0.03-2.12), respectively, for women who received two stitches rather than one.

Comments

Cervical insufficiency remains a major cause of preterm birth. Cervical cerclage remains the cornerstone of management for women with a history of cervical insufficiency, but is one of the more controversial surgical interventions in obstetrics. Numerous studies have attempted to identify the optimal technique and timing of this procedure. For example, a number of clinical studies – some prospective, but the majority retrospective – have shown that placement of an elective (prophylactic) cerclage is preferable to emergent (salvage) cerclage placement after cervical effacement and dilatation has already occurred,^{3,5-7} and that there is no difference between transvaginal and transabdominal techniques^{3,9,10} or between McDonald and Shirodkar transvaginal procedures.^{3,8} In an attempt to improve perinatal outcome, many obstetric care providers choose to place two stitches rather than one at the time of cervical cerclage placement. This study, the first to systematically examine the outcome of this approach, does not show a measurable benefit to placing two versus one stitch at the time of cervical cerclage placement in women with a singleton pregnancy in this 11 year cohort.

The primary outcome measure was GA at delivery. GA at cerclage placement was similar between the two groups (Table 2). Mean gestational age at delivery in weeks was 36.4 ± 4.52 and 37.2 ± 3.70 for one versus two cerclage ($P=0.333$), respectively. The power to detect such a difference as statistically significant is 18%, and since the gestational age data are significantly skewed from a normal distribution, a comparison of the medians is more

appropriate. There was no difference in overall median GA at delivery between two versus one cerclage (38.3 weeks vs 38.0 weeks, respectively; $P=0.356$) nor for specific birth subgroups or intervals (Table 4). For example, preterm births <34 weeks – a gestational age associated with higher perinatal morbidity and mortality – were not different between the two groups (18.4% and 16.8% for two versus one cerclage, respectively; $P=0.823$) (Table 4). Preterm birth rates <28 weeks of gestation also did not statistically differ (2.6% and 9.4% for two versus one cerclage, respectively; $p=0.179$); however, the power to detect a difference this small was 21%. The same difference in percentage of preterm birth <28 weeks of gestation would have to be observed in a sample 3.5 times larger for this difference to achieve statistical significance with 80% power. Since some may consider a 7% difference in birth rates at less than 28 weeks clinically significant, a larger study of one versus two stitches at cerclage placement may be merited to determine whether this difference would persist or whether this instead reflects the variance of a small sample size. There were also no significant differences in GA at rupture of membranes, rates of induction of labor, route of delivery, or neonatal outcome (Table 4).

Although the GA at rupture of membranes was similar between the two groups, there was a significant difference between the two and one stitch groups as regards duration of rupture of membranes ($P=0.009$) and time spent on the labor floor ($P=0.003$). Patients who received a double cerclage had longer labors and consequently longer duration of ruptured membranes. One possible explanation for this finding is that the presence of two stitches may cause more fibrosis and scarring of the cervix resulting in slower cervical remodeling and effacement and a longer labor.

The decision to place two or one stitch was at the discretion of the surgeon, and did not appear to be influenced by GA at placement, history, funneling, or actual cervical length (Table 2). Interestingly, when a decision was made to proceed with a double stitch, the surgeon typically chose to place a second stitch of the same type, and combined McDonald and Shirodkar cerclages were placed in only 2 out of 38 double cerclage cases (5.3%). Moreover, although McDonald and Shirodkar cerclages were equally represented in the single stitch group, surgeons who chose to place 2 stitches seemed to preferentially use the McDonald technique, although this was not statistically different than the distribution in the 1 stitch group (Table 2). There was no difference in the rates of preterm birth when those who received double and single stitch McDonald and Shirodkar cerclages were examined separately (results not shown), but the current cohort does not provide enough power to examine these smaller subgroups. It is generally accepted that McDonald and Shirodkar techniques are equally effective,^{3,8} but there have been no head-to-head studies comparing the efficacy of these two techniques.

Perioperative complications (such as rupture of fetal membranes, miscarriage, or excessive blood loss) are uncommon at the time of prophylactic cervical cerclage placement (<6%).^{3,8,11} Similar short-term complication rates were noted in our population, and were similar between the two and one stitch groups (5.3% vs 5.4%, respectively; $P=1.00$) (Table 3). The overall complication rate in our study population was 31.3% (Table 3). Although there was an almost 10% difference in complication rates between the two and one stitch group (23.7% vs 33.9%, respectively), this was not statistically significant ($P=0.239$) and was due almost exclusively to a difference in long-term complications ≥ 7 days (21.1% vs 31.3%, respectively). The most common long-term complication in both groups was preterm PROM with an occurrence rate of 21% in the two stitch group and 18% in the one stitch group ($P=0.692$) (Table 3). This is consistent with prior publications.^{3,11}

Although not statistically significant, there were several trends in the data that may merit further investigation within a larger cohort. Among the two stitch group, no women required a repeat cerclage placement and no fetal losses occurred at less than 20 weeks of gestation. In contrast, in the one stitch group, two (1.8%) women required a repeat procedure ($p=1.000$) and 5 (4.5%)

experienced a fetal loss at less than 20 weeks of gestation ($p=0.330$). Similarly, there were no cases of cervical stenosis in the two stitch group and 7 (6.3%) in the one stitch group ($p=0.192$). On the other hand, there was a fourfold increase in the rate of cervical laceration in women who received two rather than one cerclage (7.9% vs 1.8%, respectively; $P=0.104$) (Table 3). The current study was underpowered to test these endpoints individually. A larger, multi-institutional study would likely be required to examine these less frequent outcomes.

The majority of cervical cerclages in our study population were removed electively at 36-37 weeks' gestation in anticipation of labor and delivery, although some patients required early removal and four women requested that the cerclages be left in place for future pregnancies. Most cases of early removal were a result of pregnancy complications (preterm PROM, chorioamnionitis, preterm labor, abnormal bleeding, or abortion). In two instances, however, removal was required because of complications of the cerclage: in one case, the cerclage was associated with cervical laceration and excessive bleeding and, in another case, the cerclage fell out spontaneously. Cerclage removal was usually attempted in the office setting. In approximately 10% of cases, the obstetric care provider was unable to remove the cerclage in the office and the patient was taken to the operating room. Failure of removal in the office was similar between the two and one cerclage groups (10.5% vs 10.3%; $P=1.00$) (Table 3).

Although this study included all women with singleton pregnancies who had a non-emergent cerclage placed over an 11 year period at a large tertiary care center, our sample size is still relatively small for many of the outcome measures under study. This study is also limited by its retrospective nature. Despite these limitations, this study does not reveal a clear benefit to placing two versus one stitch at the time of cervical cerclage placement in women with a singleton pregnancy. While two stitches were associated with longer duration of ruptured membranes and labor, trends in the data reveal that two stitches may potentially be associated with lower rates of preterm birth prior to 28 weeks of gestation, fetal loss prior to 20 weeks of gestation, cervical stenosis, and need for repeat cerclage placement, but higher rates of cervical laceration. Further studies among larger cohorts are needed to elucidate these outcomes and better identify the optimal technique for cervical cerclage placement.

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Figure 1. Study population

Table 1

Maternal demographics

Variable	1 cerclage (n=112)	2 cerclages (n=38)	P-value [*]
Age (years) [†]	29.3 ± 6.1	30.7 ± 5.4	0.243
Race			0.944
White	50 (44.6%)	17 (44.7%)	
Black	45 (40.2%)	17 (44.7%)	
Hispanic	13 (11.6%)	3 (7.9%)	
Other	4 (3.6%)	1 (2.6%)	
Gravity [‡]	4.0 (3-6)	4.0 (3-5)	0.709
Parity [‡]	1.0 (0-2)	1.0 (1-2)	1.000
DES exposure	5 (4.5%)	3 (7.9%)	0.418
Previous cervical operation			0.716
None	90 (80.4%)	33 (86.8%)	
Conization [§]	13 (11.6%)	2 (5.3%)	
LEEP	4 (3.6%)	2 (5.3%)	
Other ^{//}	5 (4.5%)	1 (2.6%)	
Prior preterm birth			
<37 weeks	67 (59.8%)	24 (63.2%)	0.716
<34 weeks	61 (54.5%)	22 (57.9%)	0.713
<28 weeks	57 (50.9%)	20 (52.6%)	0.853
Causes of prior spontaneous (non-indicated) preterm birth			0.357
Preterm labor (± rupture of membranes)	7 (11.5%)	2 (11.8%)	
Preterm premature rupture of membranes	20 (32.8)	9 (52.9%)	
Chorioamnionitis (± rupture of membranes)	7 (11.5%)	0 (0%)	
Cervical insufficiency	27 (44.3%)	6 (35.3%)	
Prior pregnancy loss <20 weeks	71 (63.4%)	27 (71.1)	0.391
15-20 wk loss	29 (25.9%)	9 (23.7%)	0.787
Number of prior pregnancy losses <20 weeks [‡]	1 (0-2)	1.5 (0-2)	0.567
Prior termination of pregnancy	23 (20.5%)	7 (18.4%)	0.778
Reported history of cervical insufficiency	80 (71.4%)	27 (71.1%)	0.965
Previous cerclage	25 (22.3%)	13 (34.2%)	0.145

^{*} P-value is for Wilcoxon test (medians); t-test (means) and χ^2 or Fisher's exact test (categorical variables)

[†] Mean ± standard deviation

[‡] Median (interquartile range)

[§] Conization includes cold knife and laser conization

^{//} Includes cryotherapy and laser vaporization

Table 2**Characteristics of cerclage placement**

Variable	1 cerclage (n=112)	2 cerclages (n=38)	P-value [*]
Indication for cerclage			0.414
History of cervical insufficiency	58 (51.8%)	23 (60.5%)	
Sonographic cervical shortening (≤ 2.5 cm)	32 (28.6%)	11 (29.0%)	
Both history of cervical insufficiency and sonographic cervical shortening	22 (19.6%)	4 (10.5%)	
Gestational age at placement (weeks)[†]	15.4 (14.0-19.1)	15.0 (14.0-18.0)	0.743
Cervical length at placement^{†‡}	2.1 $\pm$ 1.0 (n=53)	2.0 $\pm$ 1.2 (n=18)	0.788
Funneling[‡]	39 (38.6%) (n=101)	12 (34.3%) (n=35)	0.649
Type of cerclage[§]			0.118
McDonald	58 (51.8%)	24 (66.7%)	
Shirodkar	54 (48.2%)	12 (33.3%)	

^{*} P-value is for median test; t-test (continuous variables) and χ^2 or Fisher's exact test (categorical variable)

[†] Median (interquartile range) or mean $\pm$ SD

[‡] Cervical length and funneling status available only if ultrasound performed within 7 days of procedure and data specifically recorded in ultrasound report.

[§] Two patients with 2 cerclages had both a Shirodkar and McDonald cerclage placed and were excluded from this calculation.

Table 3
Complications after cervical cerclage placement

Variable	1 cerclage (n=112)	2 cerclages (n=38)	P-value *
Complications after cerclage placement			
Overall	39 (34.8%)	9 (23.7%)	0.204
Timing of complications of cerclage placement			
<7 days	6 (5.4%)	2 (5.3%)	1.000
≥7 days	36 (32.1%)	8 (21.1%)	0.195
Types of complications			
Abortion (<20 weeks)	5 (4.5%)	0 (0.0%)	0.330
Preterm premature rupture of membranes	24 (21.4%)	7 (18.4%)	0.692
Cervical laceration	2 (1.8%)	3 (7.9%)	0.104
Chorioamnionitis	8 (7.1%)	1 (2.6%)	0.450
Cervical stenosis / migration of suture	7 (6.3%)	0 (0.0%)	0.192
Complications from anesthesia at placement †	4 (3.6%)	0 (0.0%)	0.573
Need for repeat cerclage procedure	2 (1.8%)	0 (0.0%)	1.000

* P-value is for χ^2 or Fisher's exact test

† Includes severe headache, unstable blood pressure, hypoxia, inability to void, or need for hospital admission.

Table 4

Maternal and neonatal outcome data

Variable	1 cerclage (n=107)	2 cerclages (n=38)	P-value [*]
Indication for cerclage removal			0.613
Elective removal (≥36 weeks)	67 (62.6%)	25 (65.8%)	
Due to complications of pregnancy [†]	32 (29.9%)	11 (29.0%)	
Due to complications of cerclage [‡]	2 (1.9%)	0 (0.0%)	
Not removed	4 (3.7%)	0 (0.0%)	
Not recorded	2 (1.9%)	2 (5.3%)	
Failed removal in the office	11 (10.3%)	4 (10.5%)	1.000
Induction of labor	15 (14.0%)	9 (23.7%)	0.204
GA at rupture of membranes (weeks)[§]	38.0 (35.6-39.0)	38.2 (34.4-39.7)	0.358
GA at delivery (weeks)[§]	38.0 (35.7-39.1)	38.3 (34.6-39.7)	0.356
GA at delivery, intervals			0.467
GA ≥37 weeks	67 (62.6%)	25 (65.8%)	
34 weeks ≤ GA <37 weeks	22 (20.6%)	6 (15.8%)	
28 weeks ≤ GA <34 weeks	8 (7.5%)	6 (15.8%)	
24 weeks ≤ GA <28 weeks	6 (5.6%)	1 (2.6%)	
20 weeks ≤ GA <24 weeks	4 (3.7%)	0 (0.0%)	
GA at delivery, subgroups			
<37 weeks	40 (37.4%)	13 (34.2%)	0.727
<34 weeks	18 (16.8%)	7 (18.4%)	0.823
<28 weeks	10 (9.4%)	1 (2.6%)	0.179
Type of delivery			0.129
Normal vaginal delivery	60 (56.1%)	27 (71.1%)	
Operative vaginal delivery	7 (6.5%)	0 (0.0%)	
Cesarean delivery	40 (37.4%)	11 (29.0%)	
Indication for cesarean delivery	(n=40)	(n=11)	0.055
Elective (breech, prior cesarean delivery)	25 (62.5%)	4 (36.4%)	
Fetal indications	10 (25.0%)	3 (27.3%)	
Maternal indications	3 (7.5%)	0 (0.0%)	
Failure to progress / failed induction of labor	2 (5.0%)	3 (27.3%)	
Complications of cervical cerclage	0 (0.0%)	1 (9.1%)	
Duration on Labor & Delivery (minutes)[§]	326 (124-661)	559 (385-923)	0.003
Duration of rupture of membranes (minutes)[§]	223 (9-579)	453 (250-764)	0.009
Neonatal outcome			
Apgar 1 minute <7	21 (19.6%)	5 (13.2%)	0.372
Apgar 5 minutes <7	10 (9.4%)	1 (2.6%)	0.289
Birth weight (grams) [§]	2960 (2430-3300)	3150 (2570-3720)	0.127

^{*} P-value is for Wilcoxon test (medians); t-test (means) and χ^2 or Fisher's exact test (categorical variables)

[†] Including preterm PROM, chorioamnionitis, spontaneous preterm labor, abnormal bleeding, abortion.

[‡] One cerclage fell out spontaneously and another caused laceration with significant bleeding.

[§]Median (interquartile range)