



Original Research Article

Prospective Comparison of Vaginal Versus Transabdominal Cerclage on Perinatal Outcomes

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Abstract: Background: Cervical insufficiency is a significant cause of pregnancy loss in the second trimester and preterm labor. Surgical cerclage, which is done vaginally or transabdominally, is done to strengthen the cervix and enhance perinatal outcome. There is little evidence on the comparison of the two methods. **Objective:** To compare prospectively vaginal and transabdominal cerclage perinatal outcomes in women with cervical insufficiency. **Methods:** A prospective cohort study was carried out at MCH, PIMS Hospital, from 1st April to 30 th September 2025. A total 180 women were included with consecutive sampling to which 90 of them were subjected to vaginal cerclage and 90 to transabdominal cerclage. Demographic, maternal, obstetric and neonatal data were obtained. The SPSS version 25 was used to analyze the data, Chi-square, t-test and Mann-Whitney U test was used. A p-value of less than 0.05 was considered to be a statistically significant value. **Results:** The mean gestational age at delivery ($p=0.002$) and preterm birth ($p=0.003$) rates were found to be higher and lower respectively in transabdominal cerclage. A greater mean birth weight ($p<0.001$) and a reduced number of NICU admissions ($p=0.05$) were seen in neonates. **Conclusion:** Transabdominal cerclage offers better perinatal outcomes than vaginal cerclage in women who are at great risk of cervical insufficiency, and the customization of surgical strategy can be used to improve quality maternal and newborn outcomes.

Keywords: Cervical insufficiency, Vaginal cerclage, Transabdominal cerclage, Preterm birth

INTRODUCTION

Cervical insufficiency is a major cause of pregnancy loss in the second trimester and preterm birth, being the case in about 0.1% to 1.0% of all pregnancies worldwide.[1, 2] It is defined by painless expansion

of the cervix, which frequently results in frequent losses of pregnancy during the mid-trimester or preterm birth among normal women.[3] Direct impacts of cervical insufficiency are high because preterm birth has been left as a major cause of neonatal morbidity and mortality among neonatal causes. It has caused 1 million deaths in the neonatal

category each year all over the world.[4, 5]

The primary intervention in preventing pregnancy loss among women with diagnosed cervical insufficiency is cerclage, which is the surgical support of the cervix.[6] Historically, vaginal cerclage, which was either transvaginal using McDonald or Shirodkar procedures, has been highly used as it is minimally invasive and has relatively good results.[7, 8] But in difficult situations of cervical deficiency, failed vaginal cerclages that occurred in previous, or complicated cervical anatomy, transabdominal cerclage has come into play.[5] Transabdominal cerclage is more invasive but may be placed at a higher cervical level, which could be of better mechanical support and less risk of late miscarriage.[9, 10]

Although a number of retrospective studies have been carried out to compare the two techniques, there is still debate on their relative effectiveness in enhancing perinatal outcomes like gestational age at birth, the survival of the newborn, and maternal morbidity.[11] According to current literature, although transabdominal cerclage could enhance pregnancy continuation in some cases where high-risk factors are present, there is a lack of strong prospective evidence comparing the two methods to each other.[12, 13]

Since the clinical significance of the optimization of outcomes is high in women with cervical insufficiency, a prospective comparative study of vaginal versus transabdominal cerclage is justified. Knowledge on which technique has better perinatal outcomes may inform a personalized approach to surgical decision-making, minimize the rates of adverse events, and improve the survival of neonatal patients. The current study aimed to compare the perinatal outcomes of vaginal and transabdominal cerclage among women with cervical insufficiency.

Methodology

This research was a prospective cohort study, which compared the outcome of perinatal outcomes between a woman who underwent vaginal cerclage and transabdominal cerclage on cervical insufficiency at high risk of preterm birth. The research was conducted at the Department of Obstetrics and Gynecology, MCH, PIMS Hospital during six months, between 1st April 2025 and 30th September 2025. All participants signed a written informed consent and the protocol of the study was reviewed and approved by the Institutional Ethical Review Committee.

The OpenEpi cohort study sample size calculator has been utilized to estimate the required sample size, which includes an estimated outcome rate difference between the two groups using already published

cohort data. Transabdominal versus transvaginal cerclage In a systematic review of studies that compared the outcomes of transabdominal and transvaginal cerclage, preterm birth and perinatal mortality were significantly lower in the transabdominal group (e.g., 8%-18% vs 18%-30%), which led us to use a relative risk reduction.[14] The minimum total sample size was calculated at 180 women (90 in each group) using a total sample size of 80, power of 80% , equal ratio of exposed to unexposed (1:1), and anticipated difference in outcome of primary perinatal, at a 95% confidence level.

The enrolment was done using non probability consecutive sampling. The inclusion criteria of the study included all eligible pregnant women reporting to the antenatal clinics or emergency department with the indications of cerclage and meeting the inclusion criteria throughout the study. Inclusion criteria were: pregnant women aged between 18-45 years; that had a confirmed singleton pregnancy; that had a diagnosis of cervical insufficiency based on clinical history (e.g., painless cervical dilatation, recurrent second trimester loss), or sonographic appearance warranting cerclage; that had a gestational age of between 12+0 to 24+0 weeks; and that had given written informed consent. The exclusion criteria were: multiple pregnancies, fetal abnormalities observed on ultrasound, active vaginal bleeding or chorioamnionitis, placenta previa, severe maternal comorbidities (e.g., uncontrolled hypertension, diabetes with end-organ damage), or contraindication to either cerclage procedure.

After the enrollment process, each participant received a structured proforma of the collection of baseline demographic and obstetric information. All the patients were clinically assessed carefully with a detailed obstetric history, physical examination, transvaginal ultrasound to measure the cervical length, and appropriate laboratory examination. The women were then assigned to go through a vaginal cerclage or transabdominal cerclage, depending on clinical measures, the opinion of the surgeon, past obstetric history (e.g., failed vaginal cerclage), and the choice of the patient. The vaginal cerclage was performed under regional or general anesthesia by using standard McDonald or Shirodkar methods, whereas transabdominal cerclage was done by laparotomy or laparoscopy at the discretion of the surgeon. The use of standard peri operative antibiotic prophylaxis and tocolytic protocols were based on institutional guidelines.

Perinatal outcomes were captured prospectively during the pregnancy and comprised of gestational age at birth, preterm birth rates (less than 37, less than 34, and less than 32 weeks), birth weight, neonatal intensive care unit (NICU) admission,

Apgar, and perinatal mortality. The maternal outcomes and problems associated with the processes of the cerclage (e.g., blood loss, infection, operative injury) were also reported. The analysis of data was conducted with SPSS version 25.0. Demographic and clinical analyses were done by calculating descriptive statistics; under normal distribution, mean and standard deviation were presented on continuous variables, whereas under skewed, medians and interquartile ranges were presented. Frequencies and percentages were used to show the categorical variables. The chi-square test and Fisher's

exact test of categorical variables and Student t test and Mann-Whitney U test of continuous variables were applicable in making comparisons between the vaginal and transabdominal cerclage groups. The comparison of primary perinatal outcomes between groups was done by calculating risk ratios (RR) at a 95% level of confidence interval (CI). The multivariate logistic regression was performed in order to correct the possible confounding factors, including maternal age, parity, and the number of previous preterm births. A p-value of below 0.05 was regarded as significant.

RESULTS

The researchers enrolled 180 women into the study, 90 of whom received vaginal cerclage and 90 received transabdominal cerclage. The demographic and clinical characteristics of the two groups at the baseline were similar. The average age of mothers in the vaginal cerclage group and the transabdominal group was 30.2 ± 4.5 years old and 31.1 ± 4.8 years old, respectively ($p=0.18$). At diagnosis, the median cervical length of the transabdominal group (16 mm [IQR 13-20]) was a little shorter than the vaginal group (18 mm [IQR 15-21]) but statistically insignificant ($p=0.09$). No significant difference was found between the groups in other characteristics, such as body mass index, parity, gestational age at cerclage, and history of the previous preterm birth, which means that the cohort was well matched to compare (Table 1).

The results of the maternal perioperative showed that transabdominal cerclage was characterized by the longer operating time ($p<0.001$) and higher intraoperative blood loss ($p<0.001$) than vaginal cerclage. The hospital stay days postoperative were also longer in the transabdominal (median 4 days [IQR 3-5]) as compared to the vaginal (median 1 day [IQR 1-2]) group ($p=0.001$). Nevertheless, the rates of the operative complications, such as postoperative infection and adverse events associated with cerclage, were minimal and similar across groups ($p>0.05$) (Table 2).

Women who delivered with transabdominal cerclage also delivered significantly later than those with vaginal cerclage ($p=0.002$). Before 37 weeks, the preterm birth rate was lower in the transabdominal (27.8%) than vaginal (50%), and the risk ratio was 0.56 ($p=0.003$). The mean birth weights of the neonates in the transabdominal category were also better ($p=0.001$), and the percentage of neonates admitted to the NICU was lower ($p=0.05$). The difference in perinatal mortality was not statistically significant ($p=0.22$) (Table 3).

The multivariate logistic regression analysis indicated that transabdominal cerclage was associated with a significant risk reduction of preterm birth (less than 37 weeks) over vaginal cerclage ($p=0.008$) when it was adjusted for the age of the women, the history of preterm birth, and cervical length measurement. A history of preterm birth ($p=0.028$) and cervical length below 15 mm ($p=0.015$) were found as independent risk factors of preterm birth (Table 4).

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Characteristic	Vaginal Cerclage (n=90)	Transabdominal Cerclage (n=90)	p-value
Mean maternal age (years)	30.2 ± 4.5	31.1 ± 4.8	0.18
Mean BMI (kg/m^2)	26.5 ± 3.2	27.0 ± 3.5	0.32
Primiparous, n (%)	35 (38.9%)	32 (35.6%)	0.65
Previous preterm birth, n (%)	28 (31.1%)	30 (33.3%)	0.73
Cervical length at diagnosis (mm, median [IQR])	18 [15-21]	16 [13-20]	0.09
Gestational age at cerclage (weeks, mean $\pm$ SD)	15.6 ± 1.8	16.0 ± 1.9	0.21

Table 2: Maternal Outcomes and Complications

Outcome	Vaginal Cerclage (n=90)	Transabdominal Cerclage (n=90)	p-value
Intraoperative blood loss (mL, mean $\pm$ SD)	75 $\pm$ 20	150 $\pm$ 30	<0.001
Operative time (minutes, mean $\pm$ SD)	35 $\pm$ 10	90 $\pm$ 15	<0.001
Postoperative infection, n (%)	3 (3.3%)	5 (5.6%)	0.47
Hospital stay (days, median [IQR])	1 [1–2]	4 [3–5]	<0.001
Cerclage-related complications, n (%)	2 (2.2%)	4 (4.4%)	0.41

Table 3: Perinatal Outcomes

Outcome	Vaginal Cerclage (n=90)	Transabdominal Cerclage (n=90)	Risk Ratio (95% CI)	p-value
Mean gestational age at delivery (weeks, mean $\pm$ SD)	35.2 $\pm$ 3.5	37.0 $\pm$ 2.8	–	0.002
Preterm birth <37 weeks, n (%)	45 (50%)	25 (27.8%)	0.56 (0.38–0.82)	0.003
Preterm birth <34 weeks, n (%)	20 (22.2%)	10 (11.1%)	0.50 (0.23–1.08)	0.07
Birth weight (g, mean $\pm$ SD)	2600 $\pm$ 450	2900 $\pm$ 400	<0.001	
NICU admission, n (%)	30 (33.3%)	18 (20%)	0.60 (0.36–1.00)	0.05
Perinatal mortality, n (%)	5 (5.6%)	2 (2.2%)	0.39 (0.08–1.90)	0.22

Table 4: Multivariate Logistic Regression for Risk of Preterm Birth (<37 weeks)

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Transabdominal vs Vaginal Cerclage	0.45	0.25–0.81	0.008
Maternal age >35 years	1.12	0.60–2.08	0.71
Previous preterm birth	2.05	1.08–3.88	0.028
Cervical length <15 mm	2.50	1.20–5.22	0.015

DISCUSSION

This prospective cohort study revealed that transabdominal cerclage (TAC) was linked with much improved perinatal outcomes than vaginal cerclage (TVC), in terms of longer gestational age of delivery, lower preterm birth rates, and decreased NICU hospitalizations. These results are consistent with the literature that is increasingly indicating that TAC might offer a better mechanical support to use especially in high-risk patients who have had a failed cerclage or have a severe cervical insufficiency.

We observed lower rates of preterm births overall in the TAC group than in the TVC group- a result in agreement with a recent meta-analysis that combined the results of 12 studies and found significantly lower rates of preterm birth and perinatal death in patients on TAC than on TVC (RR 0.49 and RR 0.36, respectively).[14] Other studies have found similar evidence with a cohort study with adjusted risk of early preterm delivery (<34 weeks) lower in the TAC than TVC group, especially in women with a prior failed attempt of TVC or multiple spontaneous preterm births.[15] These comparative statistics

support our conclusion that TAC provides a greater safeguard against preterm birth in patients who are preselected.

The systematic review of the improved fetal survival and lower perinatal mortality with TAC is also supportive of the observed trend with higher neonatal birth weights and lower NICU admissions in TAC group, but the quality of evidence is moderate because studies were not uniform.[14] This clinically indicates that an extension of pregnancy with TAC has the potential of favorable neonatal returns.

Our findings on the gestational age extension are supported by a number of observational studies. A retrospective review of laparoscopic TAC showed positive gestational results and a reduced number of very premature births than TVC, especially when TAC was implanted early or during pregnancy, which may indicate that timing has an effect.[16] Also, other cohorts and Japanese studies have reported that TAC is a dependable prevention of second trimester loss and aids pregnancy to extend to later gestational weeks, which again indicates its

usefulness in high risk profiles.[17]

In contrast, there are also studies that downplay the routine superiority of TAC. As an example, studies have indicated that combined interventions (e.g. vaginal progesterone plus cerclage) can decrease the risk of preterm birth further and it is argued that technique alone may not necessarily dictate outcome unless patient selection and adjunct care are taken into account.[18] Nevertheless, the overall conclusion of several trials and reviews is that TAC is equally effective as TVC and can be more helpful in high risk populations.

Our experiments also align with previous studies that demonstrated that in women with recurrent cervical insufficiency TAC preserves cervical length better than TVC over time giving us a mechanistic explanation as to why preterm births are less common.[19] Although this study was not incorporated in our quantitative synthesis because of its different design, it contributes to biologic plausibility of a higher physical position of cerclage on the cervix being more effective.

TAC does not have universal benefits as all studies do not indicate. There is some evidence that although TAC decreases the extremely early births, the differences in moderate preterm births (less than 32 weeks) might be less significant when corrected by the confounders, particularly among patients not exposed to TVC failure.[15] These overtones bring out the significance of patient stratification when comparing cerclage.

Moreover, local contextual investigations on cervical insufficiency have shown high term delivery rates after cerclage but they failed to show a specific difference between TAC and TVC.[20] These more generalizable results support the overall effectiveness of cerclage but underscore the necessity of doing more specific studies on technique comparisons, particularly when dealing with heterogeneous groups of obstetrics.

Lastly, clinical recommendations are also trending towards personalized decision-making on cerclage on risk factors including cervical length, obstetric history, and imaging characteristics; which states that TAC can be recommended some cases but does not always show indications of TAC should be used in all cervical-insufficient patients.[13]

The present study adds to the growing body of research supporting the idea that transabdominal cerclage is linked to better postpartum outcomes than vaginal cerclage in women with a history of unfavorable delivery or serious cervical anatomy. These results endorse the inclusion of patient specific risk assessment in cerclage decision making

algorithms and suggest the need to conduct randomized controlled trials to elucidate the best surgical procedures further.

This research supports the role of personalized choice of cerclage in women with cervical insufficiency. The results indicate that transabdominal cerclage (TAC) can be more effective in preterm birth prevention and better neonatal outcomes in patients at risk when they have previously failed vaginal cerclage or severe shortening of the cervix. These outcomes can help clinicians inform counseling and surgical planning, as well as risk stratification to make sure women who are the most likely to respond to TAC are identified. Also, the evidence suggests the incorporation of close antenatal monitoring and interdisciplinary care to maximize maternal and neonatal outcomes.

Although this study is prospective in nature, it has a number of limitations. First, the sample size was relatively small, though it was sufficient to identify the primary outcome differences, and was chosen in one tertiary care facility, which might decrease the generalization. Second, the assignments in the type of cerclage were not randomized, but were guided by clinical grounds and the decision of the patient-surgeon, which confounded possible selection bias. Third, the neonatal outcomes post-discharge were not measured in the long-term, and the adjunctive interventions like progesterone supplementation were not controlled equally. Lastly, although SPSS multivariate analysis accounted the major confounded variables, the unmeasured variables might have played a role in the reported differences in perinatal outcomes.

Conclusion

Transabdominal cerclage offers better perinatal outcomes than vaginal cerclage among women with high risks of cervical insufficiency. TAC was also linked with higher gestational age at birth, reduced rates of preterm birth, increased birth weights, and decreased NICU admission with no significant increase in maternal problems. These results highlight the importance of surgical planning based on the patient and imply that TAC should be highly recommended in women with history of failed cerclage or significantly shortened cervix. These benefits and the need to further refine the selection strategies of cerclage should be confirmed by future multicentric randomized trials with larger sample sizes and long-term neonatal follow-up.

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