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Pregnancy Outcomes Following Cervical Cerclage: A Prospective Observational Study From A Tertiary Care Centre In Tamilnadu

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ABSTRACT

Background: Cervical insufficiency is a known contributor to mid-trimester pregnancy losses and preterm births. Cervical cerclage, introduced by Shirodkar and McDonald in the 1950s, remains a primary intervention to prolong gestation in women with structural cervical weakness. The success of cerclage depends on patient selection, timing, and the indication for its placement.

Objective: This study aimed to evaluate pregnancy outcomes following cervical cerclage in women presenting with various risk factors and indications. It assessed gestational age at delivery, rates of miscarriage, term and preterm delivery, neonatal birth weight, and Apgar scores.

Methods: A prospective observational study was conducted at Government Chengalpattu Medical College and Hospital between February 2023 and January 2024. Fifty pregnant women who underwent cervical cerclage between 12 and 32 weeks of gestation were included. The participants were categorized based on cerclage indication: history-indicated, ultrasound-indicated, and rescue. Outcome measures included delivery timing, neonatal weight, Apgar scores, and associated complications.

Results: Most participants were aged 26–30 years and multiparous. Ultrasound-indicated cerclage was the most common indication (50%), followed by rescue and history-indicated types. Term delivery was achieved in 68% of cases. Higher birth weight and favorable Apgar scores were observed in cases with early and appropriately indicated cerclage. Better outcomes were associated with multiparity, spontaneous conception, absence of comorbidities, and cerclage placement between 14–20 weeks.

Conclusion: Cervical cerclage, particularly when placed electively based on ultrasound or obstetric history, significantly improves pregnancy outcomes. Timely intervention and proper case selection are essential to optimize maternal and neonatal prognosis.

Keywords: *Cervical insufficiency, Cervical cerclage, Preterm birth, Pregnancy outcome, Ultrasound-indicated cerclage.*

1. INTRODUCTION

Cervical insufficiency, historically described as the cervix being "so slack that it cannot keep in the seed," denotes the inability of the cervix to maintain a pregnancy to term without uterine contractions or labor pains, leading to second-trimester pregnancy losses or early preterm deliveries (1). The cervix, a crucial component of the lower uterine segment, maintains pregnancy integrity by remaining structurally intact until parturition, undergoing complex biochemical and biomechanical changes near term to facilitate fetal expulsion (2).

Preterm birth remains a significant contributor to perinatal morbidity and mortality, responsible for up to 70% of perinatal deaths and 36% of neonatal deaths (3). Cervical insufficiency has been implicated in 0.1–1.0% of pregnancies, and up to 8% among women with prior second-trimester losses (4). In response to this, cervical cerclage has emerged as a key intervention. The technique was introduced by Shirodkar in 1955 and modified by McDonald in 1957, and has since shown utility in prolonging gestation in women with a weakened cervix (5,6).

Cervical cerclage is categorized into three main indications: (1) history-indicated cerclage (HIC) for women with previous second-trimester losses due to painless cervical dilation, (2) ultrasound-indicated cerclage (UIC) when cervical length is <25 mm before 24 weeks in women with prior preterm birth, and (3) physical examination-indicated cerclage (PEIC), applied emergently upon detection of cervical dilation with bulging membranes (7).

Outcomes after cerclage vary depending on the indication and timing. Nelson et al. observed that elective cerclage was associated with a mean gestational age of 35.9 weeks and higher rates of term delivery compared to emergency cerclage (8). However, other studies such as those by Gluck et al. found no significant differences between emergency and elective cerclage groups in terms of neonatal outcomes (9). These inconsistencies necessitate further study.

This study aims to evaluate pregnancy outcomes in women undergoing cervical cerclage under different indications, analyzing rates of miscarriage, preterm, and term deliveries. By comparing these outcomes, clinicians can better determine the timing and necessity of cerclage, ultimately guiding decisions to improve maternal-fetal prognosis.

2. MATERIALS AND METHODS

This prospective observational study was conducted at the Department of Obstetrics and Gynaecology, Government Chengalpattu Medical College and Hospital, over one year from February 2023 to January 2024. The study population included pregnant women who underwent cervical cerclage during the current pregnancy and those admitted for the same procedure. Participants were recruited from both outpatient and inpatient services between 12 and 32 weeks of gestation.

Inclusion Criteria

- All pregnant women who had undergone cervical cerclage during the current pregnancy.
- All pregnant women admitted for cervical cerclage.
- Patients willing to participate in the study.

Exclusion Criteria

- Pregnant women unwilling to participate.
- Pregnant women with multiple gestations.

After obtaining written informed consent, comprehensive demographic, medical, obstetric, and personal histories were recorded. A total of 50 participants were enrolled based on the sample size calculated using the formula $N = 4pq/d^2$, assuming a prevalence (p) of 50% and an allowable error (d) of 14%. All participants were monitored throughout their antenatal period until delivery. At each follow-up visit, maternal vitals were recorded, fetal growth assessed, and patients were educated about warning signs of miscarriage and preterm labor. Details such as the gestational age at which cerclage was placed, the indication for the procedure (history-indicated, ultrasound-indicated, or rescue), delivery outcomes (miscarriage, preterm or term delivery), birth weight, and neonatal Apgar scores were meticulously documented.

Outcome Measures

Primary Outcomes:

- Gestational age at delivery (miscarriage, preterm, term)
- Pregnancy survival beyond viability (>24 weeks)

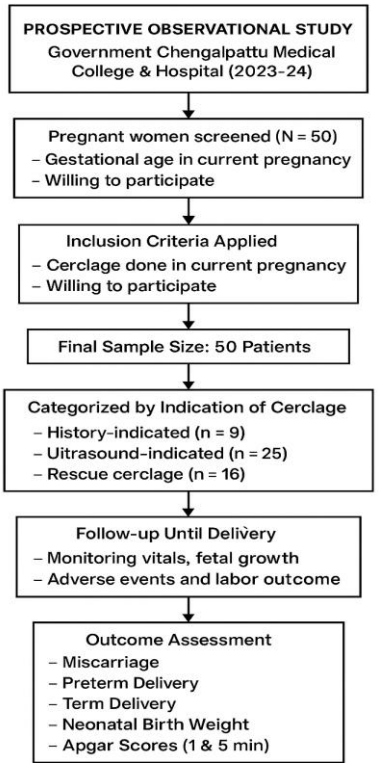
Secondary Outcomes:

- Birth weight categories (<1.5 kg, 1.6–2.5 kg, >2.5 kg)
- Apgar scores at 1 and 5 minutes

- Pregnancy outcomes by cerclage indication (history, ultrasound, rescue)
- Complications (e.g., PPROM, chorioamnionitis)
- Interval from cerclage to delivery
- Influence of mode of conception on outcomes

Data collection was carried out using structured interviews and maintained in Microsoft Excel. Statistical analysis was performed using SPSS version 27. Categorical data were presented as frequencies and percentages, while continuous variables were expressed as mean with standard deviation. A p-value of <0.05 was considered statistically significant.

3. STUDY FLOW CHART



4. RESULTS

The results of this study provide an overview of the demographic characteristics, clinical indications, and pregnancy outcomes among women who underwent cervical cerclage. Key variables such as age, parity, gestational age at cerclage, and mode of conception were analyzed. The study also explored delivery outcomes, birth weights, and neonatal Apgar scores. These findings offer insight into the effectiveness of cervical cerclage in improving pregnancy outcomes and contribute to the growing body of evidence supporting timely intervention in cervical insufficiency.

Table 1: Demographic Profile of Study Participants (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	21–25	18	36.0%
	26–30	27	54.0%
	>30	5	10.0%
Mean ± SD	—	26.62 ± 2.45	—

Variable	Category	Frequency (n)	Percentage (%)
Parity	Primiparous	16	32.0%
	Multiparous	34	68.0%
Mode of Conception	Spontaneous	32	64.0%
	Ovulation Induction	9	18.0%
	IUI	7	14.0%
	IVF	2	4.0%
Co-morbidities	None	42	84.0%
	First-degree	2	4.0%
	Second-degree	6	12.0%

Table 1 - The demographic analysis showed that most participants were aged 26–30 years and multiparous. Most conceived spontaneously and had no comorbidities. The distribution indicates a relatively healthy obstetric population with minimal underlying risk factors, providing a balanced baseline to assess the effectiveness of cervical cerclage on pregnancy outcomes.

Table 2: Clinical Indications for Cervical Cerclage and Associated Outcomes

Indication	Criteria	Timing	Associated Outcome
History-Indicated Cerclage	≥1 second-trimester loss or ≥3 preterm births	12–14 weeks	Reduced risk of miscarriage and preterm delivery
Ultrasound-Indicated Cerclage	Cervical length <25 mm before 24 weeks with prior PTB	14–24 weeks	Prolonged gestation and improved neonatal outcomes
Rescue Cerclage (Emergency)	Cervical dilation with visible membranes (no labor/infection)	≤24 weeks	Modest prolongation of pregnancy if timely performed
Transabdominal Cerclage (TAC)	Failed prior vaginal cerclage or very short/absent cervix	Pre-pregnancy or early first trimester	Higher fetal survival in selected high-risk patients
Elective Cerclage	Planned in high-risk cases with structural cervical abnormalities	12–16 weeks	Variable benefit; depends on patient selection

Table 2 - Highlights that history- and ultrasound-indicated cerclage are most consistently associated with better pregnancy outcomes, including reduced miscarriage rates and prolonged gestation. Historically, cerclage offers benefits when placed early in women with prior second-trimester losses. Ultrasound-indicated cerclage is effective in patients with short cervical length and previous preterm birth. Rescue cerclage may help salvage pregnancies in select cases. Transabdominal cerclage provides favorable outcomes for those with failed vaginal cerclage, while elective cerclage outcomes vary based on proper case selection.

Table 3: Factors Associated with Better Pregnancy Outcomes After Cervical Cerclage

Factor	Subgroup/Category	Associated Outcome
Type of Cerclage	History- or ultrasound-indicated	Higher term delivery rate, lower miscarriage rate
Gestational Age at Cerclage	14–20 weeks	Improved fetal survival and gestational prolongation
Parity	Multiparous women	Better cervical response and fewer complications
Mode of Conception	Spontaneous conception	Fewer adverse outcomes compared to assisted methods

Factor	Subgroup/Category	Associated Outcome
Absence of Comorbidities	No maternal medical illness	Reduced obstetric risk and better neonatal outcomes
Birth Weight	>2.5 kg	Indicates favorable fetal growth and term gestation
Apgar Score at 5 minutes	≥8	Reflects good immediate neonatal health

Table 3 - Outlines key factors linked to improved pregnancy outcomes following cervical cerclage. History- and ultrasound-indicated cerclage performed between 14 and 20 weeks showed higher success rates in prolonging gestation. Multiparous women and those who conceived spontaneously had more favorable outcomes, likely due to fewer anatomical or hormonal challenges. Absence of maternal comorbidities contributed to better maternal-fetal health. Additionally, higher birth weights and favorable Apgar scores reflected improved neonatal outcomes, emphasizing the importance of early and appropriate intervention.

5. DISCUSSION

This discussion evaluates key demographic and clinical variables influencing pregnancy outcomes following cervical cerclage, supported by recent literature that reinforces the effectiveness of early, indication-based intervention strategies.

Ravikumar et al[10]. reported that the average age of women undergoing cervical cerclage was approximately 26.9 years, closely aligning with our study population. This suggests that cervical insufficiency and related interventions are commonly managed in women of similar reproductive age, reinforcing our age-based demographic findings.

Andrea et al[11]. found that multiparous women were more frequently represented among those receiving cervical cerclage, similar to our observation. This correlation underscores that women with prior deliveries are more likely to be evaluated for cervical insufficiency, making multiparity a common factor in cerclage intervention.

Vasantha Lakshmi GN et al[12]. observed that ultrasound-indicated cerclage was the most prevalent type, followed by history and rescue cerclage. These findings mirror our results, highlighting the crucial role of transvaginal ultrasound in identifying short cervix and facilitating timely preventive cerclage.

Berghella et al[13]. performed a meta-analysis confirming that ultrasound-indicated cerclage in women with cervical length under 25 mm significantly reduced preterm birth rates. This evidence supports our findings and emphasizes the utility of cervical length screening as a reliable predictor of preterm delivery risk.

In a randomized controlled trial, To et al[14]. demonstrated that cervical cerclage in women with a short cervix significantly decreased preterm delivery incidence. These outcomes validate our observation that early cerclage based on ultrasound findings contributes to favorable pregnancy prolongation and neonatal survival.

Khan et al[15]. concluded that cerclage based on history and ultrasound yields superior results compared to emergency placement. Their study showed improved gestational age at delivery and neonatal outcomes, aligning with our findings that planned interventions lead to better perinatal health than delayed cerclage.

Althuisius et al[16]. compared therapeutic cerclage with bed rest in women with cervical dilation and found that cerclage extended pregnancy duration more effectively. This supports our findings that even in rescue cases, cerclage provides benefit, although less predictably than when applied electively.

Ishioka et al[17]. reported successful deliveries following cervical cerclage, particularly when placed early and electively. Their results support our study's outcomes, emphasizing how well-timed surgical intervention contributes to higher birth weights and improved Apgar scores in neonates.

Martin et al[18]. highlighted the influence of maternal health on pregnancy outcomes, reporting increased risks in the presence of comorbidities. Our study similarly found that the absence of comorbidities in 84% of participants likely contributed to the favorable pregnancy and neonatal outcomes observed.

6. CONCLUSION

Cervical cerclage, especially when performed electively based on prior obstetric history or ultrasound findings, has been shown to significantly enhance pregnancy outcomes by reducing the risk of preterm birth and miscarriage. The effectiveness of the procedure is closely linked to the timing of placement and the selection of appropriate candidates. Early identification of at-risk women, combined with judicious use of cerclage, plays a crucial role in improving both maternal and neonatal health and ensuring favorable perinatal results.

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