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# Pregnancy Outcomes after Cervical Cerclage

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**ABSTRACT**

**OBJECTIVE:** To assess maternal and neonatal outcomes following emergency cervical cerclage (ECC) in women with cervical incompetence.

**METHODOLOGY:** This prospective, observational cohort study was conducted at the Department of Obstetrics & Gynaecology, Liaquat National Hospital, Karachi, Pakistan, from December 2024 to September 2025. A total of 160 women aged 18 to 35 years with singleton pregnancies presenting during the second trimester and diagnosed with cervical incompetence based on clinical and ultrasound criteria were prospectively enrolled. Inclusion required a history of at least one previous second-trimester pregnancy loss and evidence of painless cervical dilation with or without bulging membranes. ECC was performed under aseptic conditions, with standardized perioperative monitoring and postoperative follow-up. Outcomes assessed included live birth rate, gestational age at delivery, interval from cerclage to delivery, neonatal birth weight, and maternal complications. Data were analyzed using SPSS 26.0.

**RESULTS:** Among 160 women, the mean maternal age at cerclage was 26.4±2.4 years, and the mean gestational age was 26.0±2.5 weeks. Mean cervical dilation was 2.3±0.8 cm. Live birth occurred in 156(97.5%) women. The mean interval from cerclage to delivery was 64.5±21.3 days. Mean gestational age at delivery was 32.4±4.3 weeks, with mean neonatal birth weight 1890±610g. Maternal complications included cervical laceration in 2(1.3%), deep vein thrombosis in 2(1.3%), and pulmonary edema in 1(0.6%).

**CONCLUSION:** The ECC demonstrates high rates of pregnancy prolongation and live birth, with minimal maternal morbidity.

**KEYWORDS:** Cervical cerclage, cervical laceration, deep vein thrombosis, live-birth, pulmonary edema.

## INTRODUCTION

Cervical incompetence represents a major contributor to 2nd trimester pregnancy loss and spontaneous preterm birth, affecting approximately 0.1% to 2% of pregnancies[1,2]. Cervical insufficiency is implicated in nearly 15% of recurrent mid-trimester losses, most commonly between 16-28 weeks of gestation[3]. Women at risk of cervical incompetence often present with a history of unexplained 2nd trimester pregnancy loss, preterm birth, or painless cervical shortening and dilatation in the absence of overt uterine activity or infection[4,5].

Cervical cerclage, first introduced by Shirodkar and later refined by McDonald, involves the placement of a suture around the cervix to reinforce structural integrity and prevent premature cervical opening[6]. Cervical cerclage is typically reserved for women diagnosed with cervical incompetence based on clinical history, ultrasonography (USG) findings, or acute cervical changes detected during pregnancy[7]. Emergency cervical cerclage (ECC) is utilized in cases where advanced cervical dilatation and bulging fetal membranes are evident, with the primary aim of extending pregnancy duration and improving neonatal survival[8]. Despite its potential benefits, the decision to perform ECC remains controversial due to heightened risks of procedure-related complications, such as infection, membrane rupture, or preterm labor, especially when membranes are already exposed to the vaginal environment[9,10]. Data suggest that, with careful patient selection and adherence to stringent preoperative criteria including the exclusion of active uterine contractions, significant bleeding, or signs of infection, ECC can achieve remarkably high rates of pregnancy prolongation and live birth (around 90%) for live infant delivery without significant severe maternal or neonatal complications[11].

Given these considerations, this study seeks to evaluate the effectiveness, safety profile, and neonatal outcomes associated with cervical cerclage in women presenting with advanced cervical dilatation and bulging fetal membranes. This study aims to clarify the therapeutic value and risk profile of ECC, thereby informing best practices and improving outcomes for women with cervical incompetence at imminent risk of preterm birth. The objective of this study was to assess maternal and neonatal outcomes following ECC in women with cervical incompetence.

## METHODOLOGY

This prospective, observational cohort study was conducted from December 2024 to September 2025 at the Department of Obstetrics & Gynaecology, Liaquat National Hospital, Karachi, Pakistan. Approval from the Institutional Ethical Committee was sought (1039-2024-LNH-ERC, dated December 27th, 2024). A sample size of 160 was calculated using the online OpenEPI sample size calculator, assuming a 88.2% success rate of live births following ECC, with 95% confidence and a 5% margin of error[12]. The study included women aged 18 to 35 years who presented during the 2nd trimester with a clinical and USG-confirmed diagnosis of cervical incompetence. Eligible participants were required to have a history of one or more 2nd trimester pregnancy losses and to demonstrate painless cervical dilation with or without bulging fetal membranes on examination. Only women with singleton pregnancies and viable fetuses, as confirmed by USG, were considered for enrollment. Informed written consent was obtained from all participants. Women were excluded if they were in active labor, exhibited clinical or laboratory signs of intrauterine infection (such as maternal fever, leukocytosis, or elevated C-reactive protein), or had evidence of ruptured membranes or significant vaginal bleeding at the time of assessment. Women with known major fetal anomalies, multiple pregnancies, or any maternal medical condition precluding surgery or anesthesia were also not included. Women with a contraindication to cerclage placement, such as prolapsed membranes that could not be reduced or cervical dilation exceeding five centimeters, were also excluded.

At the time of the procedure, details about demographic and obstetrical characteristics were documented. The number of previous miscarriages and history of prior live births were also recorded. All cerclage procedures were performed under aseptic conditions in an operating theatre by experienced obstetricians, following standardized protocols for ECC placement. Patients received prophylactic antibiotics per institutional policy, and perioperative monitoring was maintained throughout hospitalization. Following the procedure, patients were closely observed for maternal complications, including hemorrhage, cervical laceration, pulmonary edema, deep vein thrombosis, or any signs of infection. Standardized post-cerclage care and monitoring protocols were employed, and any adverse events were recorded. A standardized antenatal follow-up protocol was used for all participants. After cerclage placement, women were monitored in-hospital for 24–48 hours and subsequently followed in the antenatal clinic every 1–2 weeks until 28 weeks' gestation, and then weekly until delivery. Maternal outcomes were documented throughout the course of pregnancy, up to delivery. Women were followed prospectively until delivery, with regular antenatal visits and detailed monitoring of pregnancy progression. The primary outcome was the rate of live births following ECC. Secondary outcomes included the interval from cerclage to delivery, gestational age at delivery, neonatal birth weight, and the occurrence of maternal complications such as cervical laceration, pulmonary edema, deep vein thrombosis, hematosepsis, and maternal death. Data were analyzed using IBM SPSS Statistics, version 26.0. Continuous variables were presented as mean ± standard deviation (SD) or median and interquartile range (depending on the distribution). Categorical variables were summarized as frequencies and percentages.

## RESULTS

In a total of 160 women, the mean maternal age at the time of cerclage placement was 26.4±2.4 years. The mean gestational age at cerclage was 26.0±2.5 weeks, and the mean cervical dilation was 2.3±0.8 cm. There were 35(21.8%) women who had > 2 previous miscarriages, while 16(10./0%) had 1 prior live-births. **Table I** shows the characteristics of women undergoing emergency cervical cerclage.

**Table I: Characteristics of women undergoing emergency cervical cerclage (N=160)**

| Characteristics | | Frequency (%) |
|---|---|---|
| Age (years) | 18-25 | 54 (33.8%) |
| | 26-35 | 106 (66.2%) |
| Previous miscarriages | 1 | 39 (24.4%) |
| | 2 | 86 (53.8%) |
| | >2 | 35 (21.8%) |
| Prior live-births | 0 | 144 (90.0%) |
| | 1 | 16 (10.0%) |

Of the 160 women, 156 (97.5%) had live births, while 4 (2.5%) experienced pregnancy loss. The mean interval from cerclage placement to delivery was 64.5±21.3 days. The mean gestational age at delivery was 32.4±4.3 weeks, and the mean neonatal birth weight was 1890±610 grams. **Figure 1** shows the distribution of gestational age at the time of outcome.

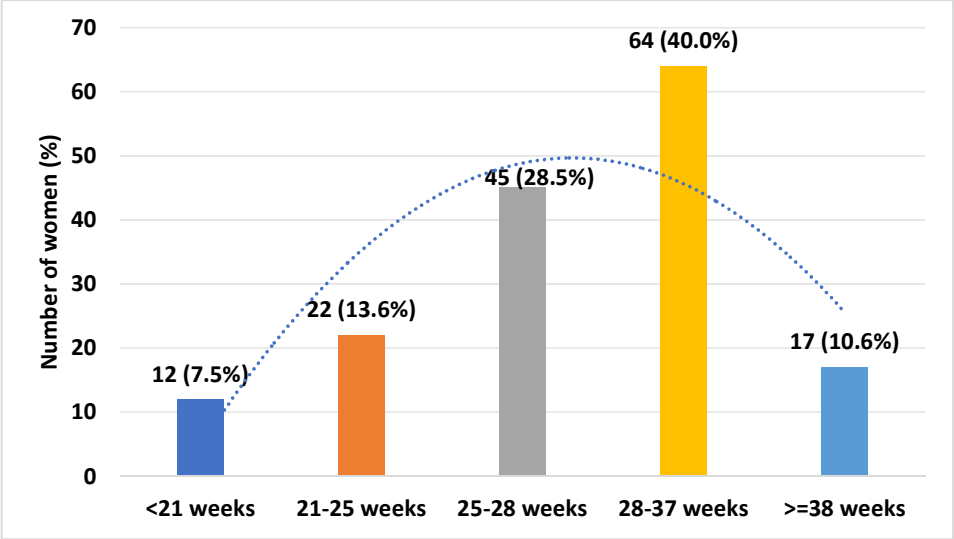


**Figure 1: Gestational age at the time of outcome (n=160)**

There were no cases of maternal death or hematosepsis. Cervical laceration occurred in 2 (1.3%), deep vein thrombosis in 2 (1.3%), and pulmonary edema in 1 (0.6%) woman. **Figure 2** shows the frequency of maternal complications following emergency cervical cerclage.

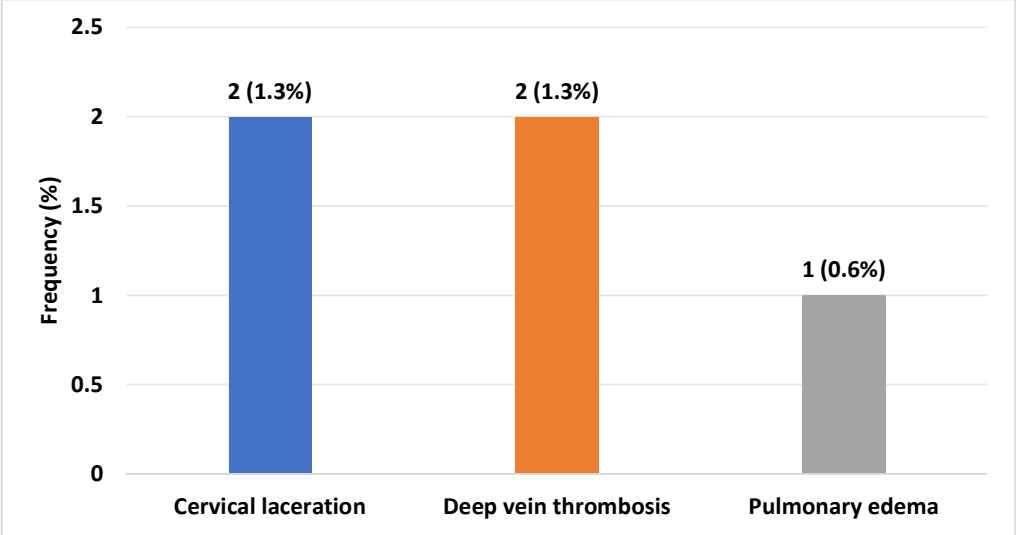


**Figure 2: Frequency of maternal complications following emergency cervical cerclage (N=160)**

## DISCUSSION

The application of ECC in this study demonstrated a live birth rate of 97.5%. This proportion is higher than that observed by **Kumari et al.,**[13] who reported on 43 pregnancies that underwent mid-trimester ECC and found an overall live birth rate of 86.4%, with singletons and twins showing success rates of 91.3% and 80%, respectively. Differences in patient selection, particularly regarding gestational multiplicity, likely contribute to variations in outcomes. **Memon et al.,**[14] in a local study observed a live birth rate of approximately 87-92% in USG indicated and history indicated cerclage patients, highlighting the generally favorable prognosis for appropriately selected women, yet also suggesting that ECC when applied as a rescue intervention can still yield outcomes approaching those of prophylactic approaches. In terms of prolongation of pregnancy, the mean suture-to-delivery interval of 64.5±21.3 days observed aligns with the findings reported by **Yi et al.,**[9] who found that ECC achieved a median latency of 84 days compared to 63 days in a conservatively managed group. The difference in latency may partially relate to gestational age at cerclage placement, which in the present study averaged 26.0 weeks, within the range examined in **Yi et al.**[9] cohort study (24-28 weeks). Prolonged latency after cerclage is clinically important, as each additional week in utero improves neonatal outcomes by allowing for further fetal growth and organ maturation. The relationship between latency and gestational age at cerclage placement has also been documented by **Hong et al.,**[15] where earlier placement in gestation correlated with greater duration of pregnancy maintenance.

The mean gestational age at delivery in this study was 32.4±4.3 weeks, with a mean birth weight of 1890 grams. Comparison with the work of **Chen et al.,**[16] reveals that physical examination-indicated rescue cerclage is typically associated with earlier delivery and lower birth weights than history or USG indicated cerclage. **Chen et al.,**[16] found that the median gestational age at delivery in the physical examination group was 26.1 weeks, notably lower than the 37.3 and 35.4 weeks for the history and USG indicated groups. The present findings thus suggest that timely ECC can allow pregnancy to progress beyond the very preterm period, thereby improving neonatal survival and reducing severe morbidity, even in women presenting with advanced cervical changes. **Huang et al. 17 also highlighted that USG indicated that cerclage conferred a** longer duration from suture to delivery and higher birth weight. The relatively high mean gestational age at delivery observed in the current study may reflect a combination of strict patient selection, prompt intervention, and standardized post-cerclage monitoring.

Analysis of neonatal outcomes demonstrates that most deliveries occurred after the threshold of viability, with 40% delivering between 28 and 37 weeks and 10.6% at or beyond 38 weeks. This distribution implies that a significant proportion of infants benefit from the procedure by achieving at least late preterm status, which is associated with better respiratory and neurological outcomes compared to earlier gestations. **Edoo et al. 18 observed a similar distribution in their four-year retrospective review, in which** elective cerclage resulted in a take-home baby rate of 88.7% and gestational age at delivery ranged from 24 weeks to full term. The low rate of extremely preterm deliveries (<21 weeks: 7.5%) and the achievement of late preterm or term status in over half of cases underscore the potential for ECC to improve neonatal outcomes.

The present study also investigated maternal morbidity associated with ECC. The absence of maternal deaths, or hematosepsis, and the low incidence of cervical

laceration (1.3%), deep vein thrombosis (1.3%), and pulmonary edema (0.6%) are consistent with published safety profiles for the procedure[19]. **Paliwal et al.,**[20] also found comparable rates of maternal complications, reporting five miscarriages, two intrauterine fetal deaths, and four early neonatal deaths among 78 cases, with few severe maternal adverse events. **Kumari et al.,**[13] revealed that maternal complications were observed in 56.5% of patients, but composite morbidity was higher in twin pregnancies. The lower complication rate in the present study may reflect exclusive enrollment of singleton pregnancies, rigorous patient screening, adherence to aseptic protocols, and comprehensive perioperative monitoring. These findings reinforce that ECC, when performed in an optimal setting with careful patient selection, does not expose women to undue maternal risk[21,22].

The clinical implications of the present findings are significant. ECC offers a viable and effective strategy for prolonging pregnancy in women with cervical incompetence. In settings where access to universal cervical length screening or routine prophylactic cerclage is limited, ECC represents an important tool for reducing rates of mid-trimester pregnancy loss and extreme prematurity. The high success rate and low complication profile observed suggest that, with careful patient selection and standardized care protocols, the risks are outweighed by the benefits. Importantly, the study reinforces the critical role of ongoing surveillance after cerclage, including regular antenatal visits and prompt management of complications, to optimize maternal and neonatal outcomes.

While the present study demonstrates encouraging results, certain limitations merit discussion. The lack of a concurrent control group (either expectant management or alternative interventions) limits the ability to make causal inferences about the effects of ECC versus other treatments. Future research could address this by incorporating randomized or matched comparison groups more effectively to delineate the magnitude of the benefit attributable to cerclage. The exclusion of multiple gestations and women with certain maternal comorbidities may restrict the generalizability of findings to all women with cervical insufficiency. However, this approach minimizes confounding and aligns with best-practice selection criteria for cerclage. A further limitation is the lack of long-term follow-up on neonatal outcomes, including neurodevelopmental status and long-term health, as most outcomes were measured at the point of hospital discharge. Studies should include prospective longitudinal follow-up to assess the durability of benefit and identify any late-emerging adverse events. The study relied on stringent exclusion criteria for infection and advanced cervical changes, which may not be feasible in all clinical environments. The standardization of perioperative care, including antibiotic prophylaxis, was maintained, but variations in surgical technique or operator experience were not controlled for, potentially introducing variability in outcomes. Future multicenter studies, using standardized protocols across diverse clinical settings and including both singleton and multiple gestations, would improve the external validity of the results. Incorporation of emerging biomarkers of inflammation and cervical remodeling may also enhance pre-procedural risk stratification and patient selection.

## CONCLUSION

Emergency cervical cerclage demonstrates high rates of pregnancy prolongation and live birth, with minimal maternal morbidity. Emergency cerclage should remain a central component of the obstetric toolkit for cervical insufficiency, particularly in settings where prophylactic approaches are not possible or when women present late in the course of cervical change. Efforts to improve early identification of women at risk, ensure adherence to exclusion criteria, and standardize post-cerclage monitoring will further enhance outcomes.

**Ethical Permission:** Liaquat National Hospital and Medical College, Karachi, Pakistan, ERC letter No. 1039-2024-LNH-ERC.
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**Data Sharing Statement:** The corresponding author can provide the data on reasonable request. Privacy or ethical restrictions bound us from sharing the data publicly.

## AUTHOR CONTRIBUTION

Taj A**:** Conception and design, data collection and synthesis, responsible for data's integrity, Proofreading, and approved for final publication**.**
Akram F**:** Data collection, drafting, critical revisions, approved for publication.
Rind R**:** Data collection, data analysis, drafting, critical revisions, approved for publication.

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