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Descriptive Analysis of Cervical Insufficiency in Primigravida: Insights into Cerclage Intervention and Clinical Impact

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ABSTRACT

Background: Cervical incompetence (CI) is a severe obstetric disorder that can result in pregnancy loss in the second trimester and preterm birth. Cervical cerclage is a routinely utilized method for treating CI, however its efficacy in primigravida individuals requires further investigation. This study aimed to find the frequency of cervical incompetence requiring cervical cerclage in patients entering their second trimester.

Methods: This descriptive case series took place at Fatima Memorial Hospital, Lahore, Pakistan, within the six months from June 2024 to January 2025. The study included 160 primigravida individuals to determine the prevalence of cervical incompetence necessitating cerclage in the second trimester and assess delivery outcomes. Data was collected using a standardized questionnaire that included demographics, cervical length, and delivery outcomes. Patients with a cervical length of less than 2.5 cm were diagnosed as having CI and underwent cerclage. Data was analyzed using SPSS version 25.0.

Results: Out of the total subjects, 32 (20%) were diagnosed with CI. Among these, 17 (53.1%) delivered full-term (≥37 weeks), 11 (34.4%) had preterm births (<37 weeks), and 4 (12.5%) miscarried (<24 weeks). All 128 patients without CI had full-term deliveries (100%). The chi-square test revealed a significant difference in full-term delivery rates between patients with and without CI ($p < 0.001$).

Conclusion: This study discovered a 20% frequency of cervical incompetence among primigravida patients. Cervical cerclage increased the likelihood of full-term delivery; yet, preterm births and losses continued in a sizable number of patients.

Keywords: Cervical insufficiency, Cervical Cerclage, Pregnancy Trimester

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INTRODUCTION

Cervical incompetence (CI) is described as the inability of the cervix to maintain a pregnancy without uterine contractions or labor [1]. It is distinguished by a painless, gradual dilation of the uterine cervix in the second or early third trimester, which results in membrane prolapse, premature rupture of the membranes, second-trimester pregnancy loss, or preterm birth. Statistics show that cervical incompetence causes 8% of second-trimester miscarriages and preterm deliveries [2]. Preterm birth is defined as a birth that occurs before the completion of 37 weeks of gestation and accounts for 75% of overall neonatal deaths. Cervical insufficiency is a structural deficit that prevents the cervix from maintaining its integrity [3,4]. If this congenital incompetence is diagnosed during the first pregnancy, cerclage can be performed, preventing the patient from having an abortion. CI is diagnosed with a history and clinical examination. Hysterography, pull-through techniques with catheter balloons or cervical dilators, and ultrasound scanning are the tests that help in diagnosis [5,6].

Cervical ultrasonography has emerged as a therapeutically helpful screening and diagnostic technique for high-risk women with a history of early spontaneous preterm birth. Transvaginal ultrasound often reveals a short cervical length of less than or equal to 25mm, or funneling, inflation of the membranes into a distended internal OS, but a closed external os[7]. One study investigated changes in cervical markers and their link to pregnancy outcomes. The study found that the rate of cervical incompetence was 1.25%. The average cervical length was 3.49±0.53 cm, whereas the average internal OS diameter was 3.75±1.5 mm. The shorter the cervical length, the lower the gestational age at delivery. The study concluded that cervical length and diameter of internal OS are very important cervical parameters for cervical incompetence [8].

A study evaluated the efficacy of transvaginal sonography to determine the incidence of cervical insufficiency in this area [9]. The study found that 72% of the women underwent surgery and had a cervix length of less than 2.5 cm, whereas 28% had a cervix length of more than 2.5 cm at the initial transvaginal sonographic evaluation, [10,11]. A case study discovered cervical dilatation in a 31-year-old pregnant woman who had an experience with premature birth. The study reported significant pelvic pain, premature contractions, and amniotic fluid discharge [12,13]. An emergency abdominal sonogram revealed polyhydramnios and umbilical cord prolapse. The cervical diameter measured 45 mm, while the length was 19 mm, [14,15]. The internal OS was opened, revealing obvious funneling and a protruding fetal leg. The fetus was born by cesarean section and died around 24 hours later. This discovery emphasized the necessity of ultrasonography for obstetricians and neonatologists. While much work has been done, the existing studies lacked focused data on cervical incompetence in primigravida, and the use of inconsistent diagnostic criteria raised questions on the efficacy of cerclage. The study was needed to establish population-specific evidence that could guide targeted treatments to avoid preterm births and miscarriages in first-time pregnancies.

This study aimed to find the frequency of cervical incompetence requiring cervical cerclage in patients entering their second trimester. This study also compared the frequency of full-term birth in patients with cervical incompetence requiring cervical cerclage vs patients without cervical incompetence.

METHODS

It was a descriptive case series that was carried out at Fatima Memorial Hospital, Lahore, after IRB approval FMH-IRB-1514. The duration of the study was six months from June 2024 to January 2025. A total of 160 cases were included using consecutive (non-probability) sampling and calculated using a Z-score, ensuring statistical reliability with a 95% confidence level[16]. Formal permission was taken from the hospital's ethical committee to conduct the study. Informed written consent was taken from patients. Privacy and confidentiality were maintained.

Inclusion criteria included primigravida with a singleton pregnancy from 14–22 weeks of gestation. Multigravida and twin pregnancies were excluded from the study. All patients were subjected to ultrasound between 14–22 weeks of gestation. Transvaginal ultrasound was used in all patients to assess cervical parameters, including cervical length in mm and the presence or absence of funneling of the cervical OS. Those with cervical length less than 25mm were subjected to cervical cerclage after taking informed consent. They were followed up till pregnancy outcomes. Those with normal cervical length were kept on for follow-up for cervical length measurement using ultrasound.

Data was collected using a standardized questionnaire that included demographics, cervical length, and delivery outcomes. Patients with a cervical length of less than 2.5 cm were diagnosed as having CI and underwent cerclage. Data was analyzed using SPSS version 25.0, including descriptive statistics and chi-square tests for statistical comparisons.

RESULTS

Table 1: Demographic Characteristics of Study Participants

Variable	CI Group (n=32)	Non-CI Group (n=128)
Maternal Age (years)	25.3 ± 4.1	24.8 ± 3.9
Gestational Age at Diagnosis (weeks)	18.2 ± 2.3	18.5 ± 2.1
BMI	23.5 ± 3.2	24.1 ± 3.0
Ethnicity (% Punjabi)	78%	82%
Socioeconomic Status (Lower/Middle)	65%	60%

The data was collected for 160 patients using the standardized questionnaire, which included demographics, cervical length, and delivery outcomes. The demographic data is shown in **Table 1.**

Table 2: Prevalence of Cervical Incompetence

Cervical incompetence	Number of cases	Percentage (%)
Present	32	20
Absent	128	80
Total	160	100

Among the cases included in the study, 32 patients (20%) were diagnosed with cervical incompetence, defined as having a cervical length <2.5 cm. Out of a total of 160 cases, 32 patients were diagnosed with cervical incompetence (CI) and underwent cerclage. The age of delivery for these patients was analyzed and categorized as full-term (≥37 weeks), preterm (<37 weeks), and miscarriage (<24 weeks). Among the 32 patients, 17 (53.1%) had full-term deliveries, 11 (34.4%) delivered preterm, and 4 (12.5%) experienced miscarriages **(Table 2)**.

Table 3: Delivery Outcomes of Patients with Cervical Incompetence Undergoing Cerclage

Outcome	Number of Cases	Percentage %
Full Term (>37 weeks)	17	53.1
Pre-Term (24 to 36+6 weeks)	11	34.4
Miscarriage (<24 weeks)	4	12.5
Total	32	100

The frequency of full-term births was compared between patients with cervical incompetence (CI) requiring cerclage and those without CI. Among the 128 patients without CI, the full-term birth rate was 100%. In contrast, among the 32 patients with CI who underwent cerclage, 17 (53.1%) achieved full-term delivery. The Chi-Square Test revealed that the difference in full-term birth rates between the two groups was statistically significant ($p < 0.001$) **(Table 3)**.

Table 4: Comparison of Full-Term Births between Patients with and Without Cervical Incompetence (CI)

Group	Full Term Birth	Percentage (%)	p. value
No C. I	128	100	<0.001
Patients with C. I	17	53.1	

Patients without cervical incompetence had shown a 100% (128/128) full-term birth while patients with cervical incompetence had shown a 53.1% rate (17/32) full-term birth with a statistically significant p-value (<0.001), suggesting that patients with cervical incompetence had complications regarding full-term birth in comparison to those without this condition **(Table 4)**.

DISCUSSION

This study evaluated the prevalence of cervical incompetence (CI), the efficacy of cervical cerclage in improving pregnancy outcomes, and the difference in full-term delivery rates between patients with and without CI. The prevalence of cervical incompetence in the study sample was 20%, which is comparable with earlier research that found CI incidence ranging from 8% to 22% in high-risk obstetric groups. One study showed an 18% prevalence, supporting the fact that CI is a prevalent cause of mid-trimester pregnancy loss and premature birth. Similarly, another study discovered that CI prevalence ranges from 10 to 25%, depending on diagnostic criteria and patient selection [17].

Patients diagnosed with CI and treated with cerclage had 53.1% full-term deliveries, 34.4% preterm deliveries, and 12.5% miscarriages. These findings are similar to those reported by a study that found a full-term birth rate of 55% among cerclage-treated patients, a 35% preterm birth rate, and a 10% miscarriage rate [18]. Similarly, one study discovered that cerclage considerably increased the likelihood of full-term delivery, but a large proportion of patients still had preterm birth. One recent meta-analysis indicated that cerclage lowers preterm birth in high-risk individuals but does not eliminate the risk of unfavorable pregnancy outcomes [19]. These studies align with the findings of this study, reinforcing the effectiveness of cerclage while also emphasizing the need for additional interventions.

The comparison of full-term birth rates between patients with and without CI emphasizes the negative impact of this condition. All patients without CI had full-term deliveries (100%), but 53.1% of patients with CI required cerclage. This difference was statistically significant ($p < 0.001$), validating with the results of one study of a considerable divergence in full-term birth rates between the CI and non-CI groups [20]. Furthermore, research found that patients with CI who did not receive cerclage had a greater likelihood of second-trimester pregnancy loss, indicating the importance of cerclage in improving pregnancy outcomes [21].

The outcomes of this study highlight the significance of early cervical length screening in identifying patients at risk for cervical insufficiency [22,23]. Adjunctive therapy such as progesterone supplements, lifestyle changes, and frequent prenatal monitoring may also enhance pregnancy outcomes in this high-risk group [24]. Optimizing management options requires a multidisciplinary approach tailored to specific patient needs. One study made similar suggestions in their investigations, indicating that combining cerclage with other preventive measures can improve pregnancy outcomes [25,26].

While the study gives useful information, some limitations must be addressed. The sample size was limited, which may restrict the generalizability of the results. Furthermore, the study failed to account for confounding factors such as the effect of adjuvant therapy, such as progesterone supplementation. The lack of long-term neonatal outcomes limits the capacity to thoroughly analyze cerclage effectiveness after delivery. Future research with bigger sample numbers, more influencing factors, and longer follow-up periods is recommended to better our understanding and management of cervical incompetence.

CONCLUSION

The prevalence of cervical incompetence in the study population was discovered to be 20%. Patients diagnosed with CI and treated with cerclage had 53.1% full-term deliveries, 34.4% preterm deliveries, and 12.5% miscarriages. These results show that cervical cerclage improves the likelihood of full-term birth in patients with cervical incompetence. All patients without CI achieved full-term delivery (100%), whereas only 53.1% of patients with CI and cerclage delivered at full term. This finding emphasizes the adverse impact of CI on pregnancy outcomes and underscores the importance of early diagnosis and timely intervention.

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CONFLICT OF INTEREST

None

ETHICAL APPROVAL

The study received ethical approval from the Fatima Memorial Hospital College of Medicine and Dentistry under reference number (FMH-IRB-1514).

AUTHORS' CONTRIBUTIONS

All Authors Contributed Equally as per ICMJE

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