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Cervical Cerclage: Prolonging Gestational Period for Successful Pregnancy Outcome

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Abstract

Background: Cervical Cerclage may be an effective treatment option in true cervical insufficiency. Cervical function plays a crucial role to protect growing fetus in utero in maintaining successful pregnancy. As the gestational weeks progress, the cervix undergoes dynamic changes, including softening and shortening, to accommodate fetal growth.

Objective: The objective of this study is to evaluate the effectiveness and outcome of cervical cerclage placement as a preventive measure against recurrent pregnancy loss and preterm delivery and its complications, to analyze pregnancy outcomes among participants who received cervical cerclage and to investigate the relationship between cervical cerclage and pregnancy outcome based on gestational age.

Method and Materials: The study was conducted over three years at CMH, Jashore and Ibn Sina Hospital Jashore, utilizing a retrospective and longitudinal interventional approach. Ethical approval was obtained before commencing the study, which involved 92 cases undergoing mid-trimester cervical cerclage. Cervical length measurements, cervical cerclage using the McDonald technique, and subsequent medical management were performed with outcome analyzed using descriptive statistics and odds ratio. Data were analyzed retrospectively through SPSS data analysis tool.

Result: 45.65% of patients experienced term deliveries, while 33.70% had preterm deliveries, with 20.65% facing abortions. Distinct inclusion criteria unveiled diverse outcomes, such as recurrent pregnancy loss cases showing 40.82% preterm and 38.78% term deliveries. Odds ratios highlighted cervical length's significance, with a 0.25 ratio indicating reduced preterm risk. Interestingly, 61.69% of preterm births occurred between 34 and 36 weeks. Maternal outcomes indicated low incidence rates of hemorrhage (4.8%), infections (1.1%) and cervix laceration (2.4%).

Conclusion: The study underscores cervical cerclage's potential in enhancing full-term pregnancies, particularly for patients with cervical incompetence. While highlighting its success, the study also acknowledges associated risks and complications.

Keywords: Cervical cerclage, cervical incompetence, gestational age, ultrasound assessment, Odds ratio, incidence rates.

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Introduction:

Cervical function denotes a physiological process aligned with the stages of pregnancy. This process primarily entails the progressive softening of the cervix as gestational weeks advance, accompanied by the gradual shortening of the cervix in response to fetal growth. Furthermore, as contractions emerge and escalate, there is an incremental occurrence of both cervical shortening and dilatation. Instances where cervical maturation processes unfold contrary to the prevailing pregnancy status entailing softening, shortening, or even dilatation of the cervix without apparent cause may be classified as instances of cervical insufficiency (CI).[1] Cervical incompetence is a risk factor for adverse pregnancy outcomes and can cause habitual abortion during 16-28 weeks.[2] Its incidence varies between 0.05% and 2% among the obstetric population, but in women with a history of recurrent mid-trimester losses, it is estimated to occur in 8% of cases.[3] Its role as an important component of the preterm birth syndrome is one of the main causes of miscarriage and preterm fetal birth in mid-to-late pregnancy.[4-6] The onset of CI is usually earlier than 27 weeks of gestation. Whatever the cause of the onset of parturition, the final common pathway in the cascade of events leading to premature loss is cervical shortening and dilatation,

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hence cervical cerclage is a primary prevention technique. A "weak cervix" may receive some structural support from the cerclage, but it may actually play a more significant role in preserving the cervical length and the endocervical mucus plug as a mechanical barrier to ascending infection.[7] The percentage of term births increased to 95.4% after cervical cerclage in women who underwent the McDonald surgery for cervical incompetence. The mean gestational age of delivery was 35 weeks.[8] However, there are no standard definitions for its current choice of timing for surgical treatment. In order to examine the impact of the timing of cervical cerclage treatment on the pregnancy outcome in pregnant women with CI, the clinical data of 92 pregnant women with CI were sampled.

Method and Materials:

Conducted across multiple centers, employing a retrospective and longitudinal interventional approach, the study titled "Cervical Cerclage: Extending Gestational Period to Enhance Positive Pregnancy Results" was undertaken within the Department of Obstetrics and Gynecology at CMH, Jashore and Ibn Sina Hospital Jashore. The study initiative spanned a comprehensive duration of 3 years, commencing from 21st August 2020 to 20th August 2023.

The primary objective of this investigation was to assess the effectiveness of cervical cerclage in prolonging the gestational timeframe, consequently leading to more favorable pregnancy outcomes. Ethical approval was taken from the Ethical Committee of CMH, Jashore and official permission from Ibn Sina Hospital, Jashore, before the commencement of the study. Over the course of the research period, a total of 92 cases were enrolled, encompassing patients who underwent cervical cerclage during the mid-trimester. Thorough scrutiny was applied to the medical records associated with these cases. The measurement of cervical length was conducted within a sealed endocervical canal. Application of fundal pressure persisted for a span of 30 seconds to identify instances of cervical shortening and funneling.

Patients were classified as having a heightened susceptibility to preterm delivery when the cervical length registered less than 25 mm before the 27th week of gestation.[9] Women with multifetal gestations, significant vaginal bleeding, preterm premature rupture of the membranes or persistent uterine contractions were excluded from the study group. Cerclage placements were performed as a technique of McDonald. Women got 100 mg of indomethacin suppository, 1 gram of ampicillin intravenously every 6 hours, and 500 mg of metronidazole intravenously every 12 hours for 24 hours following the procedure. For 48 hours, patients had to stay in bed.. Patients were restricted to bed rest for 48 hours. Prophylactic tocolysis was not used. Cervical cerclage sutures were removed at 36 weeks gestation or when the membranes were ruptured. Descriptive statistics, including frequencies and percentages, were used to summarize participant demographics and pregnancy outcomes. Odds ratios were calculated to assess the relationship between cervical length, dilatation, and preterm delivery. The SPSS statistics Package was used to conduct the statistical analysis.

Result:

Table-I

Characteristics of demographical data (n=92).

Variable	Frequency	Percentages
Age		
21-25	26	28.26
26-30	29	31.52
31-35	37	40.22
Mean ± SD	30.67 ± 4.49	
BMI (Body mass index)	25.5 ± 3.32	

The age groups are categorized as "21-25," "26-30," and "31-35," with respective frequencies of 26 (28.26%), 29 (31.52%), and 37 (40.22%). The mean age of participants is 30.67 years, with a standard deviation of 4.49, suggesting a moderate age range. The mean BMI is 25.5, with a standard deviation of 3.32, indicating variability in body composition.

Figure 1 presents the pregnancy outcomes of a total of 92 participants who underwent cervical cerclage. The

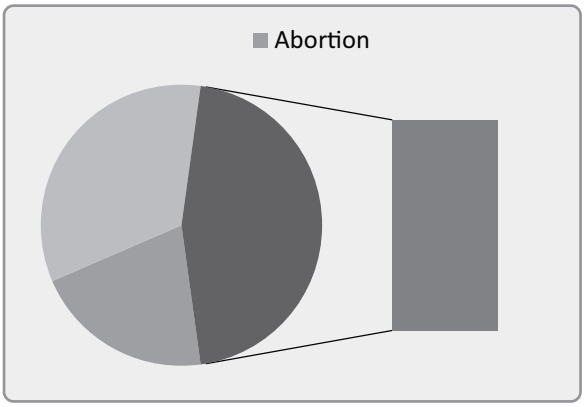

Fig.-1: *Pregnancy outcome based on cervical cerclage (n=92).*

Table-II

Inclusion Criteria and Pregnancy Outcomes. (n=92).

Inclusion criteria	Outcome	Number of cases	Percentages
Recurrent pregnancy loss (RPL) (n=49)	Abortion	10	20.41
	Preterm	20	40.82
	Term	19	38.77
IVF pregnancy (n=19)	Abortion	3	15.79
	Preterm	6	31.58
	Term	10	52.63
Short Cervix (TVS)(n=24)	Abortion	6	25.00
	Preterm	5	20.83
	Term	13	54.17

outcomes are categorized as "Abortion," "Preterm Delivery," and "Term Delivery," with respective frequencies of 19 (20.65%), 31 (33.70%), and 42 (45.65%). The data reveals that term deliveries were the most common outcome, followed by preterm deliveries, while abortions constituted the smallest portion of cases.

The table-II provides insight into pregnancy outcomes based on different inclusion criteria. For each category, the outcomes are classified as "Abortion," "Preterm," and "Term." Among cases with RPL as the inclusion criterion, 20.41% resulted in abortion, 40.82% in preterm delivery, and 38.78% in term delivery. For IVF pregnancies, 15.79% ended in abortion, 31.58% in preterm delivery, and the majority (52.63%) in term delivery. Among the "Short Cervix" cases, 25.00% ended in abortion, 20.83% in preterm delivery, and 54.17% in term delivery.

Table-III

Cervical cerclage and pregnancy outcome based on gestational age (n=31).

Gestational Age	Number	Percentages
Preterm Births (28-31 weeks)	3	9.68
Preterm Births (32-33 weeks)	9	29.03
Preterm Births (34-36 weeks)	19	61.29
Preterm Birth (Total)	31	100%

The table-III presents the relationship between cervical cerclage and pregnancy outcome, categorized by gestational age. The "Gestational Age" categories include "Preterm Birth (Total)," "Preterm Births (28-31 weeks)," "Preterm Births (32-33 weeks)," and "Preterm Births (34-36 weeks)." A total of 31 preterm births were observed across all gestational age categories. Among these, 3 preterm births occurred within the range of 28-31 weeks, accounting for 9.68% of the total preterm births. Preterm births in the range of 32-33 weeks constituted 29.03%, while the largest portion of preterm births, 61.69%, fell within the 34-36 weeks range. The data illustrates the distribution of preterm births based on gestational age, indicating that a significant majority of preterm births occurred between 34 and 36 weeks.

Table-IV

Characteristics of patients delivered before 36 weeks gestation

Variables	Odds Ratio	95% CI
Cervical length(mm)	0.25	0.01- 5.2
Cervical dilatation (mm)	34	1.3-8.5

Table IV summarizes the characteristics of patients who delivered before 36 weeks of gestation, presenting their odds ratios and 95% confidence intervals. A lower odds ratio of 0.25 for "Cervical Length (mm)" suggests the reduced likelihood of preterm delivery with increasing cervical length. Conversely, a higher odds ratio of 34 for "Cervical Dilatation" indicates an increased likelihood of preterm delivery as cervical dilatation increases.

Table-V

Maternal Complication of cervical cerclage (n=92).

Complications	Incidence number	Incidence rate (%)
Maternal death	00	00
Hemorrhage	3	3.3
Infection	1	1.1
Laceration of cervix	2	2.1
No complication	86	93.5
Total	92	100

Table-V provides insight into the maternal outcomes associated with cervical cerclage procedures. There were no reported cases of maternal death. Hemorrhage occurred in 3 cases, representing an incidence rate of 3.3%. Infections were observed in 1 case, accounting for an incidence rate of 1.1%. Instances of laceration of the cervix were reported in 2 cases, with an incidence rate of 2.1%.

Discussion:

Cervical cerclage is used to stop pregnancy and the problems that come with preterm delivery. We assessed the effectiveness and results of cerclage placement in this study. This is a descriptive cross-sectional study over 3 years on patients with 2 or more recurrent mid-trimester abortions or preterm deliveries.[10] They reported 74% term deliveries after the application of cervical cerclage, 19% premature deliveries and 7.5% miscarriages. Another study demonstrated 76% of term deliveries, 12% of preterm deliveries and 10% of abortions[11]. In our study, the analysis of pregnancy outcomes among 92 participants who received cervical cerclage reveals a distribution wherein term deliveries comprise the largest portion at 45.65%, followed by preterm deliveries at 33.70%, while abortions represent the smallest segment at 20.65%. These percentages indicate a relatively successful cerclage procedure in promoting full-term pregnancies. There are several reported cases of success with cervical cerclage in preventing mid-trimester pregnancy losses and preterm delivery. However, there exist still doubts as to the real value and place of cerclage in managing recurrent pregnancy loss due to cervical incompetence[12].

This study highlights diverse pregnancy outcomes based on distinct inclusion criteria. Notably, in cases involving recurrent pregnancy loss (RPL), abortions accounted for 20.41%, with preterm and term deliveries at 40.82% and 38.77% respectively. In in-vitro fertilization (IVF) pregnancies, abortions were 15.79%, with 31.58% as preterm deliveries and a majority of 52.63% as term deliveries. Among instances with a short cervix, abortions represented 25.00%, preterm deliveries were 20.83%, and term deliveries were 54.17% (Table II). If the cervix's architectural structure can be preserved, the gestational week should be extended to the best gestational age, which will ultimately improve the perinatal result. A typical therapy for CI is cervical cerclage, which doesn't involve cutting into the tissue and hence does less harm to the tissue around it[13]. The effectiveness of cervical cerclage in women with cervical incompetence using McDonald's procedure increased the rate of term deliveries to 95.4%, the mean gestational age at delivery was 35 weeks[14].

In our study, the data analysis detailing the relationship between cervical cerclage and pregnancy outcomes, categorized by gestational age, underscores a notable distribution of preterm births. Among a total of 31 observed preterm births, 9.68% occurred within the range of 28-31 weeks, while 29.03% were in the 32-33 weeks range. Remarkably, the largest segment of preterm births, comprising 61.29%, was within the 34-36 weeks range. Cervical shortening was discovered during the current pregnancy, and ultrasonography cervical length measurement is a well-established method of determining the risk for preterm labor and delivery (cervical length 25 mm)[15]. Ultrasound indicated cerclage is reserved for cases with a cervical measurement of <25 mm, with or without funneling, before a gestational age of 24 weeks in women who are undergoing cervical

length screening due to a prior history of spontaneous abortion between 16 - 24 weeks gestation[16]. Patients may also be found to have cervical dilatation rather than just shortening, or they may present with preterm membrane rupture. Identification of cervical dilatation in the absence of a maternal history of contractions, with or without membrane rupture is considered tantamount to the diagnosis of cervical insufficiency[15]. Several risk factors were identified that influenced the outcome of CI cervical cerclage, namely cervical dilatation, membrane prolapse, obstetric history, evidence of infection[17].

In our study, the provided summary of patient characteristics associated with delivery before 36 weeks of gestation reveals noteworthy odds ratios and confidence intervals. A lower odds ratio of 0.25 for "Cervical Length (mm)" implies that a longer cervical length is linked to a reduced likelihood of preterm delivery. Conversely, a higher odds ratio of 34 for "Cervical Dilatation" signifies an elevated probability of preterm delivery as cervical dilatation increases. A previous systematic review has reported the published adverse events immediately following cervical cerclage placement include traumatic rupture of membranes (0.4%), vaginal bleeding (1.4%),and premature rupture of fetal membranes (15.6%) and other complications including suture detachment (1.4%), preterm delivery (16.4%), cervical lacerations (8.9% to 25%), cervical dystocia (7.2%),uterine rupture (6.3%) and postpartum hemorrhage (2.8%).[18] In our study, Hemorrhage occurred in 3 cases, representing an incidence rate of 4.8%. Infections were observed in 1 case, accounting for an incidence rate of 1.1%. Instances of laceration of the cervix were reported in 2 cases, with an incidence rate of 2.1%.

Limitations of the study: The limitations of this study are the restricted number of patients can be attributed to stringent inclusion criteria and potential reluctance among obstetricians to perform emergency cervical cerclage, possibly influenced by perceived high failure rates. Moreover, there might be an inherent bias in the selection of patients, impacting the generalizability of the findings.

Conclusion

In conclusion, this comprehensive study delves into the efficacy and outcomes of cervical cerclage placement as a preventive measure against preterm delivery and its associated complications. The findings highlight the promising potential of cervical cerclage in promoting full-term pregnancies, as evidenced by significant proportions of term deliveries in various scenarios, particularly among patients with cervical incompetence. The study underscores the intricate relationship between cervical characteristics and pregnancy outcome, emphasizing the importance of cervical length and dilatation in predicting the likelihood of preterm delivery. While the study reveals a relatively successful cerclage procedure, it also acknowledges the complex array of risk factors and potential complications associated with this intervention.

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