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Original Article *Özgün Araştırma*

EVALUATION OF PERINATAL OUTCOMES IN PREGNANT WOMEN WHO UNDERWENT PROPHYLACTIC AND EMERGENCY CERCLAGE

Profilaktik ve Acil Serklaj Uygulanan Gebe Kadınlarda Perinatal Sonuçların Değerlendirilmesi

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ABSTRACT

Objective: The aim of this study was to compare prophylactic and emergency (rescue) cerclage procedures in pregnant women diagnosed with cervical insufficiency and to evaluate the effects of these two approaches on pregnancy duration and perinatal outcomes.

Material and Methods: Between January 2021 and December 2024, 76 pregnant women diagnosed with cervical insufficiency who underwent McDonald cerclage at a tertiary center were retrospectively reviewed. Patients were divided into two groups: those who underwent prophylactic cerclage based on their medical history and those who underwent emergency cerclage based on physical examination or ultrasonographic findings. Demographic characteristics (age, gravida, parity, history of abortion, body mass index), gestational week at cerclage, indication, interval from cerclage to delivery, gestational week at delivery, birth weight, 1st- and 5th-minute Apgar scores, mode of delivery, and neonatal intensive care unit (NICU) requirement were recorded and compared between the groups.

Results: The mean gestational week at cerclage was 14.3±2.3 in the prophylactic group and 21.3±1.8 in the emergency group. The interval from cerclage to delivery and the gestational week at delivery were longer in the prophylactic group (21.89±4.80 weeks / 36.25±3.12 weeks; p<0.001 and p=0.003, respectively). Birth weight was higher (2833.7±674 g vs. 2400.3±789.7 g; p=0.014) and NICU requirement was lower (p<0.001) in the prophylactic group.

Conclusion: Emergency cerclage may prolong pregnancy duration when compared to cases without cerclage. However, prophylactic cerclage is associated with more advanced gestational age at delivery, higher birth weight, and a lower need for neonatal intensive care.

Keywords: *Cervical cerclage, emergency cerclage, prophylactic cerclage, perinatal outcomes, preterm birth, cervical insufficiency*

ÖZ

Amaç: Bu çalışmanın amacı, servikal yetmezlik tanılı gebelerde uygulanan profilaktik ve acil serklaj yöntemlerini karşılaştırarak, bu iki yaklaşımın gebelik süresi ve perinatal sonuçlar üzerindeki etkilerini değerlendirmektir.

Gereç ve Yöntemler: Ocak 2021-Aralık 2024 tarihleri arasında, tersiyer merkezde servikal yetmezlik tanısı ile McDonald tekniği kullanılarak serklaj uygulanan 76 gebe retrospektif olarak incelendi. Hastalar, öyküye dayalı profilaktik serklaj uygulananlar ve fizik muayene veya ultrasonografi bulgularına göre acil serklaj uygulananlar olarak iki gruba ayrıldı. Demografik özellikler (yaş, gravida, parite, abortus öyküsü, beden kitle indeksi), serklaj haftası, endikasyon, serklaj ile doğum arasındaki süre, doğumdaki gebelik haftası, doğum ağırlığı, 1. ve 5. dakika Apgar skorları, doğum şekli ve yenidoğan yoğun bakım gereksinimi kaydedildi ve gruplar arasında karşılaştırıldı.

Bulgular: Profilaktik serklaj grubunda serklaj haftası 14,3±2,3; acil serklaj grubunda 21,3±1,8 idi. Serklaj ile doğum arasındaki süre ve doğumdaki gebelik haftası, profilaktik grupta daha uzundu (21,89±4,80 hafta / 36,25±3,12 hafta; p<0,001 ve p=0,003). Doğum ağırlığı profilaktik grupta daha yüksek (2833,7±674 g vs. 2400,3±789,7 g; p=0,014), yenidoğan yoğun bakım ihtiyacı ise daha düşüktü (p<0,001).

Sonuç: Acil serklaj, gebelik süresini uzatmakta ve perinatal sonuçları iyileştirmektedir. Ancak profilaktik serklaj, daha ileri gebelik haftası, daha yüksek doğum ağırlığı ve daha az yenidoğan yoğun bakım ihtiyacı ile ilişkilidir.

Anahtar Kelimeler: *Servikal serklaj, acil serklaj, profilaktik serklaj, perinatal sonuçlar, preterm doğum, servikal yetmezlik*

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INTRODUCTION

The inability of the cervix uteri to maintain pregnancy, particularly during the second trimester, in the absence of obvious symptoms of labor is known as cervical insufficiency. Prolapse of the membranes, premature rupture of membranes, loss of pregnancy in the second trimester, or premature delivery are common outcomes if treatment is not received. Recurrent second trimester or early third trimester pregnancy loss in the ongoing process, as well as painless cervical dilatation without uterine contraction, vaginal bleeding, or other causes of recurrent pregnancy loss, are typically used to diagnose cervical insufficiency.[1,2] Cervical insufficiency has been linked to a number of variables, including congenital Müllerian malformations, prior cervical surgeries, cervical traumas, and disorders of the collagen tissue.[3] In order to manage cervical insufficiency, conservative measures such as bed rest, hydration, pessary applications, medication, and surgery are tried. The primary surgical procedure is cervical cerclage. It is possible to execute the cervical cerclage surgery vaginally or, less frequently, abdominally. A transvaginal cervical cerclage is often implanted as a preventative measure, ideally prior to or during the first trimester of pregnancy. It can be used as an emergency treatment once membrane prolapse develops and therapeutically in the latter stages of pregnancy following the beginning of cervical alterations.[4] The three primary categories of cervical insufficiency indications for cerclage that necessitate surgical intervention are as follows. "History-based cerclage" is characterized as having a history of prior cerclage administration, one or more mid-trimester pregnancy losses, and a painless cervical opening without clinical contraction. "Physical examination-indicated cerclage" is defined as the finding of painless cervical dilatation during speculum examination in the second trimester of pregnancy, whereas "ultrasound-indicated cerclage" is defined as the presence of a cervix length of less than 25 mm prior to the 24th week of pregnancy and a history of delivery prior to the 34th week. [5-9] The objectives of our study are to evaluate the impact of emergency and prophylactic cerclage on pregnancy duration, examine its potential to improve neonatal outcomes, and compare the findings with existing literature to ascertain the therapeutic efficacy of cerclage.

MATERIALS AND METHODS

This study retrospectively examined 76 individuals who underwent cerclage at a tertiary center from January 2021 to December 2024 following a diagnosis of cervical insufficiency. In the study, all obstetric and perinatal data-including patients' demographic characteristics (age, gravida, parity, history of abortion, body mass index), gestational week at cerclage placement, indication for cerclage, latency period between cerclage and delivery, gestational age at delivery, birth weight, 1st- and 5th-minute Apgar scores, mode of delivery, and the need for neonatal intensive care unit admission-were retrospectively evaluated using medical records. Two groups of patients were formed based on the cervical cerclage indications. Cervical length measurements were performed by transvaginal ultrasonography using a standardized technique. All measurements were obtained with an empty bladder, in the sagittal plane, by visualizing the entire endocervical canal from the internal to the external os. The shortest of at least three measurements was recorded. The presence or absence of cervical funneling was also noted during the examination. The emergency cervical cerclage group includes cerclage based on physical examination and cerclage based on ultrasonographic findings (short cervix less than 25 mm on ultrasound) with a history of prior premature birth (less than 34 weeks). The prophylactic cerclage group includes a history-based cerclage. Patients with chorioamnionitis, active vaginal hemorrhage, fetal abnormalities, premature membrane rupture, or active labor prior to cerclage were not eligible for the procedure. The study excluded patients with multiple pregnancies, those who underwent abdominal cerclage, and those with unavailable medical data. All patients underwent a McDonald-style transvaginal cerclage. Cervical sutures were removed between weeks 36 and 37 of pregnancy or prior to the start of labor. Progesterone therapy was administered according to the clinician's preference and patient condition.

The IBM SPSS statistics for windows, version 26.0 (IBM Corp., Armonk, NY, USA) software was used to conduct statistical analyses. The normality assumption was assessed using the Kolmogorov-Smirnov test. The mean±standard deviation (SD) for continuous variables with a normal distribution and the median (minimum-maximum) values for continuous variables without a normal distribution were used to display descriptive statistics. The independent samples T-test was utilized for continuous variables with a normal distribution, the Mann-Whitney U test for continuous variables without a normal distribution, and the chi-square (χ^2) test for categorical data when comparing the elective (prophylactic) and emergency cerclage groups. For comparisons involving three or more groups, non-normally distributed continuous variables were analyzed using the Kruskal-Wallis test. Statistical significance was defined as $p<0.05$ in all analyses. This retrospective study was approved by the Ethics Committee of Bursa City Hospital (Approval Date: 19.03.2025; Number: 2025-6/10). As the study involved only anonymized data collected from medical records and did not include any personally identifiable information, the requirement

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for informed consent was waived by the ethics committee.

RESULTS

Cerclage surgery was conducted on 86 patients at the obstetrics clinic of a tertiary care center. Eight individuals were excluded from the study due to inability to obtain pregnancy outcomes, and two patients were omitted because they were carrying twin pregnancies. Seventy-six patients were evaluated. Prophylactic cerclage was administered to 28 individuals (36.8%), while emergency cerclage was performed on 48 (63.2%). Cases were grouped based on cerclage indications: those with cerclage due to ultrasonography (n=32), those based on historical factors (n=26), and those identified through physical examination findings (n=18). Perinatal outcomes varied among the groups. The application week for cerclage was determined to be 14.3±2.3 weeks in the preventative cerclage group and 21.3±1.8 weeks in the emergency cerclage group. The demographic and obstetric features of the patients are presented in Table 1.

Table 1: Demographic and obstetric characteristics

	Prophylactic cerclage Median (min-max)	Emergency cerclage Median (min-max)	p-value
Age (years)	29 (20-44)	29 (18-44)	0.905
Gravida	3 (1-5)	2 (1-5)	0.040 *
Parity	1 (0-3)	0 (0-3)	0.154
Abortion	1 (0-2)	0 (0-3)	0.019 *
BMI (kg/m2)	27.14±4.08	28.88±3.98	0.077

Continuous variables are shown as median (min-max) for non-normally distributed variables (gravida, parity, abortion) and mean ± standard deviation (SD) for normally distributed variables (age, BMI). Mann-Whitney U test was used for non-normally distributed variables, and Student's t-test for normally distributed variables. *p<0.05 was considered statistically significant.

A significant difference was observed between the two groups regarding the interval from cerclage to delivery, gestational week at delivery, and neonatal weight. The prophylactic cerclage cohort exhibited an extended gestational age, a delayed delivery week, and an elevated birth weight. The Apgar score at first minute was elevated in the prophylactic cerclage group; however, no significant difference was seen between the groups regarding the Apgar score at five minutes.

The necessity for neonatal intensive care unit (NICU) admission was noted to be decreased in the prophylactic cerclage cohort. The prophylactic cerclage group revealed a higher rate of cesarean sections in the delivery methods analysis. The comprehensive statistics from our investigation are displayed in Table 2.

Table 2: Perinatal outcomes and categorical variables in prophylactic and emergency cerclage groups

		Prophylactic cerclage (Mean±SD)	Emergency cerclage (Mean±SD)	p-value
Birth week (weeks)		36.25±3.12	33.51±4.50	0.003 *
Birth weight (g)		2833.75±674.64	2400.31±789.70	0.014 *
Time between cerclage and delivery (weeks)		21.89±4.80	12.1±4.8	<0.001 *
Apgar 1st min (score)		8.50±1.72	7.36±2.12	0.013 *
Apgar 5th min (score)		9.25±2.15	8.61±1.99	0.201
Delivery mode	**Normal delivery**	46.4% (13)	68.8% (33)	<0.001 *
	Cesarean Section	53.6% (15)	31.2% (15)	
NICU need		21.4% (6)	43.8% (21)	<0.001

NICU: Neonatal intensive care unit

The groups were divided into two groups as pregnant women who underwent prophylactic cerclage and those who underwent emergency cerclage. Continuous variables are presented as mean ± standard deviation (SD), and categorical variables are presented as percentage (%) and number of cases (n). For comparisons between the two groups, Student's t-test was used for continuous variables and Chi-square test (χ^2) was used for categorical variables. *p<0.05 was considered statistically significant. Furthermore, perinatal outcomes exhibited notable variations based on the indications for cerclage. Delivery week, post-cerclage pregnancy duration, NICU necessity, and Apgar scores displayed a statistically significant difference between the groups (p<0.001) (Table 3). Delivery week and Apgar scores were highest in pregnant women who received cerclage based on historical factors, whereas delivery week and Apgar scores were lowest, and NICU requirements were highest in those who underwent cerclage based on physical examination findings. Comprehensive statistics from our research are given in Table 3.

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Table 3: Perinatal outcomes according to cerclage indications

	USG based cerclage (n=32)	History based cerclage (n=26)	Physical examination based cerclage (n=18)	p-value
Week of birth (Median)	34.80	36.25	33.51	<0.001*
Cerclage-labor time (Median, weeks)	14.2	21.1	9.6	<0.001*
NICU need (%)	22.5	17.9	31.2	<0.001*
Apgar 1st min (Median, score)	7.8	8.5	7.2	<0.001*
Apgar 5th min (Median, score)	8.9	9.4	8.3	<0.001*

NICU: Neonatal intensive care unit. Values are presented as median (IQR) or percentage (%). Kruskal-Wallis test was used for delivery week, cerclage-delivery time and Apgar scores, and chi-square test was used for NICU need. *p<0.05 was considered statistically significant.

DISCUSSION

Preterm birth, a notable pregnancy complication, occurs in approximately 6-10% of pregnancies and is responsible for nearly half of perinatal deaths.[10,11] Cervical insufficiency is a prevalent cause of preterm birth; however, a definitive diagnostic method remains unestablished. The diagnosis is typically based on obstetric history and/or identification of a short cervix during examination. Cerclage is regarded as a significant therapeutic intervention for cervical insufficiency.

The cervical surgical techniques of Shirodkar and McDonald were first reported in 1955 and 1957, respectively.[12] Neither technique is superior to the other.[13] All patients in our cohort underwent cerclage using the McDonald technique.

In our cohort, perinatal outcomes favored the prophylactic cerclage group, including higher birth weight, better first-minute Apgar scores, longer cerclage-to-delivery interval, and lower NICU requirement compared to emergency cerclage.

According to a meta-analysis, patients who underwent emergency cerclage for painless cervical dilatation in the second trimester had a significantly lower risk of preterm birth at 28 and 32 weeks and a reduced need for NICU admission.[14] Hashim et al. reported that emergency cerclage reduced the risk of preterm birth before 34 weeks by 50% and prolonged pregnancy by an average of 4 weeks.[15] In our study, pregnancy prolongation after emergency cerclage was approximately 12 weeks, which is at the upper range reported in the literature.[14,15] This clinically significant prolongation may be related to meticulous patient selection, appropriate indication, and surgical experience in a tertiary referral center where perinatal care is optimized.

The findings of our study are consistent with those of Chen et al. and Aytaj et al., who reported better perinatal outcomes in patients undergoing prophylactic cerclage, including higher gestational age at delivery and greater birth weight.[16,17] These results suggest that preventing cervical changes before they begin may be more effective than attempting to halt a process that has already started.

Joseph et al. reported no significant difference in perinatal outcomes according to cerclage indication.[18] However, our study demonstrated significant differences according to indication type (p<0.001). History-indicated cerclage was associated with the best neonatal outcomes, whereas physical examination-indicated cerclage showed the poorest results and the highest NICU requirement. This gradient suggests that once cervical dilatation and structural changes have begun, the effectiveness of cerclage may decrease. Differences in patient selection criteria and methodological approaches across studies may explain discrepancies in the literature.

In addition to international evidence, studies from Türkiye have also evaluated cerclage outcomes and highlighted clinically relevant predictors. In a 10-year retrospective experience, Akdemir et al. reported high live-birth rates in both prophylactic and emergency cerclage groups, while outcomes were poorer particularly in cases with advanced cervical dilatation (≥3 cm), emphasizing careful patient selection for emergency cerclage.[19] More recently, Erbey et al. demonstrated that elevated maternal systemic inflammatory indices (SII, SIRI, and PIV) were associated with a higher risk of preterm birth after prophylactic cerclage, suggesting that non-invasive inflammatory markers may help identify high-risk patients during follow-up.[20] In a separate Turkish cohort focusing on etiology-based management, Tanacan and Beksaç underlined that addressing underlying inflammatory and thrombotic risk factors may reduce unnecessary repeat cervical interventions and improve pregnancy outcomes in selected patients.[21]

The higher cesarean delivery rate observed in the prophylactic cerclage group may be explained by closer antenatal surveillance, a higher rate of previous cesarean deliveries, and clinician preference in managing high-risk pregnancies. In addition, concerns regarding cervical integrity during labor in patients with cerclage may have influenced delivery planning in our tertiary center.

Studies demonstrating comparable effectiveness between emergency and prophylactic cerclage may reflect heterogeneity in definitions and patient selection. There is no universally accepted definition of cerclage indications, and cervical length thresholds, obstetric history, and cervical dilatation criteria vary across studies. In some research, ultrasound-indicated and history-indicated cerclage groups were analyzed together, whereas in others they were evaluated separately, which may influence reported perinatal outcomes.

The limitations of our study include its retrospective design, relatively small sample size, and single-center setting. Nevertheless, the clear differences observed according to cerclage indications emphasize the importance of appropriate patient selection and timing of intervention.

In conclusion, while emergency cerclage can effectively prolong pregnancy in selected cases, prophylactic cerclage is associated with more favorable perinatal outcomes when cervical insufficiency is recognized early. Furthermore, cerclage indication itself appears to be a key determinant of neonatal prognosis and should be carefully considered in clinical decision-making.

*Conflicts of Interest***:** The authors declare that they have no competing interests.

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