The impact of cervical dilatation on pregnancy outcomes after cerclage placement in women with a short cervical length

Kısa serviks nedeniyle serklaj atılan kadınlarda servikal dilatasyonun gebelik sonuçları üzerine etkisi

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Abstract

Objective: The aim of the study was to compare the outcome of pregnancies with cerclage placement in which cervical length was <15 mm and 15-25 mm. We further investigated the impact of cervical dilatation on delivery at <34 weeks.

Material and Methods: Women with singleton gestations with cerclage placement due to cervical insufficiency were enrolled into the study. The data were collected prospectively between September 2004 and February 2009. We divided patients into two categories: (group I) cervical length below 15 mm, (group II) cervical length between 15-25 mm. We compared the pregnancy outcomes of the two groups and also analyzed the independent impact of cervical dilatation on delivery <34 weeks.

Results: The cervical cerclage group <15 mm had a similar incidence of preterm delivery <34 weeks gestation to the cerclage group 15-25 mm (p=0.4). No significant difference in rate of neonatal survival (p=0.6) was found between the two groups. Increased cervical dilatation in centimeters was found to be a significant predictor of delivery before 34 weeks gestation (OR: 3.4, 95% CI: 1.3-8.5, p=0.009).

Conclusions: The extent of cervical shortening did not have a significant independent effect on the perinatal outcome of patients with cerclage placement. However, the presence of cervical dilatation prior to cerclage placement in cases of cervical insufficiency may worsen perinatal outcomes by increasing the rate of delivery before 34 weeks.

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Key words: Cervical insufficiency, cerclage, pregnancy outcomes, preterm delivery

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Özet

Amaç: Bu çalışmanın amacı serviks uzunluğu <15 mm ve 15-25 mm arasında olan serklaj yapılmış gebeliklerin sonuçlarının karşılaştırılmasıdır. Ayrıca, serviks dilatasyonunun 34 haftanın altında doğum yapma üzerine etkisi araştırılmıştır.

Gereç ve Yöntemler: Bu çalışmaya serviks yetersizliği nedeniyle serklaj atılmış tekil gebeler kaydedilmiştir. Veriler Eylül 2004 ile Şubat 2009 arasında prospektif olarak toplanmıştır. Hastalar iki kategoriye ayrılmıştır: serviks uzunluğu 15 mm. nin altında olanlar (grup I), serviks uzunluğu 15–25 mm olanlar (grup II). Bu iki grubun gebelik akıbetleri karşılaştırılmış ve servikal dilatasyonun 34 haftanın altında doğum yapma üzerine bağımsız etkisi incelenmiştir.

Bulgular: Serviks uzunluğu 15 mm. nin altında serklaj yapılan olgularda 34 haftanın altında erken doğum yapma insidansı 15-25 mm de serklaj atılmış grupla benzer bulunmuştur (p=0.4). İki grup arasında yenidoğan sağkalım oranları anlamlı farklı bulunmamıştır (p=0.6). Artmış servikal dilatasyon, 34 haftanın altında doğum yapma açısından anlamlı bir belirteçtir (OR: 3.4, 95% CI: 1.3- 8.5, p=0.009).

Sonuçlar: Servikal kısalma derecesi, serklaj konulmuş hastalar için perinatal sonuçlar açısından belirgin bağımsız etkiye sahip değildir. Bununla birlikte, serviks yetersizliği olan olgularda serklaj öncesi serviks dilatasyonunun varlığı 34 haftadan önce doğum yapma oranlarını artırarak perinatal sonuçları kötüleştirebilir.

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Anahtar kelimeler: Servikal yetersizlik, serklaj, gebelik sonucu, erken doğum

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Introduction

Mid trimester miscarriage and premature delivery remain a significant cause of perinatal morbidity and mortality presenting an important challenge in perinatal medicine. Cervical incompetence is defined as the inability to support a term pregnancy because of a functional or structural defect of the cervix in which painless, progressive cervical dilatation occurrs in the second trimester and results in recurrent pregnancy loss. Placement of a cervical suture may be useful when there is cervical weakness in a woman at risk of miscarriage or premature birth. A transvaginal cervical cerclage can be inserted prophylactically before pregnancy or during the first trimester, or therapeutically after detection of progressive cervical changes during pregnancy (1). The efficacy of prophylactic and therapeutic cervical cerclage for prevention of preterm deliveries is still controversial. However, there is some evidence of a positive role for cerclage placement in women considered to be at very high risk, with more than one second trimester loss (2).

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Transvaginal ultrasound examination of the cervix can predict patients who are at risk of cervical insufficiency. Sonographic observation of shortening of the endocervical canal length, dilatation of the internal os, funneling of the fetal membranes into the endocervical canal (funnel length ≥16 mm or funneling of ≥40 percent) have been defined as sonographic signs for this obstetrical condition (3).

The purpose of the presented study was to compare the outcome of pregnancies with cerclage placement in which cervical length was <15 mm and between 15 and 25 mm. We also investigated the impact of cervical dilatation on delivery at <34 weeks as an independent prognostic factor.

Material and Methods

The study was carried out at Acibadem Hospital, Kadikoy, Istanbul, between September 2004 and February 2009. The transvaginal ultrasound follow-up of the cervix was performed during antenatal care visits of patients with a history of suggestive or suspicious cervical insufficiency, previous preterm labor, and of those with symptoms such as a feeling of pelvic pressure or increased vaginal discharge. The women were asked to empty their bladder before examination and were placed in the dorsal lithotomy position. Cervical length was measured along a closed endocervical canal. Fundal pressure was applied for 30 seconds to detect cervical shortening and funneling. The patients were considered as being at high risk for preterm delivery when the cervical length was measured as under 25 mm before 26 weeks of gestation, which is below the 10th percentile in a population delivering at term (4). We divided patients into two categories: [1] cervical length below 15 mm, which was suggested as the lowest critical value for practicing cerclage procedure (5), [2] cervical length between 15-25 mm. We also analyzed the outcome of patients with cervical dilatation with or without membrane bulging of the intact amniotic sac into the vagina. In all patients, vaginal microbiological culture and ureaplasma, mycoplasma culture investigations, vaginal pH measurement, whole blood test, and C-reactive protein assessment were performed to exclude active vaginal infection and chorioamnionitis. Patients with symptoms of clinical chorioamnionitis such as fever (temperature ≥38°C), uterine tenderness, fetal tachycardia, marked leukocytosis (≥15 nLO[1]), and/or elevated C-reactive protein (≥1.5 mg/dL) were not included into the study group. Five cases were excluded from the study because of the clinical and laboratory evidence of chorioamnionitis which resulted in second trimester abortion. We performed amniocentesis and amnioreduction in cases of membrane bulging in order to diminish intraamniotic pressure and to facilitate the procedure. Leukocyte count, gram staining and amniotic fluid culture were studied to rule out intrauterine infection in these cases before cerclage placement (6, 7).

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 single purse-string suture by using the Cervix-Set (B.Braun, Aesculap, Tutlingen), similar to the technique of Mc Donald. After placement of the cervical suture, women received 100 mg indomethacin suppository, ampicillin 1 gram intravenously every 6 hours and metronidazole 500 mg intravenously every 12 hours for 24 hours after the surgery. Patients were restricted to bed rest for 48 hours. Prophylactic tocolysis was not used. Cervical cerclage sutures were removed at 37 weeks gestation or when the membranes were ruptured.

Statistical analysis

Analysis was performed using the SPSS statistical Package for Windows 13.0 (SPSS, Chicago, IL, USA). The Chi-square test was used to compare categorical variables between the two groups. The Mann-Whitney U test was used to compare continuous variables between the two groups. Logistic regression analysis was used to identify possible predictors of pregnancy prolongation beyond 34 weeks as a dichotomous variable. Variables entered into the logistic regression model were presence or absence of previous preterm delivery, previous recurrent abortion (>2 abortions), tobacco use, infertility treatment in the present pregnancy, first trimester threatened abortion in the present pregnancy, uterine anomaly, conisation history, gestational age at cerclage placement, cerclage placement as emergency or elective, cervical length of <15mm and 15-25mm, cervical dilatation in centimeters, amniodrainage before cerclage placement (done or not done), ureaplasma, trichomonas or chlamydia isolation from the vagina. The results of logistic regression analysis are presented as odds ratio and 95% confidence interval. A *P* value <0.05 was considered to be significant.

Results

A total of 34 pregnant women with a cerclage placement after detection of short cervical length were enrolled into the study. Maternal demographic characteristics, obstetrics and gynecologic histories of the study population are presented in Table 1. Median maternal age was 29.82±4.14 (range, 23-41 years) years old. Mean gestational age at cerclage procedure was 20.38±4.18 (11.7-28) weeks. Mean cervical length at surgery was 14.61±5.93 (5-25) mm. Mean gestational age at delivery was 34.05±5.31 weeks. Mean birth weight was 2399.8±970 (210-3890) grams. Four women (11.8%) had one previous preterm birth and four (11.8%) women had >2 previous preterm birth histories. Five women (14.7%) had first trimester vaginal bleeding, three women (8.8%) were cigarette smokers and five (14.7%) had hereditary thrombophilia. Amniodrainage was performed in four cases and their amniotic fluid cultures were negative. Maternal complications such as sepsis, cervical laceration during pregnancy or at parturition did not occur.

Pregnancy prolongations beyond 34 weeks gestation occurred in 21 cases (61.7%). The mean cervical lengths for group I and group II prior to placement of the cerclage were 9.88±2.88 mm and 19.9±3.3 mm respectively. Maternal and perinatal

outcomes between the two groups were shown in Table 2. Women with cervical lengths of 15-25 mm underwent significantly earlier cerclage placement and their pregnancy was significantly prolonged when compared with those with a cervical length less than 15 mm (18±4 weeks vs. 22.5±3 weeks respectively, p=0.001 for gestational age at cerclage and 18.1±5.5 vs.10.2±6.2 respectively, p=0.001 for delayed delivery). Mean gestational age at delivery in the group whose cervical length <15 mm was 32.7±6.2 weeks of gestation which was not significantly lower than 36.1±3.48 weeks of gestation in the group whose cervical length was 15-25 mm (p=0.06), probably due to the small sample size of the study. Neonatal survival rate did not differ significantly between the groups (p=0.6). In group I, two fetal wastages were detected soon after the cerclage placement because of the preterm premature membranes ruptures. In group II, one neonatal death occurred in a homozygote Factor V Leiden mutation carrier patient complicated with preeclampsia and ablation placenta at 28 weeks gestation.

Table 1. Baseline demographic and obstetric characteristics

Characteristics	**n=34**
Maternal age (years)	29.82±4.14 (23-41)*
Number of prior births, n (%)	9 (26.6)
Number of prior preterm births, n (%)	8 (23.5)
Prior induced abortions, n (%)	11 (32.4)
Prior cerclage, n (%)	2 (5.8)
Cervicovaginal microbiology, n (%)	
Ureaplasma urealyticum	4 (11.8)
Chlamydia trachomatis	1 (2.9)
Trichomonas vaginalis	1 (2.9)
Gestational age at vaginal sonogram (weeks)	20.17±4.13 (11-28)*
Cervical length at vaginal sonogram (mm)	14.76±6.13 (5-25)*
Cervical length between 15-25 mm, n (%)	16 (47)
Cervical length less than 15 mm, n (%)	18 (53)
Patients with bulging membranes, n (%)	5 (14.3)

*Mean±SD (minimum-maximum)

Every centimeter increase in cervical dilatation was found to be a significant predictor of delivery before 34 weeks gestation (OR; 3.4 95% CI -1.3-8.5, p=0.009) (Table 3). We detected that there was no significant contribution of cerclage placement between cervical length <15 mm and 15-25 mm to delivery before 34 weeks gestation even with the higher incidence in group I than group II (44% (n=8/18) *vs.* 31% (n=5/16), respectively, p=0.4)

Conclusions

Sonographic cervical length measurement is an effective prognostic indicator of cervical insufficiency and preterm birth (PTB) which has been evaluated and studied up to the present. Cervical shortening is accepted as an early asymptomatic phase in the occurrence of PTB rather than as a sign of innate or acquired cervical weakness (8). A shortened cervical length can predict 61% of PTB cases, whereas the combination of cervical shortening and a history of PTB predict only an additional 4.4% cases at the same false positive rate of 5% (9). A cervical length of less than 25 mm before 28 weeks gestation has been found to have the best predictive accuracy for PTB in most populations (8). Owen et al. concluded that the overall sensitivity, specificity and positive predictive value for preterm birth were 69, 80 and 55 percent respectively when the optimum threshold for cervical length was considered below 25 mm (10). A recent metaanalysis by Berghella et al. demonstrated that cerclage does not prevent preterm birth in all women with a short cervix, but they detected a significant reduction in preterm birth <35 weeks in the subgroup of patients with a cervical length of <25 mm before 24 weeks gestation only if they had a prior PTB. Interestingly, this significance was lost in the subgroup of patients with cervical length <15 mm (11). More recently, reports of a multicenter randomized trial demonstrated that pre-viable birth rates less than 24 weeks occurred in 14% of the no-cerclage group vs 6.1% of the cerclage group (p=0.03), and perinatal mortality reduction was statically significant in the cerclage group, but cerclage did not prevent birth after less than 35 weeks of gestation unless the cervical length was less than 15 mm (12).
In the presented study, the prevalence of PTB before 34 weeks of gestation increased significantly with increased cervical dilatation. Women with a cervical length of 15-25

Table 2. Delivery outcomes between cervical length <15 mm and 15-25 mm groups

Variables	**Group I Cervical length <15 mm**	**Group II Cervical length 15-25 mm**	**P value**
Gestational age at cerclage placement (weeks)	22.5±3	18±4	0.001
Gestational age at delivery (weeks)	32.7±6.2	36.1±3.4	0.06
Delayed delivery (weeks)	10.2±6.2	18.1±5.5	0.001
Fetal body weight at delivery (gram)	2123±1083 (210-3890)	2710±738 (870-3615)	0.1
Delivery rate <34 weeks	8/18 (44%)	5/16 (31%)	0.4
Neonatal surveillance	16/18 (88.9%)	15/16 (93.8%)	0.6

Table 3. Characteristic of patients delivered before 34 weeks gestation

Variables	Odds ratio	95% CI	p value*
Cervical length <15 mm	0.26	0.01-5.3	0.38
Cervical dilatation in cm	3.4	1.3-8.5	0.009
Previous preterm birth	0.8	0.2-3.8	0.8
Previous second trimester abortion	1.2	0.3-4.5	0.7
*Delivery <34 weeks gestation			

mm underwent earlier cerclage placement when compared with those less than 15 mm. Although there was no significant difference in the rate of the PTB prior to 34 weeks, mean gestational age at delivery and pregnancy prolongation were higher in women with a cervical length of 15-25 mm. Neither obstetrical and gynecological history nor cervical length was found to have a significant impact on the effect of cerclage on PTB before 34 weeks. The limitation of our study is the small sample size and interobserver and even intraobserver variability of cervical dilatation evaluations by manual examination. As cervical effacement and dilatation first occur at the level of the internal os which cannot be assessed by the manual vaginal examination, transvaginal ultrasound screening of the cervical length is an important strategy for preventing PTB regardless of the underlying cause (13). Fox et al. studied the additional benefit of serial follow-up measurement of the cervical length in patients already diagnosed with a short cervix. They concluded that patients with an unstable cervix, that is, shortening over time delivered earlier when compared with short but stable cervix (14). On the other hand, weekly or biweekly transvaginal ultrasound follow-up of the short cervix between 16 and 24 weeks gestation may result in acute cervical insufficiency in high-risk patients. If cerclage could be placed before exposure of the membranes, there is a greater opportunity to reinforce the cervical barrier and prevent irreversible cervical changes (5). Positive fetal fibronectin test results and/or increased interleukin-8 levels in the cervical mucus could be a marker for procedure failure in these cases. Cerclage may be used for patients with a high-risk obstetric history when the cervical length is detected as <25 mm before the development of cervical dilatation.

We choose 15 mm as an alternate cutoff to introduce the benefit of the cerclage procedure when the cervical length is very short. In our study, women whose transvaginal cervical length was less than 15 mm delivered earlier and presented more frequently with acute cervical insufficiency. Since the emergency cerclage had the poorest obstetrical outcomes with a high rate of chorioamnionitis and PPROM (6), these cases may have benefitted from earlier cerclage procedure. On the other hand, operative management for emergency cases with membranes bulging significantly improves perinatal outcomes when compared to the conservative treatment modalities such as bed rest and/or tocolysis (15, 16).

Although the cervical length is important, absence of the cervical dilatation prior to cerclage placement in cases of cervical insufficiency may improve perinatal outcomes by increasing delivery rate after 34 weeks. Larger numbers of patients and prospective randomized trials are needed to verify our findings.

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Conflict of interest

None declared

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