

# Emergency cerclage: gestational and neonatal outcomes

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## SUMMARY

**BACKGROUND:** *The gestational and neonatal outcomes of women with early cervical dilatation undergoing emergency cerclage were evaluated and compared with women treated with expectant management and bed rest.*

**METHODS:** *Retrospective analysis of pregnant women admitted between 2001 and 2017 with a diagnosis of early cervical dilatation and/or bulging membranes. Patients with a singleton pregnancy of a fetus without malformations, between 16 and 25 weeks and 6 days, with cervical dilatation of 1 to 3 cm were included; patients who delivered or miscarried within 2 days after admission were excluded.*

**RESULTS:** *The study enrolled 30 patients: 19 in the cerclage group and 11 in the rest group. There was a significant difference, with the cerclage group showing better results concerning gestational age at delivery (28.7 vs. 23.3 weeks;  $p=0.031$ ) and latency between hospital admission and delivery (48.6 vs. 16 days;  $p=0.016$ ). The fetal death rate was lower in the cerclage group (5.3% vs. 54.5%,  $p=0.004$ ). Considering gestational age at delivery of live newborns, no difference was observed between the cerclage and rest groups (29.13 vs. 27.4 weeks;  $p=0.857$ ).*

**CONCLUSIONS:** *Emergency cerclage was associated with longer latency, a significant impact on gestational age at delivery and reduction in the fetal death rate.*

**KEYWORDS:** *Cerclage, Cervical. Emergencies. Pregnancy, High-Risk. Premature birth. Uterine cervical incompetence.*

## INTRODUCTION

Miscarriage during the second trimester occurs in less than 1% of diagnosed pregnancies<sup>1,2</sup> and is caused by many different etiological factors; however, approximately half of all gestational losses are due to idiopathic causes<sup>3</sup>. Among the etiological factors identified for these losses are antiphospholipid syndrome, genital infections, and cervical incompetence<sup>3</sup>. The latter is manifested as painless

cervical dilatation and is a situation in which there is early uterine cervix opening and exposure of the membranes to the vaginal environment. Only 8% of patients who miscarry in the second trimester meet the criteria for cervical incompetence<sup>3,4</sup>. Cerclage indicated upon physical examination is recommended for pregnant women with early cervical dilatation in the absence of preterm labor<sup>5</sup>. Emer-

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gency cerclage is less effective in prolonging gestation when compared with elective cerclage and is associated with a higher rate of prematurity and complications<sup>6,7</sup>.

Previous studies suggest that there is a benefit in performing cerclage, since these patients present a more extended period of latency until delivery, higher gestational age at birth and a lower rate of prematurity<sup>8-11</sup>. However, data in the literature on the outcome of pregnancies in patients undergoing emergency cerclage, as well as on the superiority of this treatment relative to expectant management are limited.

The objective of this study was to evaluate the effectiveness of cerclage in prolonging gestation and reducing the rate of extreme prematurity and neonatal complications in pregnant women diagnosed with early cervical dilatation.

## METHODS

A clinical, historical cohort study was conducted at the Obstetric Clinic of the Clinical Hospital of the University of São Paulo Medical School. Data from medical records of patients hospitalized between 2001 and 2017 with a diagnosis of early cervical dilatation and/or bulging membranes were reviewed. The inclusion criteria were singleton pregnancies of a live fetus without malformations, gestational age between 16 and 25 weeks and 6 days, cervical dilatation between 1 and 3 cm and/or bulging membranes. The exclusion criteria were a latency period between admission and delivery or miscarriage less than or equal to 2 days.

Thirty patients were identified and divided into two groups: a cerclage group containing 19 patients undergoing emergency cerclage and a rest group with 11 patients receiving expectant management.

The choice of treatment was nonrandom, based on the indication of the attending physicians of the service according to a clinical, case-by-case assessment and patient agreement. In the cerclage group, surgery was performed using the McDonald technique<sup>12</sup> or the modified McDonald technique, in which a second stitch is performed in the cervix 1 cm below the first stitch using a no. 5 polyester suture. The stitches were removed approximately 37 weeks or earlier in the case of complications such as preterm labor, premature amniorrhexis or chorioamnionitis. In the cerclage group, 18 pregnant women were discharged

over a variable period after undergoing cerclage and were readmitted due to obstetric complications or delivery. In the rest group, all patients remained hospitalized until miscarriage/delivery.

The groups were compared in regard to the following: maternal characteristics (age, obstetric history, gestational age, cervical dilatation, presence of bulging membranes at admission); gestational outcomes (gestational age at delivery/miscarriage, latency between hospital admission and delivery/miscarriage, birthweight, chorioamnionitis, placental infection, fetal death, prematurity below 24 weeks, survival to discharge); laboratory testing (leukogram and C-reactive protein (CRP) collected at admission and before delivery/miscarriage, screening for genital infections: urine culture, *Streptococcus agalactiae* culture in vaginal and anal secretions, trichomonas and yeast screening in vaginal secretion, hybrid capture for chlamydia and gonococcal culture in endocervical secretion); neonatal outcomes (birth weight, hospitalization time, 1- and 5-minute Apgar score, need for admission into the intensive care unit, need and duration of invasive mechanical ventilation, surfactant use, necrotizing enterocolitis, intracranial bleeding, neonatal death).

The quantitative variables were summarized using mean and standard deviation and compared using the nonparametric Mann-Whitney test. Qualitative variables were expressed through absolute and relative frequencies and compared using Fisher's exact test. For the variables that measure the time until an event, the Kaplan-Meier estimator and the Log-Rank test were used. A 5% significance level was adopted, and the IBM SPSS software version 20 was used.

**Ethical approval:** This study was approved by the Ethics Committee for Analysis of Research Projects of the Clinical Hospital of the University of São Paulo Medical School.

## RESULTS

The final analysis included 19 pregnant women into the cerclage group and 11 into the rest group. Regarding the maternal characteristics, there was a significant difference between the cerclage and rest groups in mean cervical dilatation ( $1.8 \pm 0.7$  cm vs.  $2.5 \pm 0.7$  cm,  $p=0.018$ ) and rate of membranes extending beyond the external os (30.8% vs. 100%,  $p=0.005$ ) (Table 1).

**TABLE 1.** MATERNAL CHARACTERISTICS AND GESTATIONAL OUTCOMES IN THE CERCLAGE AND REST GROUPS

|                              | Cerclage (n=19)                  |               | p-value |
|------------------------------|----------------------------------|---------------|---------|
|                              | Rest (n=11)                      |               |         |
|                              | Mean ± SD                        |               |         |
| Maternal age (years)         | 28.4 ± 7.4                       | 24.4 ± 6.1    | 0.145   |
| GA at admission (weeks)      | 21.7 ± 2.3                       | 21.1 ± 2.8    | 0.672   |
| Dilatation (cm)              | 1.8 ± 0.7                        | 2.5 ± 0.7     | 0.018   |
| GA at delivery (weeks)       | 28.6 ± 6.9                       | 23.3 ± 4.3    | 0.031   |
| Latency (days)               | 48.6 ± 47.1                      | 16 ± 19.2     | 0.016   |
| Birthweight (grams)          | 1468.3 ± 1220.8                  | 861.2 ± 448.8 | 0.418   |
|                              | Absolut and relative frequencies |               | p-value |
| Nulliparity                  | 12/19 - 63.2%                    | 5/11 - 45.5%  | 0.454   |
| Previous prematurity         | 5/19 - 26.3%                     | 4/10 - 40.0%  | 0.675   |
| Previous miscarriage         | 15/19 - 78.9%                    | 5/11 - 45.5%  | 0.108   |
| Bulging membranes            | 13/18 - 72.2%                    | 10/11 - 90.9% | 0.362   |
| Membranes beyond external os | 4/13 - 30.8%                     | 7/7 - 100.0%  | 0.005   |
| Chorioamnionitis             | 4/17 - 23.5%                     | 4/9 - 44.4%   | 0.382   |
| Placental infection          | 13/16 - 81.3%                    | 7/11 - 63.6%  | 0.391   |
| Delivery before 24 weeks     | 6/19 - 31.6%                     | 6/11 - 54.5%  | 0.266   |
| Fetal death                  | 1/19 - 5.3%                      | 6/11 - 54.5%  | 0.004   |
| Survival to discharge        | 9/19 - 47.4%                     | 4/11 - 36.3%  | 0.708   |
| Cesarean section             | 8/19 - 42.1%                     | 3/11 - 27.3%  | 0.466   |

GA: gestational age; SD: standard deviation

**TABLE 2.** NEONATAL OUTCOMES IN THE CERCLAGE AND REST GROUPS

|                           | Cerclage (n=18)                  |              | p-value |
|---------------------------|----------------------------------|--------------|---------|
|                           | Rest (n=5)                       |              |         |
|                           | Mean ± SD                        |              |         |
| GA at birth (weeks)       | 29.1 ± 6.7                       | 27.4 ± 2.3   | 0.857   |
| Birth weight (grams)      | 1531.2 ± 1224.1                  | 1129 ± 330.8 | 0.587   |
| IMV duration (days)       | 17.9 ± 23.3                      | 25.3 ± 32.7  | 0.6     |
| Apgar 1'                  | 5 ± 3.2                          | 5.2 ± 2.3    | 0.94    |
| Apgar 5'                  | 7.1 ± 3.1                        | 7.6 ± 0.9    | 0.649   |
|                           | Absolut and relative frequencies |              | p-value |
| Neonatal death            | 9/18 - 50.0%                     | 1/5 - 20.0%  | 0.339   |
| ICU admission             | 14/18 - 77.8%                    | 4/4 - 100.0% | 0.554   |
| IMV use                   | 9/16 - 56.2%                     | 3/4 - 75.0%  | 0.619   |
| Surfactant use            | 8/15 - 53.3%                     | 1/4 - 25.0%  | 0.582   |
| Neonatal sepsis           | 8/16 - 50.0%                     | 4/4 - 100.0% | 0.117   |
| Positive blood culture    | 5/10 - 50.0%                     | 2/5 - 40.0%  | 0.999   |
| Intracranial bleeding     | 2/17 - 11.8%                     | 1/4 - 25.0%  | 0.489   |
| Necrotizing enterocolitis | 0/17 - 0.0%                      | 1/4 - 25.0%  | 0.19    |

GA: gestational age; IMV: invasive mechanical ventilation; ICU: intensive care unit; SD: standard deviation;

The mean gestational age at delivery was  $28.6 \pm 6.9$  weeks in the cerclage group and  $23.3 \pm 4.3$  weeks in the rest group,  $p=0.031$  (Figure 1). The mean latency period was  $48.6 \pm 47.1$  days for the cerclage group and  $16 \pm 19.2$  days for the rest group,  $p=0.016$ . Fetal death occurred in one case in the cerclage group (5.3%) compared to six cases in the rest group (54.5%,  $p=0.004$ ). No differences were found for the other gestational outcomes analyzed (Table 1).

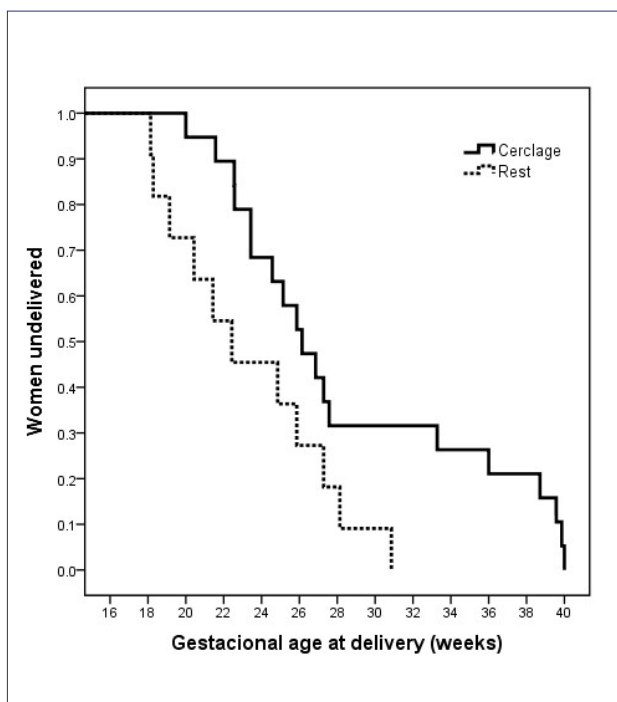
No significant differences were observed between the groups based on the results of the laboratory tests collected. There were no positive cases for chlamydia, gonococcus or trichomonas.

For the analysis of neonatal outcomes, after excluding the seven cases of fetal death, 23 live births (18 from the cerclage group and five from the rest group) were considered. The groups did not differ in gestational age at birth, birth weight, duration of invasive mechanical ventilation, or 1- or 5-minute Apgar scores. There were also no differences in neonatal death rates, need for admission into intensive care unit, invasive mechanical ventilation, surfactant use, neonatal sepsis, positive blood culture, intracranial bleeding or necrotizing enterocolitis (Table 2).

## DISCUSSION

Early cervical dilatation is a rare condition, but it is associated with a high risk of extreme prematurity and, consequently, high neonatal morbidity and mortality. There are two therapeutic options for early cervical dilatation - cerclage or expectant management with rest. Among papers published since 2000 comparing the two treatments, there have only been two prospective studies<sup>10,13</sup>. Of these, only one was randomized<sup>10</sup>, and it included a small number of cases (13 in the cerclage group and 10 in the control group) and twin pregnancies. The present study chose to exclude patients who delivered or miscarried within 2 days of hospital admission, considering that they would probably be cases already in a process of miscarriage or active phase of labor. The choice of treatment was nonrandom, based on the indication of the clinical specialists and agreement of the patient. Thus, the study is subject to possible selection biases. Given the difficulty of recruiting cases in the present study, a historical cohort design was chosen.

FIGURE 1



Although only patients with dilatation between 1 and 3 cm were included, there was a significant difference between the groups regarding cervical dilatation at admission and a higher frequency of bulging membranes extending beyond the external os in the rest group. Given these data, it is possible that the less severe cases were selected to receive the surgical treatment. However, the presence of bulging membranes beyond the external os was not related to a worse prognosis.

In this study, the emergency cerclage presented better gestational outcomes with a more extended latency period (48.6 vs. 16 days) and older gestational age at delivery (28.7 vs. 23.3 weeks). These results are in agreement with the literature on the subject that describes more favorable results in the cerclage group<sup>11,14-16</sup>. Based on these findings, the surgical approach with emergency cerclage seems to be superior to rest in prolonging gestation in patients with cervical dilatation in the second trimester. The cerclage group had a lower fetal death rate, but there was no difference in survival to discharge rates, meaning that the frequency of patients whose newborns were discharged home was equivalent between the groups (47.4% vs. 36.3%).

There were no differences between groups regarding variables related to infectious processes, including chorioamnionitis or placental infection.

Additionally, no differences were identified between the groups for leukocyte count or CRP level in maternal blood. It is known that chorioamnionitis may occur subclinically, causing a delayed change in serum markers. Thus, it is difficult to identify any differences between groups for these variables. Screening for intra-amniotic infection may be a more accurate marker<sup>17</sup>. For this reason, some services perform amniocentesis prior to the emergency cerclage as a way to exclude subclinical chorioamnionitis, which is not part of the routine care of our service. There was no evidence of a higher frequency of genital infections in either of the groups studied. However, because of the retrospective design of the study, the analysis of the presence of genital infection was limited because not all patients were tested, especially in the rest group.

For the neonatal outcomes, data on the 23 live births during the study were evaluated. Fetal death occurred in one case among 19 in the cerclage group and six out of 11 in the rest group. Considering that delivery occurred before 24 weeks in 54.5% of the cases, the high fetal death rate in the rest group suggested that cerclage may reduce fetal risk, including late miscarriage and stillbirth, compared to resting management. However, after excluding the seven cases of fetal death, the gestational age at delivery was similar ( $29.1 \pm 6.7$  vs  $27.7 \pm 2.3$  weeks,  $p=0.857$ ), and neonatal death rate was higher in the cerclage group, but this difference was not statistically significant. Fifty percent of the newborns from the cerclage group died during the neonatal period, which may have contributed to the similar survival to discharge rates between the groups. Therefore, when fetal and neonatal deaths were considered, no differences were observed in the rate of newborns discharged to go home. The difference in the neonatal sepsis rate, 50% in the cerclage group and 100% in the control group, was noteworthy. This finding is important to consider when counseling pregnant women to undergo cerclage or bed rest because if the fetus remains alive, the gestational age at delivery will be similar despite the treatment applied.

Despite the limitations of a retrospective study with small sample size, emergency cerclage seems to be beneficial in prolonging gestation; however, no difference was found in the survival to discharge rate for newborns.

## RESUMO

**OBJETIVO:** Os resultados gestacionais e neonatais de mulheres com cervicodilatação precoce submetidas à cerclagem de emergência foram avaliados e comparados com mulheres tratadas com manejo expectante com repouso no leito.

**MÉTODOS:** Análise retrospectiva de gestantes admitidas entre 2001 e 2017 com diagnóstico de cervicodilatação precoce e/ou membranas protrusas. Foram incluídas pacientes com gestação única de feto sem malformações, entre 16 semanas e 25 semanas e 6 dias, com dilatação cervical de 1 a 3 cm; as pacientes que tiveram parto ou aborto dentro de 2 dias após admissão foram excluídas.

**RESULTADOS:** O estudo envolveu 30 pacientes: 19 no grupo cerclagem e 11 no grupo repouso. Houve diferença significativa, com o grupo cerclagem apresentando melhores resultados em relação à idade gestacional no parto (28,7 vs. 23,3 semanas;  $p=0,031$ ) e à latência entre a admissão hospitalar e o parto (48,6 vs. 16 dias;  $p=0,016$ ). A taxa de mortalidade fetal foi menor no grupo cerclagem (5,3% vs. 54,5%,  $p=0,004$ ). Considerando a idade gestacional no nascimento dos recém-nascidos vivos, não houve diferença entre os grupos cerclagem e expectante (29,13 vs. 27,4 semanas;  $p=0,857$ ).

**CONCLUSÕES:** A cerclagem de emergência foi associada a maior período de latência com impacto significativo na idade gestacional do parto e à redução da taxa de mortalidade fetal.

**PALAVRAS-CHAVE:** Cerclagem cervical. Emergências. Gravidez de alto risco. Nascimento prematuro. Incompetência do colo do útero.

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