Perinatal outcome after late emergency cerclage – a retrospective observational study

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Abstract

Background: Second trimester cervical dilation with or without bulging membranes is associated with preterm delivery and therefore increased rates of perinatal morbidity and mortality. Mid-trimester emergency cerclage is a therapeutic option, but the clinical benefit is discussed controversially. Objective: To analyze pregnancy prolongation and neonatal outcome after emergency cerclage. Study design: In this retrospective observational study we included all singleton pregnant women within a period of 6 years who received emergency cerclage due to preterm cervical dilation. Results: Between 2007 and 2012 55 emergency cerclages were performed. The median gestational age at day of cerclage placement was 23 6/7 weeks (range 19 2/7-29 6/7; IQR 23 1/7-24 4/7). The procedure leads to a mean pregnancy prolongation of 84 days (range 0-135, IQR 46-111). The effect on pregnancy prolongation was independent of gestational age at surgery. The median gestational age at delivery was 36 4/7 weeks (IQR 31 6/7-39 3/7) with a birth weight of 2750 g (IQR 1822-3360 g). Pregnant women without bulging membranes had a comparatively greater benefit of the procedure. Overall neonatal survival rate was 94.4%. Conclusion: Mid-trimester emergency cerclage may be a beneficial therapeutic option, even after 22 weeks of gestational age.

Key words: emergency cerclage, late mid-trimester, perinatal outcome, cervical dilatation, bulging membranes

Introduction

Preterm birth is still the leading cause of perinatal morbidity. Cervical insufficiency, defined as painless second-trimester cervical dilatation, is a common etiology of preterm birth. Cervical cerclage is a possible intervention to prevent preterm delivery. However, for therapeutically intervention women with only a shortened cervix and those with a cervical dilation and bulging of membranes need to be distinguished. The overall use and effectiveness of emergency cerclage remains unclear. Namouz et al. [1] recently published a literature review and identified prolapsed membranes, evidence of intra-amniotic or systemic infection, symptomatic presentation, cervical dilatation greater than 3 cm, or cerclage after 22 weeks as predictors for poor outcome. In a total of 994 cases, emergency cerclage lead to a mean pregnancy prolongation of 8 4/7 weeks with a mean gestational age at delivery of 30 4/7 weeks. The fact that pregnancy extension can also be achieved in more advanced gestational weeks is documented in numerous studies [1-3]. However, it needs to be questioned whether a prolongation of pregnancy is associated with improved neonatal outcome and is therefore justifiable. Especially in late cerclage beyond 26 weeks of gestation the safety and efficacy must be clearly demonstrated since neonatal survival rates reaches rates over 85% [4]. The selection of suitable patients to benefit from an emergency cerclage, poses a great challenge to the treating gynecologists. Since in our hospital emergency cerclage is a frequently performed procedure even in later gestational age we analyzed our own cases.

Methods

In this retrospective study patients were identified by query of all cerclage placements performed at St.-Marien-Hospital Bonn, Germany, between January 2007 and December 2012. St.-Marien-Hospital is a Perinatal Centre of highest care level (level 1) with approximately 2000 births per year.

Since 2007 an increasing number of emergency cerclages have been performed at St.-Marien-Hospital Bonn. Patients were either selected by routine cervical length surveillance ultrasound or were presenting in the hospital with subjective complaints of increased pelvic pressure or vaginal discharge and then underwent cervical length sonography.

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Surgery was indicated following an in-house protocol. Inclusion criteria were cervical dilatation with exposed fetal membranes or a shortened cervix below 10 mm with a dilated internal cervical os of more than 20 mm. The defined gestational age was between 18 0/7 and 29 6/7 weeks. Preoperative requirements were intact fetal membranes, no significant vaginal bleeding, no persistent regular uterine contractions, no suspected chorioamnionitis, no known fetal anomalies or aneuploidy. Suspected chorioamnionitis was defined by a maternal rectal temperature of 38°C or higher, significant leukocytosis, elevated CrP > 1.5 mg/dl, maternal tachycardia (> 100 bpm) or tachycardic cardiotocography (> 160 bpm).

Except for 2 cases with Shirodkar-type emergency cerclage, McDonald-type emergency cerclage was performed in all cases. Procedure was done in spinal or peridural anesthesia using purse-string suture with non-absorbable stitches. A Foley balloon and/or a humid swab were used to push the amniotic membrane back into the uterine cavity.

First postoperative examination took place at day 2 after procedure, with earlier examination just in exceptional cases. Afterwards patients were mobilized. After discharge from the hospital regular examinations were performed by resident gynecologists. Cerclage was removed after 37 0/7 weeks of gestation. Indications for earlier removal of the cerclage were unstoppable contractions or suspected chorioamnionitis.

Outcome parameters of interest were time from cerclage placement to delivery and the gestational age at delivery. Apgar score, umbilical artery pH, respiratory insufficiency and neonatal infection were defined as neonatal outcome parameters.

Statistical analysis: Categorical data were calculated with single sample t-test; \( p < 0.005 \) was considered significant. Box-plot whiskers represent ± 1.5 × inner quartile range (IQR).

**Results**

Within the time of analysis 55 patients underwent emergency cerclage (Table 1). Median maternal age at the time of procedure was 31 years (IQR 27-35). 36 patients had a visible fetal membrane through a dilated internal cervix. Median cervical dilatation was 3 cm (IQR 1-5 cm). Median gestational age was 23 6/7 weeks (range 19 2/7-29 6/7; IQR 23 1/7-24 4/7).

Median pregnancy prolongation was 84 days (range 0-135, IQR 46-111) (Table 2). Patients with exposed prolapsed membranes had a median pregnancy prolongation of 112 days (IQR 89-124) compared to 71 days (IQR 38-91) in the group of patients without exposed prolapsed membranes (Fig. 1).

![Figure 1](image-url)

**Table 1. Characteristics (n = 55)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at cerclage (years)</td>
<td>31; 27-35 (median, IQR)</td>
</tr>
<tr>
<td>Para</td>
<td>2; 1-4 (median, IQR)</td>
</tr>
<tr>
<td>Gravida</td>
<td>0; 0-1 (median, IQR)</td>
</tr>
<tr>
<td>Gestational age at cerclage (weeks)</td>
<td>23 6/7; 23 1/7-24 4/7; 18 6/7-29 6/7 (median, IQR; range)</td>
</tr>
<tr>
<td>Cervical dilatation (cm)</td>
<td>3; 1-5 (median, IQR)</td>
</tr>
<tr>
<td>Prolapsed membranes (n)</td>
<td>36 (65%)</td>
</tr>
</tbody>
</table>

In 12 patients the procedure was performed earlier than 22 completed weeks of gestation leading to a median pregnancy prolongation of 87 days (Fig. 2). Within the 43 remaining pregnant women who underwent emergency cerclage placement after 22 completed weeks of gestation, birth occurred at a median of 84 days after intervention (IQR 54-108 days).
One fetus was born 1 day after procedure because of preterm labor and chorioamnionitis with a gestational age of 21 4/7 weeks and received palliative care. 51 of 54 (94%) newborns survived. The three infants who died were extremely premature (24-25 weeks of gestation) and suffered from typical problems of prematurity. The mean gestational age was 36 4/7 (IQR 31 6/7-39 3/7) with a median birth weight of 2750 g (IQR 1822-3360 g) (Table 2). 36 neonates (67%) were delivered vaginally, 18 (33%) by cesarean section.

The one minute Apgar score was median 9 (IQR 7-9), the five minutes Apgar score 9 (IQR 8-10) and the 10 minute Apgar score 10 (IQR 9-10) in an umbilical arteries value of 7.30 (IQR 7.22 to 7.34). Of the 51 surviving neonates 12 (24%) required respiratory support (CMV or CPAP). 8 neonates (15%) were treated with antibiotics due to a suspected neonatal infection. Within the group of neonates born after 34 completed weeks of gestation (34 children), 3 had to be treated with antibiotics due to neonatal infection (8.8%).

**Discussion**

Second trimester cervical dilation, especially with bulging membranes is a diagnosis connected to a high risk of extreme preterm labour and thus neonatal complications. Recent studies analyzed the efficiency of emergency cerclage in second trimester cervical dilation [5-8].

Due to the lack of a control group we used data from former studies to compare results. In 2007 Pereira and co-authors published data of 225 patients with cervical dilatation between 14 to 25 weeks of gestation [9]. Within the group of 73 patients who underwent conservative treatment the median pregnancy prolongation was 1.6 weeks. In a similar study setting, Althuisius et al showed a pregnancy prolongation of 20 ± 28 days in the group (n = 8) who were treated with “bed rest”[10]. A retrospective study by H. Stupin and co-authors of 161 patients with bulging membranes in the second trimester showed a mean prolongation of only 3 days within the group undergoing conservative treatment [11].

The most recent data published in a comprehensive literature review by Namouz [1] emphasized the benefit of this surgical procedure regarding the prolongation of pregnancy. The over all prolongation of pregnancy in this meta-analysis was 64 days with a highly inter-study variation between 21 to 78 days. Within our cohort a median prolongation of 84 days was achieved with a relatively narrow range.

Even though different collectives of patients with different risk factors were compared the role of an experienced surgeon regarding indication and surgical practice seems to be important. In our hospital cerclage placement was performed only by one surgeon of high operative experience. Debby et al. [12] also emphasized the importance of a meticulous and prudent surgical technique as the key for success. According to our experience spinal anesthesia should be favored over general anesthesia because of better postoperative analgesia and therefore less reactive uterine contractions. In addition,
the danger of increased intra-abdominal pressure after extubation is reduced.

Despite the promising data several authors caution about extending pregnancies from pre-viability to severe prematurity [5]. On the one hand responsible selections of patients who are suitable for an operative procedure are needed. To strictly follow the protocol for inclusion criteria is essential to justify the procedure even in high risk patients around 22 weeks of gestation. On the other hand the knowledge of a therapeutic option especially for patients with bulging membranes and expected miscarriage makes it impossible to deprive patients of the therapeutic option of an emergency cerclage [6]. In our cohort 65% presented with severe dilatation of the cervix with bulging membranes. Although time of prolongation was 41 days shorter than within the cohort without bulging membranes even in this group all pregnancies could be prolonged over 30 weeks of gestational age.

However, there are still general concerns related to late trimester interventions after 22 weeks of gestations. Some studies [2, 3] (Abo-Yaqoub, Ventolinio) describe an adverse outcome for late cerclages. Within our study cohort we did not see a significant difference regarding the point of procedure. 78 percent of our patients were beyond 22 weeks of gestation (Fig. 2). A retrospective review of 20 patients concluded that the duration of cerclage was significantly longer when the procedure was done before 22 weeks of gestation. However there was no difference in the duration of gestation and the neonatal birth weight. Therefore Terkildsen [13] defined a gestational age of more than 22 weeks as a positive prognostic factor to prolong pregnancy beyond 28 weeks of gestation. In our collective the mean gestational age was significantly higher with 36 4/7 weeks compared to the meta-analysis of Namouz et al. [1] with 30 4/7 weeks. Furthermore, time of cerclage placement was an average 13 days later than in the meta-analysis. In our opinion, with regarding neonatal outcome the time of prolongation is not a good parameter to tell the success of an emergency cerclage procedure. The avoidance or delaying of extremely preterm birth must be the focus of therapeutic treatment.

Due to the late point of delivery with almost 37 weeks of gestation the neonatal morbidity and mortality was quite low in our cohort. Three neonates died because of extremely preterm birth between 24 and 25 weeks of gestation and typical preterm complication like intraventricular hemorrhage and pulmonary insufficiency. The overall survival rate was 94%. Neonatal outcome parameters defined as Apgar score with 1, 5 and 10 minutes, umbilical artery pH, respiratory failure and neonatal infection differed only slightly from normal population where neonates are subdivided into neonates > 34 weeks of gestation and < 34 weeks, respectively. Within the group of newborns born after 34 gestational weeks only 2 infants needed respiratory support and 3 infants received antibiotic therapy. The relatively high overall rate of antibiotic therapy might be due to extended therapy in preterms. Severe amnion infection with neonatal sepsis was seen in two cases. Reliable prediction parameters are needed to detect amnion infections in time in order to determine the correct point of delivery. Therefore further studies are needed to detect early biochemical parameters of an amnion infection [14].

In summary, our study shows that emergency cerclage is a relatively safe and effective therapeutic option even in advanced pregnancy.

References

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