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# PRETERM BIRTH: EVALUATION OF UTERINE CERCLAGE AND THE USE OF PROGESTERONE TO PROLONG PREGNANCY

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**Abstract: Objective: To** evaluate the effectiveness of cerclage and progesterone treatment in relation to prolonging pregnancy. **Methods:** Integrative literature review through a search for articles related to the topic in the PubMed and VHL databases, using the descriptors: "cerclage" and "prematurity", applying the inclusion criteria controlled clinical trial and observational study, published between 2018 and 2023, text in English, complete and free, and articles that did not fit the proposed theme were excluded to select the most suitable articles. **Results:** The final sample consisted of 9 articles, which were analyzed and it was evidenced that the use of progesterone, cerclage alone or association of the two methods are effective treatments in general, but in specific situations there is a prevalence of one method over another. **Final considerations:** The interventions are different in each case, so it is up to the specialist to individualize each patient's condition and jointly choose the best treatment method.
**Keywords:** Preterm labor; Therapy; Cervical cerclage; Progesterone.

## INTRODUCTION

According to the World Health Organization (WHO), the proportion of prematurity has been increasing in recent decades. The concept is defined according to gestational age (GA), so any child born at less than 37 weeks, or 36 weeks and 6 days, is considered preterm (NETO ETS. et al., 2021). On a global scale, in 2010 there were 15 million premature births in the world, around 11.1%, with 1 in every 10 births being premature. According to the World Health Organization, prematurity is a global problem, mainly because it is directly related to the neonatal mortality rate (BONILHA ALL. et al., 2016).

Prematurity is one of the main causes of neonatal morbidity and mortality (MINISTERIO DA SAÚDE, 2016), with a complex and multifactorial etiology, often of unknown cause, but it is known that maternal age is an independent risk factor, that is, it alone can cause premature birth, regardless of other risk factors that contribute to such an outcome (BONILHA AL, et al., 2016). This is why the Declaration of Live Births, standardized nationally by the Ministry of Health, must be filled out in hospitals in order to record the maternal-fetal conditions that justify premature births, such as whether or not the birth took place with the assistance of a doctor or traditional midwife, whether there were any congenital anomalies identified at birth, the place where the birth took place, the gestational history, including the start of prenatal care, complications and the number of visits, as well as the history of the birth, whether it was induced, the complications, the route of delivery and the length of labor. To this end, it is important to know the group of pregnant women who are attended to in order to provide guidance on health care so that secondary and tertiary preventive measures can be adopted (RAMOS HAC and CUMAN RKN, 2009).

According to a study, one cause of premature birth is the length of the cervix (PACAGNELLA RC, et al., 2023) and the length of the cervix is identified through transvaginal ultrasound in the second trimester, with immediate results, so if the size is normal, i.e. > 25mm, this pregnant woman will have a normal follow-up, with a low-risk pregnancy, however, if a cervix < 25mm is identified, she will undergo special follow-up (XAVIER J, 2015) (ZUGAIBE M, et al., 2013), and may receive vaginal progesterone alone, 2013), and may receive vaginal progesterone alone, transabdominal or vaginal uterine cerclage, or an association of medication with a surgical procedure, as this is considered a risk factor (MINISTERIO DA SAUDE, 2022). Therefore, the shorter the length of the cervix, the lower the gestational age tends to be, regardless of previous history (TOMA OT, et al., 2021).

Cervical or uterine cerclage is one of the techniques that can be used to prevent preterm birth. It consists of a small operation in which a suture is made in the cervix, in the vaginal portion, so that it doesn't open prematurely, i.e. to prevent births before 37 weeks. Due to the weight of the fetus when there is isthmus--cervical insufficiency, cerclage prevents the fetal sac from descending, leading to premature birth (BVS ATENÇÃO PRIMÁRIA A SAUDE, 2022). This is one of the most frequent causes of premature birth, an anomaly that makes it impossible to maintain the pregnancy to term, due to a functional defect in which the sphincter of the cervix becomes weak so that the cervix does not remain closed, unable to retain the fetus. (PIATO S, 2009).

This procedure, uterine cerclage, can be done transabdominally or vaginally, the latter being the most commonly used nowadays because it presents less risk and is less invasive (MONTENEGRO CAB, REZENDE FILHO J, 2017). According to the literature, an emergency situation is when there is an imminent risk to life (GIGLIO-JACQUEMOT A, 2005), in this situation, the woman arrives at the emergency department with cervix dilation <3cm and prolapse of the amniotic sac, if the conditions are favorable for performing cerclage, that is, cervix dilation <3cm, not being empty, no suspicion of chorioamninitis and conceptus without impaired vitality, it can be performed in an emergency. (PROTOCOL PRT.DM.023, 2021).

In addition to cerclage, progesterone can be administered, which is a hormone produced by the placenta to maintain pregnancy and reduce uterine contractions. This intervention is indicated for women with a previous premature birth or a short cervix (<25mm) identified on ultrasound in the second trimester of pregnancy. In addition to the benefits during pregnancy, it was observed that there was a reduction in neonatal death, fewer complications requiring mechanical ventilation and hospitalization in intensive care. (CROWTHER CA, et al., 2013) (MINISTÉRIO DA SAUDE, 2010).

Thus, the decision to intervene to minimize the risk of preterm birth should be personalized and based on the clinical circumstances, competence and experience of the medical team and the consent of the pregnant woman (MEDLEY N, et al., 2012). However, there is no consensus on the effectiveness of interventions, since it varies for different populations of pregnant women, and is frustrating for them and for professionals, thus requiring new research due to the lack of evidence (ALFIREVIC Z, et al., 2018). Therefore, the aim of this study is to evaluate the effectiveness of each treatment in relation to prolonging pregnancy.

## METHODS

This is a descriptive integrative literature review with a qualitative approach, using the guiding research question: How to approach and treat women at risk of premature birth? The bibliographic research was carried out in October 2023, and searches were conducted in the following databases: National Library of Medicine (NIH/PubMed) and the Regional Portal of the Virtual Health Library (VHL), using the Health Sciences Descriptors (DeCS): "cerclage" and "prematurity", combining the terms using the Boolean operator "and".

The integrative literature review followed the following steps: definition of the topic, bibliographic survey in databases, establishment of inclusion and exclusion criteria, analysis of the studies found and writing up of the results. The inclusion criteria applied were: articles of the controlled clinical trial and observational study type, published between 2018 and 2023, with text in English, complete available in the database and with free access. The exclusion criteria were articles that did not fit the proposed theme.

## RESULTS

The database search resulted in a total of 1769 papers. Of these, 1422 articles were initially found in the PubMed database and 347 articles in the VHL. After using the inclusion and exclusion criteria, 6 articles were found in PubMed and 3 in the VHL. Thus, after the two searches, 9 articles were selected and analyzed in their entirety, as shown in the flowchart in **Figure 1**

**Table 1** summarizes the articles included in the final sample, covering not only the titles of the articles, but also the authors and year of publication, type of study, objectives and conclusions, included in the main results.

With regard to the type of suture used in the uterine cerclage carried out by 1 article, of the 1003 women who were checked after pregnancy with a monofinal suture in the cervix, it was observed that 80% had a pregnancy loss, and 76% of the 993 women who received a braided suture had a pregnancy loss.

Among the articles selected, 1 analyzed women with a history of preterm birth and a short cervix diagnosed after 24 weeks. The study showed that vaginal progesterone had the best results for preventing preterm birth, with 67.75% of pregnancies delivering at term, and compared to non-intervention with progesterone with only 57.2% of deliveries at term. Another 2 articles evaluated various therapeutic interventions for prematurity (TBP). One of them showed that for late cerclage the most effective was a combination of interventions, using progesterone and cerclage followed by progesterone and pressor, with progesterone alone performing less well. The other study showed that women with a cervix >= 9mm had the same benefit when using progesterone or performing uterine cerclage, but those who had a cervix <= 8mm during ultrasound screening were more efficient when using uterine cerclage.

The other two articles selected discussed emergency and elective uterine cerclage, one of which showed that emergency cerclage, using current techniques, at the end of the second trimester due to late isthmus-cervical insufficiency had the same result as cerclage performed in the first few weeks after the short cervix had been identified by ultrasound. The second article performed emergency cerclage with a new technique of its own, the three-stage procedure for emergency cerclage (TSEC), and observed that pregnancy was prolonged, but no births were delivered at term.

One of the selected articles evaluated cervical length after high, low or abdominal vaginal cerclage, and concluded that abdominal cerclage had a superior result to low and high vaginal cerclage, i.e. the length of the cervix increased by 1.8mm, while low and high vaginal cerclage resulted in a decrease in the cervix, 13.2mm and 20mm respectively, after the 12-week surveillance period.

Of the 9 articles selected, 1 analyzed cerclage in women with twin pregnancies and showed that cerclage before 24 weeks had more benefits than cerclage performed between 24-28 weeks. Another study showed that early reduction from trigeminal to twin gestation, in relation to cerclage, found that fetal reduction has more obstetric benefits compared to cerclage in relation to miscarriage.

## DISCUSSION

In order to identify women with a short cervix, the length of the cervix was measured vaginally with a 9 MHz probe. After urinating in the lithotomy position, i.e. a gynecological position that allows access to the genital and pelvic region, the length was measured from the internal ostium to the external ostium. Two groups of women were then separated: one received progesterone via vaginal capsule and the other was treated with cervical cerclage using the McDonald technique. It was observed that

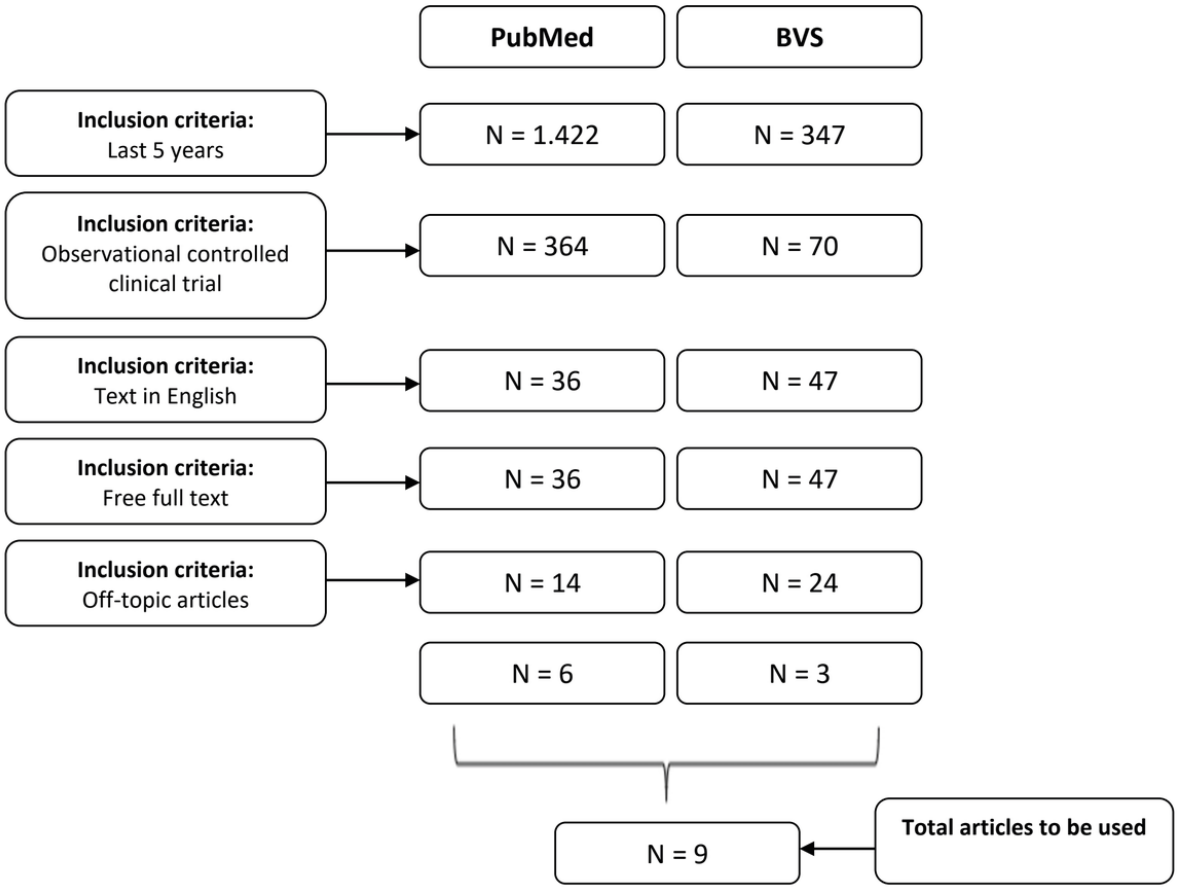


**Figure 1** - Flowchart of the article selection process for the integrative review.

| N | Title | Authors and year | Main findings |
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| 1 | Early fetal reduction for twins versus prophylactic cervical cerclage for triplet pregnancies conceived with assisted reproduction techniques. | ABDELHAFEZ MS, et al. (2018) | Retrospective study. With the aim of comparing the obstetric results of treatment with fetal reduction for twins with treatment by prophylactic cervical cerclage. They concluded that reduction has better results due to lower morbidity and mortality, prematurity and miscarriage. |
| 2 | A three-stage procedure for emergency cerclage: gestational and neonatal results. | GOMEZ-CASTELLANO, et al. (2022) | Observational study. The aim was to evaluate a new cerclage technique in the second trimester. They concluded that the procedure had excellent results in terms of gestational age (GA) at delivery, birth weight and few complications, but more data needs to be collected, |
| 3 | Unraveling the efficacy of therapeutic interventions for short neck: insight from a retrospective study for better clinical management. | LUCA AM, et al. (2023) | Retrospective observational study. Aimed to evaluate the effects of the treatment and the effectiveness of the intervention. They concluded that the combined therapeutic intervention had better results. |
| 4 | Efficacy of vaginal progesterone in reducing preterm birth in high-risk patients diagnosed with short cervical length after 24 weeks: a retrospective cohort study. | LUXEMBOURG D, et al. (2023) | Retrospective cohort study. The aim was to assess the impact of progesterone treatment on maternal and fetal outcomes in pregnant women with a previous history of preterm birth and a short cervix diagnosed after 24 weeks of GA. They concluded that progesterone treatment had good maternal-fetal outcomes, with a reduction in preterm delivery before 34 weeks of GA. |
| 5 | Should it really be called heroic cerclage? The obstetric results of emergency cerclage at the end of the second trimester compared with elective cerclage indicated by the initial history: a retrospective study. | MOR M, et al. (2024) | Retrospective cohort study. The aim was to compare the obstetric results of emergency versus elective cerclage. They concluded that although the circumstances of the emergency procedure are less favorable, it is considered a safe procedure and has obstetric results similar to the elective one. |

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| 6 | Monofilament suture versus braided suture to improve pregnancy outcomes after vaginal cervical cerclage (C-STICH): a pragmatic, randomized, controlled, phase 3, superiority trial. | HODGETTS MV, et al. (2022) | Pragmatic, randomized, controlled, superiority trial. The aim of the study was to determine the effectiveness of a monofilament thread compared to a braided thread in the rates of pregnancy loss in women undergoing cervical cerclage, with the hypothesis that the braided thread would be a site for bacterial profiling, predisposing to infection and consequently pregnancy loss and premature birth. They concluded that the monofilament wire did not have superior results to the braided wire. |
| 7 | Longitudinal change in cervical length after vaginal or abdominal cervical cerclage: a randomized comparison. | RIDOUT AE, et al. (2023). | Randomized controlled trial. Aimed to assess the rate of change in cervical length after low, high or transabdominal transvaginal cerclage in women with previous vaginal cerclage. They concluded that posterior vaginal cerclage shortened the cervix compared to transabdominal cerclage, in which cervix length is preserved. |
| 8 | Very short cervix in low-risk asymptomatic singleton pregnancies: outcome according to treatment and cervix length at diagnosis. | SOUKA AP, et al. (2020). | Retrospective study. Aimed to explore pregnancy outcomes according to cervical length and treatment in single pregnancies with short cervix in the absence of risk factors for preterm birth. They concluded that women with cervical length >= 9 mm had similar positive outcomes with progesterone or cerclage, and with cervix <= 8 mm cerclage was more beneficial. |
| 9 | The use of cervical cerclage in asymptomatic twin pregnancies with cervical shortening or dilation; a 10-year retrospective cohort study . | TAN H. (2023). | Retrospective observational study. The aim was to identify the effects and the ideal time to perform cerclage in asymptomatic twin pregnancies with cervical shortening or dilation. They concluded that cerclage prolongs gestational age, reducing the incidence of preterm labor . If performed before 24 weeks, it has a greater maternal-fetal benefit, and if performed between 24-28 weeks, the results were similar to not performing cerclage. |

**Chart 1** - Articles selected for this integrative review.

women who received uterine cerclage and who had a very short cervix (<= 8mm) benefited more from the treatment than women with this cervix measurement and who used progesterone via vaginal , reaching this conclusion after adjusting for age, body mass index, smoking, mode of conception, gravity, parity and gestational age. However, this difference in quality of treatment was lost with women who had a cervix <= 9mm, as the two approaches had equivalent results, with all women delivering at term. However, the study shows that if the woman is at high risk of preterm birth, i.e. a history of previous preterm birth and/or late miscarriage, cervical cerclage is more beneficial, while in the case of low-risk women, with only a short cervix length (<=25mm), they would benefit from progesterone administration (SOUKA AP, et al., 2020), which is corroborated by information from another article that says that women with a short cervix and a history of premature birth are more likely to have other premature births, and are considered high-risk women, and that the use of cerclage has proven to be more beneficial in this part of the population, while progesterone has good results if used in women without a history of spontaneous premature birth and a short cervix, considered low risk (RUNDELL K and PANCHAL B, 2017)

Another study evaluated the effectiveness of early and late pregnancy postponement treatment. In the case of emergencies, intervention with the two methods was observed, progesterone alone and associated with cerclage, and it was concluded that the response to vaginal hormone treatment was worse and the best result was with the association of progesterone with uterine cerclage. In the case of early treatment, when the short cervix was identified on third trimester ultrasound and risk factors were identified during prenatal consultations, cerclage and progesterone alone obtained similar results (LUCA AM, et al., 2023). Comparing the validation of emergency cerclage and early cerclage, the study shows that emergency cerclage is a procedure performed in less favorable

circumstances, but that it brings a good result. In addition, it was observed that emergency cerclage with the Shirodkar technique brings more benefits, since often in the emergency the cervix is already effaced and dilated, using this technique it is possible to suture at a higher point in the cervix which reduces the rupture of the membrane (MOR M, et al., 2023), 2023). This information validates the information in a second article showing that emergency cervical cerclage has benefits, such as prolonging pregnancy for a further 12 weeks after treatment (MACDOUGALL J and SIDDLE N, 1991). However, some articles consider emergency cerclage to be superior only to expectant management and non-surgical treatments such as activity restriction, bed rest and pelvic rest, since the birth weight of babies whose mothers were treated with elective uterine cerclage was more satisfactory than those who received emergency treatment (DIAMANT H, et al., 2019).

A new study that divides cerclage using the TSEC technique into three stages, which consists of a sequence of sutures, the first cerclage being to ensure the reduction of the sac, the second occlusive, i.e. to maintain cervical competence, and the last, optional, shows that the technique implemented brings more benefits in relation to weight, gestational age and fewer complications in emergency cerclages, since it makes a more reinforced suture and therefore manages to prolong pregnancy for longer, bringing more benefits to the baby (GOMEZ-CASTELLANO M, et al., 2022), which still needs to be studied further, as other articles have shown that cerclage using the current McDonalds and Shirodkar techniques is safe, resulting in successful births without maternal and fetal complications, taking into account cervical dilation at the time of the procedure, gestational age and number of previous losses, while the Shirodark technique has more benefits in terms of birth weight (TREADWELL MC, et al., 1991).

When analyzing the effectiveness of uterine cerclage in women with twin pregnancies, it was observed that performing cervical cerclage was more beneficial than not performing it. Between the two groups, the treatment group and the control group, there was not much difference in terms of maternal age, nulliparity, smoking, number of previous uterine instruments, in vitro fertilization (IVF) and previous obstetric history, so it was observed that the group that underwent cerclage had more deliveries with live births, while the non-intervention group had a higher stillbirth rate (TAN H, 2023). This was confirmed in a second research article, showing that intervening with uterine cerclage brings more benefits than maintaining the expectant management of twin pregnancies with a risk of premature birth and stillbirth (ROTTENSTREUCH A, et al., 2019).

## CONCLUSION

Preterm births due to isthmus-cervical insufficiency are a frequent and feared cause of pregnancy. Thanks to advances in technology and medicine, it is possible to identify pregnant women who fall within the risk factors for preterm births and intervene positively to postpone the delivery date, either with cerclage, progesterone or a combination of both methods. This study showed that the combination of cerclage and progesterone was more effective than the use of emergency intervention alone, while early uterine cerclage was more beneficial in shorter cervixes and women with more risk factors, as well as in twin pregnancies, compared to expectant management. It is therefore essential that obstetricians understand the importance of early identification of the risk factors that can lead to this dreaded outcome and know how to intervene correctly according to the individuality of each patient in order to approach and provide the best support during pregnancy.

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