



Transvaginal cervical cerclage

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INTRODUCTION — Cervical cerclage refers to a variety of surgical procedures in which sutures, wires, or synthetic tape are used to reinforce the cervix. By mechanically increasing the tensile strength of the cervix, the occurrence of adverse perinatal events associated with cervical insufficiency may be reduced. Adverse perinatal events associated with cervical insufficiency include:

- Prolapse of the fetal membranes into the vagina
- Intraamniotic infection
- Preterm premature rupture of the fetal membranes (PPROM)
- Preterm labor and delivery
- Fetal loss

However, the efficacy of cerclage for preventing these adverse events compared to no intervention or other interventions is controversial. (See "[Cervical insufficiency](#)".)

CANDIDATES

Good candidates — Cerclage is performed to reduce pregnancy loss/preterm birth in women with cervical insufficiency:

- Women with cervical insufficiency based on multiple prior second trimester losses and/or preterm births are potential candidates for a 'history-indicated' cerclage, which is best placed at 12 to 14 weeks of gestation [1].
- Women with singleton pregnancy, prior preterm birth, and a short cervical length (eg, <25 mm) on transvaginal ultrasound examination at 16 to 23 weeks of gestation are potential candidates for an 'ultrasound-indicated' cerclage [2-4].
- Women with cervical insufficiency based on a dilated cervix on a digital or speculum examination at 16 to 23 weeks of gestation are potential candidates for a 'physical exam-indicated' cerclage [5].

A 2012 Cochrane review of studies of cerclage versus no cerclage in singleton pregnancies concluded that placement of a cerclage may significantly reduce preterm birth in these settings (RR 0.80, 95% CI 0.69-0.95; 9 trials, 2898 women) [6]. Cervical insufficiency is reviewed in detail separately. (See "[Cervical insufficiency](#)", [section on 'Obstetrical history-based cervical insufficiency'](#) and "[Cervical insufficiency](#)", [section on 'Ultrasound-based cervical insufficiency'](#) and "[Cervical insufficiency](#)", [section on 'Physical examination-based cervical insufficiency'](#)".)

Others — Not all women with cervical insufficiency are good candidates for cerclage. The major contraindications are clinical scenarios where the procedure is unlikely to reduce the risk of preterm delivery or improve fetal outcome: fetal anomaly incompatible with life, intrauterine infection, active bleeding, active preterm labor, preterm premature rupture of membranes (PPROM), and fetal demise. The presence of fetal membranes prolapsing through the external cervical os is a relative contraindication to the procedure because the risk of iatrogenic rupture of the membranes in this setting may exceed 50 percent [7,8]. (See '[Replacement of prolapsed membranes](#)' below.) Evidence of placenta previa on ultrasound is not an absolute contraindication to cerclage placement. (See "[Placenta previa: Management](#)", section on '[Cerclage](#)'.)

Cerclage does NOT appear to be useful for prolonging pregnancy in:

- Women with multiple gestations and no past history of cervical insufficiency
- Women with short cervical length on ultrasound in the current pregnancy and no prior preterm birth. These women may be candidates for treatment with vaginal [progesterone](#).

Upper and lower gestational age thresholds for cerclage placement — There is no consensus about the lower and upper limits of gestational age for performing a cerclage. In general, the procedure is not performed before 12 weeks of gestation because most miscarriages due to aneuploidy occur in the early and mid-first trimester; waiting until the end of the first trimester also permits sonographic evaluation for fetal anomalies and screening and diagnosis of trisomy 21 prior to the procedure, if indicated [8]. A cerclage is generally not placed in the third trimester because a delivery ≥ 28 week is likely to have a reasonably good outcome. Cerclage placement at 24 to 28 weeks of gestation, a period characterized by high neonatal morbidity and mortality, is controversial. Most clinicians avoid placing a cerclage after fetal viability has been reached (generally regarded as about 24 weeks of gestation) since the procedure may cause accidental rupture of the fetal membranes leading to early preterm delivery, with its attendant high risk of neonatal morbidity and mortality. However, each case must be individualized, weighing the risks of the procedure against the likely outcome with expectant management.

PROCEDURE — The management of cerclage is largely based on data from cases series, observational studies, and expert opinion; there are few small and no large randomized trials evaluating any aspect of the procedure.

Preoperative assessment

Fetal evaluation — Before proceeding with cerclage, the clinician should confirm fetal cardiac activity and gestational age, evaluate the fetus for identifiable structural anomalies (such as anencephaly) that could affect the patient's decision to continue the pregnancy, and offer aneuploidy screening if not already performed. Ultrasound examination is useful for obtaining all of this information.

Screening for infection — We screen patients for gonorrhea and chlamydia if they are at high risk of acquiring a sexually transmitted infection and have no documentation of recent negative test results. If antibiotic therapy is indicated for positive test results, we complete treatment prior to cerclage placement, if possible. Screening and treatment of sexually transmitted infection has not been proven to improve cerclage outcome.

Randomized trials to determine the utility of amniocentesis before cerclage have not been performed. We recommend not routinely performing amniocentesis to test for subclinical infection in amniotic fluid. Although intraamniotic infection is a contraindication to cerclage since the procedure is not likely to be effective [9,10] and prolonging the pregnancy places the mother and fetus at risk of sepsis [10,11], subclinical infection is difficult to detect. Given the low prevalence of subclinical intraamniotic infection in early pregnancy and the risk of procedure-related pregnancy loss after early amniocentesis, amniocentesis is not generally performed before history-indicated cerclage [12]. Before ultrasound-indicated cerclage, most clinicians do not perform amniocentesis because biochemical tests on amniotic fluid do not have high sensitivity and predictive value for intraamniotic infection, the prevalence of subclinical infection is relatively low (1 to 2 percent) in women

with a closed cervix, and the clinical significance of Ureaplasma and Mycoplasma species (the most common organisms detected) is unclear [12,13].

The best approach before physical exam-indicated cerclage is more controversial because the incidence of intraamniotic infection is 10 to 50 percent when the cervix is dilated at least 2 cm on physical examination [12]. We are generally unwilling to wait 48 hours to obtain microbiologic culture results on amniotic fluid before performing a physical exam-indicated procedure. We perform amniocentesis when we suspect intraamniotic infection (eg, no fever but uterine tenderness, modest leukocytosis) but cannot confirm the diagnosis clinically. If the Gram stain and biomarkers of intraamniotic infection (eg, glucose, leukocyte count, lactate dehydrogenase, interleukin-6) are not indicative of infection, then we proceed with cerclage. Some clinicians perform amniocentesis to check for subclinical infection when the cervix is ≥ 2 cm dilated and on a case-by-case basis when the membranes are opaque on physical exam or there are ultrasound findings suggestive of inflammation (membrane edema, separation of membranes from the decidua) or debris in the amniotic fluid ("sludge") (image 1) because these findings were associated with an increased risk of preterm delivery and other pregnancy complications in some studies [14-17]. Diagnosis of intraamniotic infection is reviewed in more detail separately. (See "[Second-trimester evaluation of cervical length for prediction of spontaneous preterm birth](#)".)

Excluding membrane rupture and preterm labor — Preterm premature rupture of membranes (PPROM) and preterm labor should be excluded since cerclage is unlikely to be effective and may increase maternal morbidity in these settings.

When the cervix is widely dilated, watery mucous-like fluid may collect in the posterior vaginal fornix and likely represents transudation across intact membranes; it is important to distinguish this fluid from amniotic fluid. (See "[Preterm prelabor rupture of membranes](#)", [section on 'Diagnosis'](#).)

Mild, irregular contractions noted on a uterine contraction monitor can be a normal finding, but regular contractions, especially those of increasing frequency and intensity, may indicate idiopathic preterm labor, subclinical intrauterine infection, or abruptio placentae. We observe candidates for indicated cerclage for up to 24 hours before proceeding with surgery in order to help exclude PPRM, abruptio placentae, infection, and preterm labor. Cerclage is the treatment of choice for cervical insufficiency, but not for preterm labor, and placement of a cerclage in the setting of contractions can lead to tearing of the cervical tissue, which may compromise future pregnancies.

Antibiotic prophylaxis — We recommend not using antibiotic prophylaxis. There appears to be minimal risk that a history-indicated procedure will promote intraamniotic infection [18,19]. In women undergoing ultrasound- or physical exam-indicated cerclage, there is no strong evidence that antibiotic prophylaxis at the time of cerclage prevents development of intraamniotic infection or that it improves outcome in women with subclinical infection. The American College of Obstetricians and Gynecologists (ACOG) opined that "evidence is insufficient to recommend antibiotic prophylaxis for history-, ultrasonography-, or examination-indicated cerclage" [20].

In women colonized with group B streptococcus, antibiotic prophylaxis for obstetrical procedures such as cerclage is not recommended, although this has not been studied directly. (See "[Neonatal group B streptococcal disease: Prevention](#)", [section on 'Women undergoing obstetric procedures'](#).)

Perioperative tocolytic drugs — Tocolytic drugs are not given to women undergoing placement of a history-indicated cerclage because these women do not have clinically measurable uterine irritability and virtually no data are available on the use of these drugs in the first trimester.

There is no compelling evidence that perioperative administration of any tocolytic drug in the second trimester prolongs pregnancy; however, available data are sparse so practice patterns vary [21]. [Indomethacin](#), a prostaglandin synthetase inhibitor, is commonly prescribed for up to 48 hours in the second trimester, especially in physical examination-indicated procedures, because placement of a cerclage has been associated with transient elevation in prostaglandin levels and prostaglandins induce uterine

contractions [22]. For patients undergoing physical exam-indicated cerclage, the author routinely prescribes indomethacin perioperatively. In a study of women who underwent physical exam-indicated cerclage, multivariate logistic regression analysis showed a nonstatistical benefit for indomethacin use versus no indomethacin: preterm birth <32 weeks (odds ratio 0.56, 95% CI 0.26-1.25) and <35 weeks (odds ratio 0.52, 95% CI 0.23-1.14) [23]. In a randomized trial of patients undergoing physical examination indicated cerclage, use of both indomethacin and prophylactic antibiotics resulted in a similar nonstatistical reduction in preterm birth <24, <28, and <36 weeks (RR 0.53 to 0.86) compared with no treatment, but significantly increased the proportion of patients with prolongation of latency over 28 days (92 versus 63 percent) [24].

For patients undergoing ultrasound indicated cerclage, the author restricts [indomethacin](#) to patients who have contractions after the surgery. A retrospective cohort study in women undergoing ultrasound-indicated cerclage reported similar preterm birth rates whether or not indomethacin was administered (spontaneous preterm birth <35 weeks: 20/51 [39 percent] with indomethacin versus 17/50 [34 percent] without indomethacin; RR 1.15, 95% CI 0.69-1.93) [25].

Progesterone — Women who have had a previous preterm birth may have started [progesterone](#) supplementation before diagnosis of cervical insufficiency. Continuing progesterone supplementation after placement of a cerclage has not been proven to be useful, but available data are limited to secondary analysis of one underpowered trial. We continue progesterone supplementation in women who are already on the drug, but do not initiate progestin use perioperatively.

Anesthesia — Either regional or general anesthesia is acceptable. Although drugs used for general anesthesia can render uterine muscle quiescent, in a randomized trial, the anesthetic method used for elective Shirodkar procedure did not affect perioperative changes in plasma oxytocin nor postoperative uterine activity [26]. We prefer regional over general anesthesia for its overall safety. If additional uterine relaxation is needed during the procedure, it can be achieved with intravenous [nitroglycerin](#). (See '[Replacement of prolapsed membranes](#)' below.)

Patient preparation — We routinely empty the bladder pre-operatively to enhance exposure, but do not leave a bladder catheter in place during the procedure to minimize the risk of infection. The vagina is gently prepped with an antiseptic solution, avoiding contact with the fetal membranes; the value of vaginal prep has not been studied.

Replacement of prolapsed membranes — As discussed above, prolapsed fetal membranes are a relative contraindication to emergent cerclage placement because of the high risk of iatrogenic PPRM. (See '[Candidates](#)' above.) If cerclage placement is attempted in this setting, the prolapsed membranes must be replaced in the uterine cavity before applying the cerclage. The optimum technique has not been established by randomized trials. We place the patient in steep Trendelenburg position to allow gravity to retract the membranes. If position change alone is unsuccessful, we administer a uterine relaxant (eg, [nitroglycerin](#) 50 to 200 mcg intravenously). Backfilling the maternal bladder in 250 mL increments through a bladder catheter can also help to reposition the membranes in the uterus [27], although a full bladder tends to reduce exposure of the operative field and pull the cervix deeper into the pelvis. Another option is to place ring forceps or stay sutures of 00 silk around the circumference of the external os and then gently pull and shake the cervix to help ease the membranes back into the uterus ([figure 1](#)).

Invasive methods for reducing the fetal membranes include pushing them back with a smooth surfaced device, such as a gloved finger, sponge-filled condom, or Foley catheter balloon. A 30 mL Foley catheter can be used to hold the membranes in the uterus while the cerclage is placed; it is deflated and removed just before the knot is secured. However, such techniques may be associated with an increased risk of membrane rupture.

Transabdominal amniocentesis with amnioreduction under ultrasound reduces amniotic fluid volume and pressure in the prolapsed sac, allowing it to retract back into the uterine cavity [28,29]. About 150 to 250 mL is typically removed.

Surgical goals and approach — The object of cerclage placement is to reinforce the cervix at the level of the internal os; lengthening the cervix is a secondary effect [30-34]. In one study, an upper cervical length (ie, length of **closed** cervix between the cerclage and internal os) ≥ 10 mm after cerclage placement was associated with delivery at a more advanced gestational age [35]. Although another study reported that cervical height (ie, the length of cervix between the cerclage and external os) was not an important factor in determining subsequent pregnancy outcome [36], an expert review concluded that achieving a cerclage height >2 cm reduced preterm birth compared with shorter cervical height [37].

Most cerclages are placed via a transvaginal approach. The transabdominal approach is more invasive, but allows higher placement since the transabdominal cerclage can be placed at the cervicoisthmic portion of the uterus, while transvaginal cerclages often end up distal to the internal os. (See "[Transabdominal and laparoscopic cervicoisthmic cerclage](#)".)

Choice of McDonald versus Shirodkar procedure — The two most common transvaginal techniques for cerclage were described by Shirodkar [38] and McDonald [39]; modifications of both procedures have also been described. The Shirodkar cerclage is placed as close as possible to the level of the internal os after surgically reflecting the bladder anteriorly and the rectum posteriorly, whereas the McDonald cerclage is a purse-string suture that does not involve any dissection (thus, theoretically, it cannot be placed as close to the internal cervical os as the Shirodkar). In contrast to the McDonald cerclage, the Shirodkar suture does not pass through the cervical stroma.

Our preference is to perform the Shirodkar procedure; others prefer the McDonald procedure because it is easier to perform and remove. The bulk of data show no significant differences in pregnancy outcome between the two procedures [1-3,37,40-47]. However, no randomized trial has compared the McDonald and Shirodkar procedures directly. One study observed McDonald and Shirodkar procedures had similar obstetric outcomes in patients undergoing their first cerclage, but higher birth weight when Shirodkar rather than McDonald cerclage was performed for the second procedure (3020 and 2470 grams, respectively) [9].

Technique — Our techniques for Shirodkar and MacDonal cerclage are described below. The optimum suture material, needle, and knot position have not been evaluated in randomized trials. The choice should be based on general surgical principles and the operator's experience and preference.

Shirodkar cerclage — This procedure is more complicated than the McDonald cerclage because it requires incisions and dissection of the paracervical area. The bladder is emptied to facilitate visualization of the cervix. The cervix is pulled toward the surgeon with one or two ring forceps while an assistant retracts the vaginal sidewalls. A scalpel with a number 10 blade or an electrocautery needle is used to make a 1 to 3 cm vertical or transverse incision on the posterior cervix at the junction of the rugated vaginal epithelium and the smooth cervix ([figure 2](#)). We prefer a 2 to 3 cm transverse incision and suggest injecting 1 to 2 mL of sterile saline into the submucosa to raise a wheal before the incision is made to facilitate dissecting tissue planes. Making the first incision posteriorly prevents the operative field from becoming obscured by bleeding from the anterior incision. After the posterior incision is made, a similar transverse incision is made anteriorly.

The rectum is then bluntly dissected off the posterior cervix and the bladder is bluntly dissected off of the anterior cervix using a finger, sponge on a stick, or peanut sponge on a long clamp. The dissection should be carried back far enough to allow the surgeon to palpate the insertion of the uterosacral and cardinal ligaments onto the cervix at the level of the internal os. Electrocautery can be used to control small bleeders.

Long curved Allis clamps, or similar tissue forceps clamps (eg, Teale vulsellum), are used to grasp and approximate the lateral edges of the anterior and posterior aspects of the transverse incisions and some paracervical tissue. We use two atraumatic (blunted) needles premounted with a single 5 mm Mersilene tape for the cerclage. The tip of one needle is introduced anteriorly at the lateral edge of the incision at the level of the internal os (or as close as possible) and threaded submucosally adjacent to the cervical stroma (and medial to the cervical branches of the uterine vessels) to emerge at the lateral edge of the posterior incision

at the level of the internal os. If not at the internal os, the cerclage should be at least 2 cm cephalad to the external os, as feasible [48].

Bending the needle to reduce the curvature is sometimes helpful for guiding the needle to the desired position. The procedure is then repeated on the opposite side and the two ends are tied tightly using four to seven square knots. The tails of the suture or Mersilene tape should be left long. If Mersilene tape is used, it can be cut shorter, at 2 to 3 cm in length and then tagged with 2-0 silk that is left long, as well. Intraoperative ultrasound can be helpful for judging the site of the suture relative to the internal os, maternal bladder, and rectum [49].

It is the surgeon's preference as to whether the stitch is placed so that the knot is tied anteriorly or posteriorly. The authors usually find it easier to perform the cerclage with anterior placement of the knot, although there are rare instances of an anterior knot causing bladder discomfort, and even eroding into the bladder. It is also easier to remove the cerclage in the office if the knot is anterior to the cervix.

Following Shirodkar cerclage placement, the vaginal epithelium may be reapproximated with a fine chromic catgut suture, although this is not necessary if good hemostasis is achieved. It is not necessary to bury the ends of the knot under the epithelium or anchor the tape to the cervix. Avoiding burying and anchoring the cerclage facilitates removal prior to delivery. Alternatively, if cesarean delivery is planned, the Shirodkar cerclage can be left in-situ indefinitely postpartum for use in a future pregnancy. It is advantageous to completely bury the knot under the vaginal epithelium in these cases to minimize vaginal discharge.

McDonald cerclage — The procedure is begun by grasping the anterior and posterior lips of the cervix with one or two ring forceps. We insert a curved needle loaded with large caliber nonabsorbable synthetic suture (at least number 1 or 2 braided or monofilament) at 12 o'clock, at the junction of the rugated vaginal epithelium and the smooth cervix just distal to the vesicocervical reflection and at least 2 cm above the external os, as feasible [48]. Alternatively, the needle can be inserted posteriorly at the cervico-vaginal reflection at about 6 o'clock. As with the Shirodkar cerclage, there is no evidence that knot position (anterior versus posterior) affects pregnancy outcome.

Four to six passes of a purse-string suture are taken circumferentially around the entire cervix as high as safely possible, avoiding the bladder, rectum, and uterine vessels (at 3 and 9 o'clock). About 1 cm of space is left between the exit of one pass and the entry of the next pass. Each pass should extend at least midway into the cervical stroma to reduce the risk that the suture will pull out over time, but should not enter the endocervical canal (figure 3). The pass at 6 o'clock is particularly important because this is the most common site for pull-through [39]. The two ends of the suture are then tied securely and cut, leaving the ends long enough to grasp with a clamp when it is time to remove it. Intraoperative ultrasound can be helpful for judging the site of the suture relative to the internal os, maternal bladder, and rectum [49].

Number of cerclages — One cerclage is usually adequate, if placed well. In some cases, an inadequate initial cerclage is used for traction, and then a second cerclage is placed in a more optimal position closer to the internal os. A second cerclage may be needed to achieve adequate closure of the cervix when the procedure is performed on a widely dilated cervix with prolapsed membranes. If two cerclages are placed, they are generally removed at the same time.

Although some clinicians routinely place a second cerclage, this practice did not improve outcome in three retrospective studies [50-52]. In addition, a randomized trial found that placing a second stitch at the external os to keep the mucus plug in place (termed cervical occlusion) did not increase gestational age at delivery or decrease neonatal intensive care unit days or neonatal mortality [53].

POSTOPERATIVE CARE AND FOLLOW-UP — Cerclage is typically an outpatient surgery procedure. Most patients can be discharged after recovery from the anesthetic and when able to ambulate and void; however, a longer period of in-hospital observation may be indicated for some women who undergo physical exam-indicated cerclage because of their increased risk of complications. Fetal viability and amniotic fluid volume

should be documented prior to discharge. [Acetaminophen](#) alone provides adequate analgesia for most women.

Patients are told to report any leakage of fluid from the vagina so that they can be evaluated for membrane rupture. They should also be told to expect some spotting, cramps, and dysuria (due to minor muscle injury from the vaginal wall retractors) which will abate within a few days. Those who have undergone a Shirodkar procedure may note passage of the fine chromic catgut in two to three weeks as the stitches dissolve; they should be forewarned that this does not represent loss of the cerclage itself.

Women who have undergone cerclage placement have an increased frequency of uterine contractions [1], but the presence of uterine irritability is not predictive of an increased risk of preterm birth.

Although there is no evidence that coitus adversely affects perinatal outcome, we ask patients to maintain pelvic rest for at least one week after an elective procedure, and to use condoms thereafter. Women who have had a non-history-indicated cerclage are managed more conservatively; we typically limit physical activity and coitus until a favorable gestational age is reached, usually 32 to 34 weeks of gestation, although there is no high quality evidence that decreasing physical activity improves outcome.

Women followed as outpatients are seen on a regular basis with frequent (weekly or biweekly) visits for cervical checks. Ultrasound assessment of cervical length may be useful for identifying those patients at highest risk for preterm birth [54-58]; proximal cervical shortening after 23 weeks may prompt administration of antenatal corticosteroids for fetal lung maturation and [magnesium sulfate](#) for cerebral palsy prophylaxis. (See "[Antenatal corticosteroid therapy for reduction of neonatal respiratory morbidity and mortality from preterm delivery](#)" and "[Neuroprotective effects of in utero exposure to magnesium sulfate](#)".)

We do not routinely follow patients with serial fetal fibronectin assays, as the value of testing asymptomatic women is unproven. If performed, the test should not be done until at least four weeks postoperatively and a positive result may be less reliable in this setting [59,60].

Cerclage removal — The cerclage is removed electively at 37 weeks of gestation or immediately upon onset of premature labor in order to avoid cervical laceration and/or uterine rupture. The absolute risk of laceration is unclear, given the small number of reports [61]. Whether to remove the cerclage in the setting of preterm premature rupture of membranes (PPROM) is controversial. (See '[Removal of cerclage after PPRM](#)' below.)

A McDonald cerclage usually can be cut and removed in the office without analgesia. A Shirodkar cerclage often requires a return to the operating room for removal, either because the knot is buried under the vaginal epithelium or the Mersilene tape has been infiltrated by cervical granulation tissue.

Patients are generally sent home after cerclage removal to await the onset of labor, which generally occurs within two weeks; only about 10 percent of women deliver spontaneously within 48 hours of elective cerclage removal [62].

As discussed above, a Shirodkar cerclage does not have to be removed if cesarean delivery is anticipated and future pregnancies are planned. However, there is a theoretical risk of reduced fertility from inflammation/infection of the cervix due to the foreign body and a risk of erosion into adjacent tissue.

Removal of cerclage after PPRM — Whether to remove the cerclage if PPRM occurs is a matter of debate [41,63-70]. One concern is that removal of the cerclage will lead to earlier delivery; however, retention of the foreign body may increase the risk of infectious morbidity. Several observational studies have addressed the management of such patients, with inconsistent results [41,65-69]. In these studies, the gestational age at PPRM was the most important determinant of neonatal outcome [67]. The only randomized trial of cerclage removal versus retention after PPRM found no significant difference between groups in any pregnancy outcome, but the trial was terminated early after only 56 (40 percent) of the proposed 142 patients had been recruited, and was underpowered for all of the outcome measures [71].

Based on the available, limited data and our own clinical experience, we remove the cerclage in women with PPROM if (1) there is any evidence of chorioamnionitis or (2) the pregnancy is at least 32 weeks of gestation. In the absence of clinically apparent infection, we feel the possible increased risk of premature delivery with cerclage removal before 32 weeks outweighs the possible increased risk of ascending infection if the cerclage is left in place.

COMPLICATIONS — Perioperative complications at history-indicated cerclage are uncommon, typically involving less than 6 percent of procedures [1]. The frequency of complications is higher with increasing gestational age and cervical dilatation (see '[Pregnancy outcome](#)' below).

Membrane rupture — The median frequency of preterm premature rupture of the fetal membranes (PPROM) after history-indicated cerclage is approximately 2 percent [7]. Rupture of membranes intraoperatively or in the immediate postoperative period is a major concern of physical exam-indicated cerclage, especially with advanced cervical dilation and/or prolapsed fetal membranes. This complication has been reported in up to 65 percent of these procedures [7,72-74].

Intraamniotic infection — The median frequencies of intraamniotic infection after history-indicated and non-history-indicated cerclage are 2 and 25 percent, respectively [7].

Severe maternal sepsis has been reported after history-indicated, ultrasound-indicated, and physical exam-indicated cerclage [75].

Suture migration — Suture migration has been reported in 3 to 13 percent of cases [76]. This often occurs late in gestation and thus is of little clinical consequence. When migration occurs early in pregnancy (before 24 weeks), the clinician must decide whether to repeat the procedure. It is likely that the same factors that led to failure of the first cerclage will affect a second procedure. In fact, placement of a second (reinforcing) cerclage may worsen the outcome when cervical shortening has occurred in the presence of a history-indicated cerclage [77], and is not generally recommended [18]. Hospitalization and/or a course of antenatal glucocorticoids are options if a preterm potentially viable delivery appears likely. (See "[Antenatal corticosteroid therapy for reduction of neonatal respiratory morbidity and mortality from preterm delivery](#)".)

Other — Cervical dystocia and cervical trauma in labor have been reported in fewer than 5 percent of patients [9]. Excessive bleeding and fistula formation are rare.

PREGNANCY OUTCOME — Cervical cerclage is the conventional treatment for cervical insufficiency, despite the paucity of data from randomized trials proving its efficacy ([table 1](#)) [1,78,79]. Most case series report a viable birth rate of 70 to 90 percent after history-indicated cerclage, as compared with 10 to 30 percent prior to the procedure [80]. However, using patients as their own controls (ie, pregnancy success rate is compared before and after cerclage) is subject to bias since changes in the patient and her management other than cerclage may have accounted for the higher rate of success in the subsequent pregnancy. In fact, trials in which women were randomly assigned to undergo cerclage or no cerclage report much higher live birth rates in the untreated group than observed in historic controls [78,79].

The timing of cerclage also affects outcome. There is universal agreement that emergency cerclage performed in the presence of advanced cervical change and prolapsed membranes has the worst outcome. It should be appreciated that there is significant risk that an emergency procedure may convert a previable birth to a very low birthweight premature birth (24 to 27 weeks) with the potential for serious long-term neurodevelopmental disability. Thus, outcomes at the limit of viability and the potential options should be clarified with the patient. (See "[Perivable birth \(Limit of viability\)](#)" and "[Cervical insufficiency](#)", [section on 'Physical examination-based cervical insufficiency'](#).)

SUMMARY AND RECOMMENDATIONS

- Cervical cerclage refers to a variety of surgical procedures in which sutures, wires, or synthetic tape are used to reinforce the cervix and thereby prevent pregnancy loss/early preterm delivery. (See

['Introduction'](#) above.)

- Placement of a cerclage should be avoided while the patient is at significant risk of miscarriage due to aneuploidy (early to mid first trimester) or when delivery is likely to have a reasonably good outcome. (See ['Candidates'](#) above.)
- An ultrasound examination should be performed proximate to the procedure to determine if there are identifiable fetal structural anomalies (such as anencephaly) that might affect the patient's decision to continue the pregnancy, and to confirm gestational age and viability. (See ['Fetal evaluation'](#) above.)
- We observe candidates for nonelective cerclage for up to 24 hours before proceeding with surgery to help exclude the presence of preterm premature rupture of membranes (PPROM), abruptio placentae, infection, and preterm labor. (See ['Excluding membrane rupture and preterm labor'](#) above.)
- We suggest avoiding routine use of prophylactic antibiotics (**Grade 2C**). (See ['Antibiotic prophylaxis'](#) above.)
- We do not prescribe [indomethacin](#) for women undergoing history-indicated cerclage. For women undergoing physical-exam indicated cerclage, we suggest prophylactic indomethacin for up to 48 hours perioperatively rather than no tocolytic therapy (**Grade 2C**). We do not prescribe prophylactic indomethacin for women undergoing ultrasound-indicated cerclage, but order it postoperatively for women who develop contractions. (See ['Perioperative tocolytic drugs'](#) above.)
- Most controlled studies do not show significant differences in outcome between McDonald and Shirodkar procedures. (See ['Choice of McDonald versus Shirodkar procedure'](#) above.)
- The cerclage is removed electively at 37 weeks of gestation or immediately upon onset of premature labor. (See ['Cerclage removal'](#) above.)

The cerclage should be removed in women with ruptured membranes and clinical evidence of intraamniotic infection. We suggest removing the cerclage rather than expectant management in asymptomatic women with ruptured membranes if the pregnancy is at least 32 weeks of gestation (**Grade 2C**). Before this gestational age, we feel the possible increased risk of premature delivery with cerclage removal is a greater concern than the possible increased risk of ascending infection if the cerclage is left in place. (See ['Removal of cerclage after PPROM'](#) above.)

- For history- and ultrasound-indicated cerclage, we suggest placing one rather than two cerclages (**Grade 2C**). (See ['Number of cerclages'](#) above.) If suture migration subsequently occurs early in pregnancy (before 24 weeks), we suggest not placing another cerclage (**Grade 2C**). (See ['Suture migration'](#) above.)

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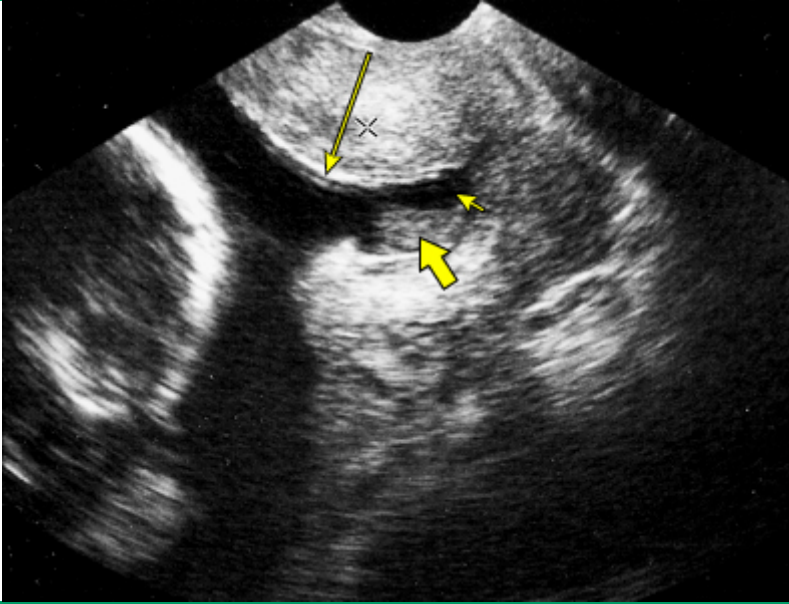
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Topic 6737 Version 28.0

GRAPHICS

Ultrasound image of membrane separation

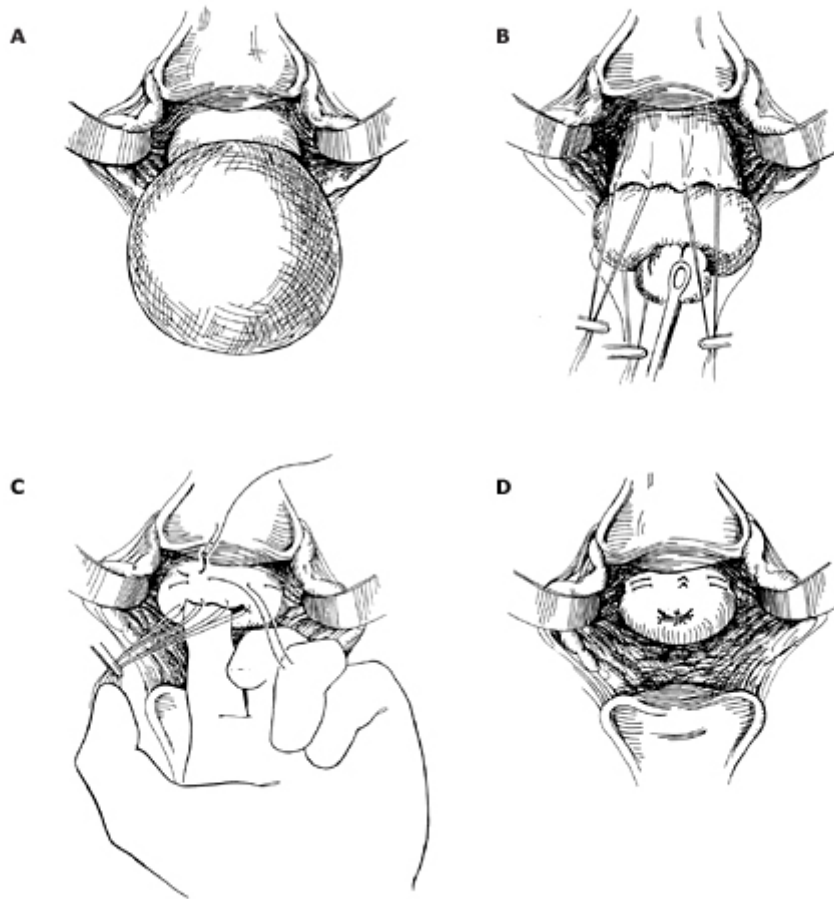


Transvaginal midline sagittal ultrasound image of the cervix showing funneling (long arrow), membrane separation from the decidua (along the anterior lip of the cervix) (short arrow), and debris (diffuse area of echodensity resting within the amniotic fluid of the funnel on the posterior cervix; thick arrow).

Courtesy of Jay D Iams, MD.

Graphic 70493 Version 4.0

Cervical cerclage procedure with dilated cervix

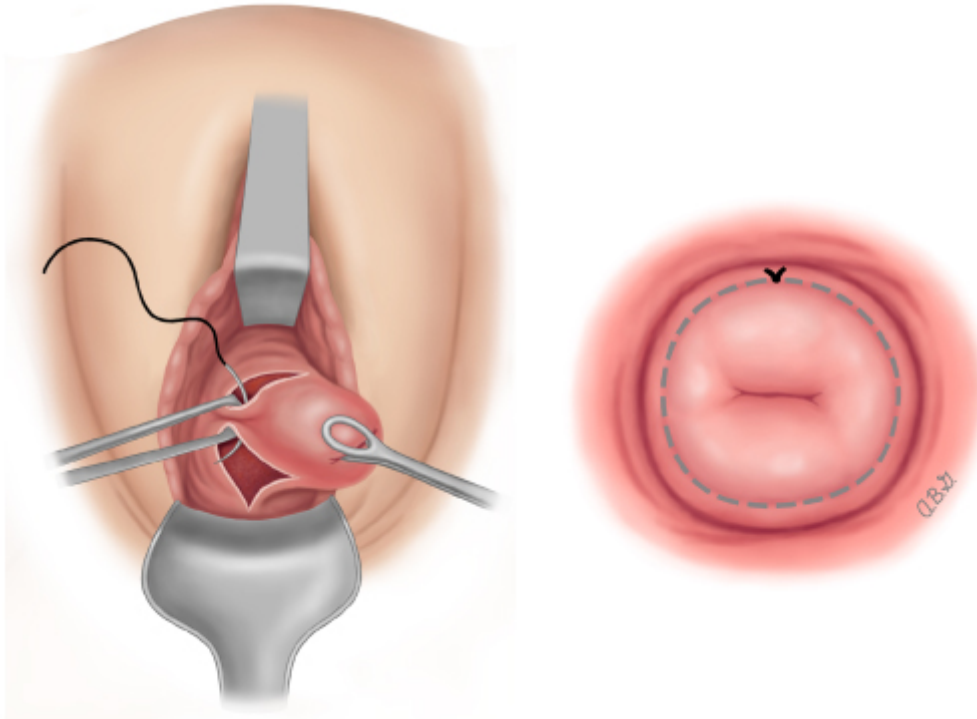


Membranes herniating through effaced and widely dilated cervix (A). Replacement of membranes into the uterus by gentle traction on stay sutures (B). Placement of 2 rows of encircling sutures (C). Final appearance of the cervix (D).

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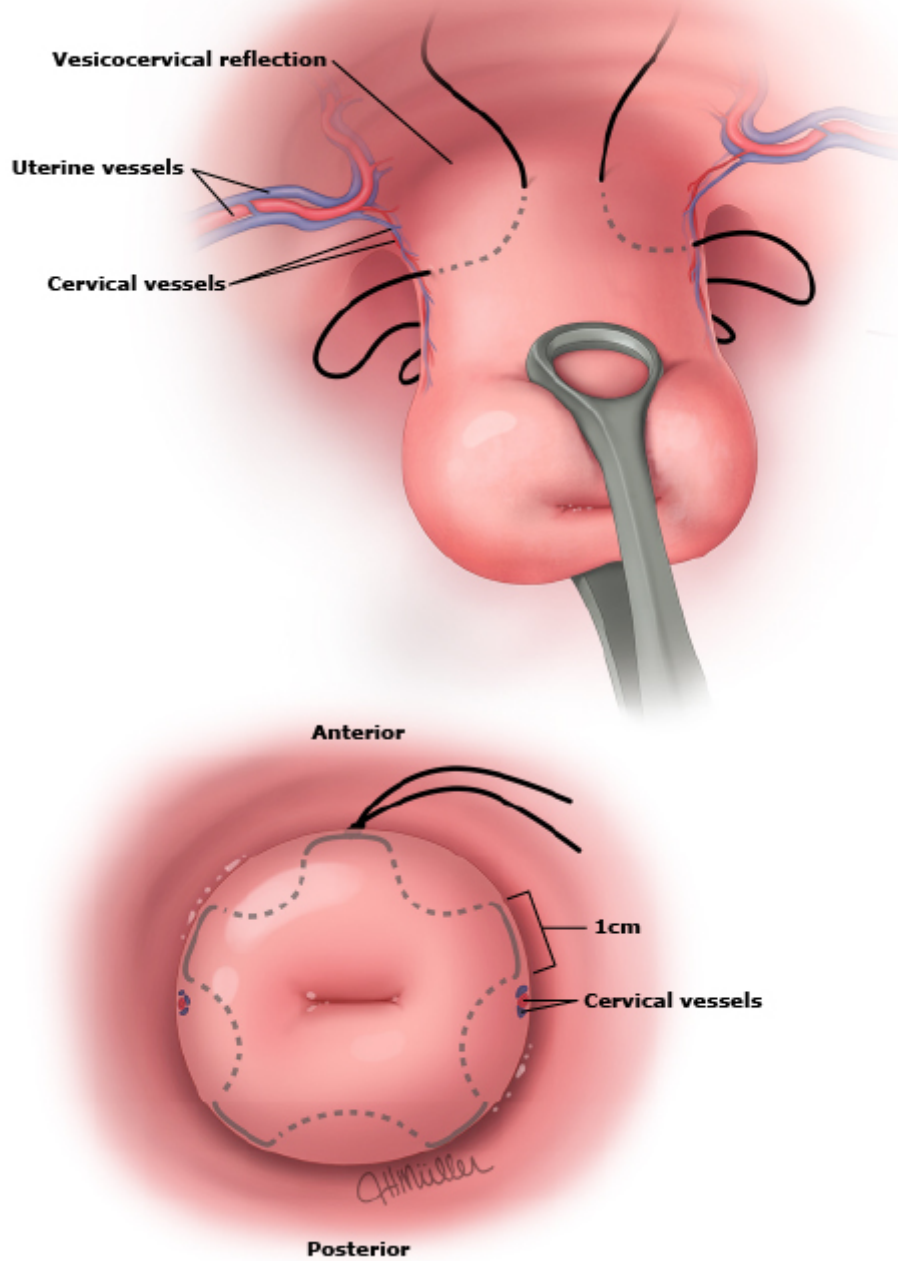
Graphic 65600 Version 3.0

Shirodkar cerclage



Graphic 67778 Version 2.0

McDonald cerclage



Each pass should be deep into the cervical stroma, and should avoid entering the endocervical canal or impacting the uterine vessels.

Graphic 55446 Version 3.0

Summary of randomized trials on cervical cerclage

	Delivery before 33 completed weeks		Significance
	n	Percent	
MRC/RCOG			
Cerclage (n = 647)	83	13	p≤0.05
No cerclage (n = 645)	110	17	
Rush et al, (1984)			
Cerclage (n = 96)	12	13	NS
No cerclage (n = 98)	10	10	
Lazar et al, (1984)			
Cerclage (n = 268)	4	1	NS
No cerclage (n = 238)	1	<1	
Dor et al, (1982)			
Cerclage (n = 25)	6	24	NS
No cerclage (n = 25)	5	20	

MRC/RCOG: Medical Research Council/Royal College of Obstetricians and Gynecologists; NS: no significant difference between cerclage and no cerclage.

Adapted from data in MRC/RCOG, Br J Obstet Gynecol 1993; 100:516.

Graphic 60929 Version 3.0

Contributor Disclosures

Errol R Norwitz, MD, PhD, MBA Grant/Research/Clinical Trial Support: Illumina [Preeclampsia (primary investigator on a prospective cohort study to collect samples from patients with preeclampsia to facilitate development of a biomarker test to predict/diagnose this disorder)]. Consultant/Advisory Boards: Hologic [Preterm birth (Fetal fibronectin test to predict preterm birth)]; Natera [Fetal aneuploidy testing (NIPT as a screening test for fetal aneuploidy)]; Seracare [Fetal aneuploidy testing (Developing controls for NIPT screening test for fetal aneuploidy)]; Bayer [Prediction test for preeclampsia (Use of urinary angiogenic factors to predict preeclampsia)]. **Charles J Lockwood, MD, MHCM** Nothing to disclose **Vanessa A Barss, MD, FACOG** Nothing to disclose

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