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Second-trimester evaluation of cervical length for prediction of spontaneous preterm birth

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INTRODUCTION — This topic will review key issues related to sonographic cervical length screening in pregnant women for prediction of spontaneous preterm birth. The cause of preterm cervical shortening is often unclear. It has been attributed to several sources, including occult uterine activity, uterine overdistention, congenital or acquired cervical insufficiency, decidual hemorrhage, infection, inflammation, and biological variation.

Management of pregnant women with a short cervix may involve progesterone supplementation or cerclage, which are discussed in detail separately. (See "[Progesterone supplementation to reduce the risk of spontaneous preterm birth](#)" and "[Cervical insufficiency](#)".)

RATIONALE FOR MEASURING CERVICAL LENGTH — Cervical shortening (ie, effacement) is one of the first steps in the processes leading to labor and can precede labor by several weeks. A decrease in cervical length in the second trimester is predictive of spontaneous preterm birth, with the highest risk in women with early and substantial cervical shortening [1-6]. Because effacement begins at the internal cervical os and progresses caudally [1,5], it is often detected on ultrasound examination before it can be appreciated on physical examination.

Identification of women with a short cervix is important because treatment with vaginal progesterone can reduce their risk of spontaneous preterm birth. In a 2016 systematic review and meta-analysis of randomized trials, vaginal progesterone treatment of women with a short cervix reduced the frequency of spontaneous preterm birth <34 weeks by 37 percent and reduced composite neonatal morbidity and mortality by 41 percent [7]. The evidence for and management of progesterone supplementation to reduce the risk of preterm birth is discussed in detail separately. (See "[Progesterone supplementation to reduce the risk of spontaneous preterm birth](#)", [section on 'Short cervix in current pregnancy'](#).)

Cervical length screening and intervention can be cost-effective [8,9], even though most women do not have a short cervix and only approximately 30 percent of women with a short cervix will deliver before 35 weeks of gestation without intervention [10]. Cost-effectiveness analyses model clinical practice and are highly dependent upon multiple assumptions/estimates; thus, these analyses have not consistently concluded that universal screening is cost-effective [11].

DISTRIBUTION OF CERVICAL LENGTH — Normally, cervical length is stable between 14 and 28 weeks of gestation and is described by a bell-shaped curve [1,12].

For singleton gestations at about 20 weeks of gestation without a prior spontaneous preterm birth, the centiles for three common cervical length thresholds are approximately:

- 15 mm – 0.5th centile

- 20 mm – 1st centile
- 25 mm – 2nd to 3rd centile

After 28 to 32 weeks of gestation, a gradual decline in cervical length is normal. The median cervical length after 32 weeks is 30 versus 35 mm at 22 to 32 weeks and 40 mm before 22 weeks.

Cervical length is not significantly affected by parity, race/ethnicity, or maternal height [1-3,13-17].

DIAGNOSIS OF SHORT CERVIX — The diagnosis of short cervix is based on cervical length ≤ 25 mm at 16 to 24 weeks of gestation. This definition was derived, in part, from intervention trials that established the efficacy of different treatments according to this cutoff. (See '[Clinical approach](#)' below.).

Although cervical length ≤ 25 mm in the second trimester is consistently associated with an increased risk of spontaneous preterm birth [2,4,18-21], with a particularly strong relationship when it occurs before 24 weeks of gestation or in women with a prior spontaneous preterm birth, especially before 32 weeks [1-6,18,22,23], there is no threshold value below which the patient always delivers remote from term:

- In one study, 25 percent of women with no measurable cervical length at 14 to 28 weeks of gestation delivered ≥ 32 weeks [24].
- In another study where providers were unaware of their patients' cervical ultrasound measurement at approximately 24 weeks and thus did not alter management based on this finding, 82 percent of women with cervical length ≤ 25 mm and 50 percent of those with cervical length ≤ 13 mm delivered at ≥ 35 weeks [1].

UNIVERSAL VERSUS SELECTIVE CERVICAL LENGTH SCREENING — We perform universal cervical length screening based, in part, on a large study in which the introduction of universal cervical length screening in singleton gestations without prior spontaneous preterm birth was associated with a significant decrease in the frequency of spontaneous preterm birth < 37 weeks of gestation (4.8 versus 4.0 percent; adjusted odds ratio [AOR] 0.81, 95% CI 0.75-0.89), < 34 weeks (1.3 versus 1.0 percent; AOR 0.78, 95% CI 0.66-0.93), and < 32 weeks (0.7 versus 0.5 percent; AOR 0.76, 95% CI 0.60-0.95) [25].

Restricting screening to women with historical risk factors for preterm birth would miss about 40 percent of women with a short cervix and thus at risk for preterm birth [26]. The number needed to screen to prevent preterm birth has been estimated to be 913 (95% CI 591-1494) with universal screening versus 474 (95% CI 291-892) when only women with one risk factor for preterm birth are screened and 125 (95% CI 56-399) when only women with two risk factors for preterm birth are screened [26]. The authors noted they found an association between a prior indicated preterm birth and a short cervix in a subsequent pregnancy, consistent with other data that women with a prior indicated preterm birth are at increased risk of subsequent spontaneous preterm birth, presumably as a result of a common pathophysiologic etiology [27-29].

Whether cervical length screening should be performed in all pregnant women or limited to those at high risk of spontaneous preterm birth is controversial. A 2013 Cochrane review of randomized trials did not find sufficient evidence to recommend routine cervical length screening for all pregnant women [30]. The value of cervical length screening could not be determined because of limitations of the included trials: The threshold for short cervix and timing of the screening examination(s) varied among the trials; there was no standard protocol for management of women based on cervical length, and the populations were heterogeneous. Population characteristics that could affect the performance of the test include the proportion of singleton versus multiple gestation, symptomatic versus asymptomatic women, intact membranes versus ruptured membranes, prior spontaneous preterm birth versus no prior spontaneous preterm birth, prior indicated preterm birth versus prior spontaneous preterm birth, prior term birth versus no prior term birth, and prior cervical surgery versus no prior cervical surgery [1,31-39].

The overall value of universal cervical length screen continues to be debated [40-42]; however, at least one decision analysis concluded that in women without a prior spontaneous preterm birth, universal cervical length

screening was cost-effective compared with both risk-based screening and no screening in the United States [43].

Recommendations from selected national and international organizations

In the United States:

- Society for Maternal-Fetal Medicine (SMFM) – The SMFM recommends routine transvaginal ultrasound cervical length screening between 16 and 24 weeks of gestation for women with a singleton pregnancy and history of prior spontaneous preterm birth [44]. They consider screening reasonable for women with a singleton pregnancy and no history of prior spontaneous preterm birth but have not recommended routine screening for this population. They recommend **not** performing routine cervical length screening for women with a cervical cerclage, preterm premature rupture of membranes, or placenta previa. They also noted that available data did not indicate adequate clinical benefit to justify routine screening of all women with multiple gestations, but this assessment was published before a 2017 meta-analysis that suggested a benefit. (See '[Multiple gestation](#)' below.)
- American College of Obstetricians and Gynecologists (ACOG) – In a practice bulletin on preterm birth, ACOG neither mandated universal routine cervical length screening in women without a prior spontaneous preterm birth nor recommended against such screening [45]. However, in women undergoing obstetrical ultrasound examination, ACOG has recommended that the cervix be examined when technically feasible [46].

International:

- International Federation of Gynecology and Obstetrics (FIGO) – FIGO recommends sonographic cervical length screening in all women 19+0 to 23+6 weeks of gestation using transvaginal ultrasound [47]. Women with a cervical length ≤ 25 mm should be treated with daily vaginal progesterone.

TEST PERFORMANCE — In women with singleton gestations and no prior spontaneous preterm birth, the sensitivity of a short cervix for subsequent spontaneous preterm birth has been reported to be as high as 35 to 45 percent in the absence of intervention [1,32], and the positive predictive value has been reported to be as high as 20 to 30 percent [48,49]. Lower values have also been observed: A large prospective study reported 8 percent sensitivity for preterm birth among nulliparous women with singleton gestations and cervical length ≤ 25 mm at 16 to 22 weeks of gestation and 23 percent sensitivity for measurements performed at 22 to 30 weeks. However, clinicians and patients were informed when the cervical length was < 15 mm, and intervention to reduce the risk for spontaneous preterm birth was initiated; cervical length screening was often started too early in these patients (< 18 weeks), and hundreds of women with high-risk factors for spontaneous preterm birth could not be included because of missing outcomes [50]. Sensitivity is much higher in high-risk populations: In a prospective study of women with a prior spontaneous preterm birth, sensitivity increased to 70 percent and was highest in women with early and/or repeated spontaneous preterm births [31].

Cervical length measurements performed in nonpregnant women are not useful for predicting spontaneous preterm birth [51]. In addition, evaluating parameters other than cervical length, such as absolute or relative change in cervical length over time, does not improve test performance [52]. However, in women diagnosed with a short cervix (≤ 25 mm), a change in cervical length on subsequent ultrasound examinations appears to impact the risk of spontaneous preterm birth [53-55]. A stable or longer cervical length at a subsequent examination is associated with a lower risk for spontaneous preterm birth than initially predicted, while a shorter cervical length increases the risk of spontaneous preterm birth.

CLINICAL APPROACH

Overview — The following algorithm summarizes our approach to transvaginal ultrasound (TVU) cervical length measurement for reducing the risk of spontaneous preterm birth in asymptomatic pregnant women ([algorithm 1](#)). We perform TVU cervical length screening in all pregnancies because this technique is more reliable than transabdominal measurement (see '[Use of transvaginal sonography](#)' below), and interventions are

available that reduce the risk of spontaneous preterm delivery in women with a short cervix. (See '[Singleton pregnancy, no prior spontaneous preterm singleton birth](#)' below and '[Singleton pregnancy, prior spontaneous preterm singleton birth](#)' below.)

Another approach used by some clinicians is to measure cervical length transabdominally during the second trimester fetal anatomic survey ultrasound in patients who are thought to be at low risk of spontaneous preterm birth: If the cervix is short or is not adequately seen, then a transvaginal ultrasound examination is performed for a definitive measurement. All women with risk factors for preterm birth undergo transvaginal ultrasound cervical length screening. Although this approach decreases the number of transvaginal ultrasound examinations that need to be performed and thus saves time, in our experience, some cases of short cervix with subsequent spontaneous preterm birth will be missed by this approach. (See '[Use of transvaginal sonography](#)' below.)

Singleton pregnancy, no prior spontaneous preterm singleton birth — For women with singleton pregnancies and no history of prior spontaneous preterm birth, we screen for a short cervix (≤ 25 mm) with a single TVU examination at approximately 20 weeks (18 to 24 weeks) ([algorithm 1](#)) [56]. Approximately 1 percent of women screen positive at the author's institution [57]. The rate is slightly higher in nulliparas than in multiparas without a prior spontaneous preterm birth [58]. Because the rates of spontaneous preterm birth <37 , <34 , and <32 weeks in women with a short cervix appear to be similar for both groups, we use the same screening protocol for nulliparous women and multiparous women with no prior spontaneous preterm birth.

Singleton gestations with no prior spontaneous preterm birth and with a short cervix are treated with vaginal progesterone. (See "[Progesterone supplementation to reduce the risk of spontaneous preterm birth](#)", section on '[Short cervix in current pregnancy](#)'.)

Use of a pessary in women with a short cervical length has been proposed as an effective, inexpensive, and easy-to-implement method for prolonging pregnancy. Efficacy is not supported by the body of literature, although some trials have reported a reduction in births <34 weeks of gestation. (See "[Cervical insufficiency](#)", section on '[Pessary](#)'.)

Cervical cerclage does not appear to be effective for women with a short cervix who have not had a prior spontaneous preterm birth. In a meta-analysis of four randomized trials in which singleton pregnancies were screened with cervical ultrasound examination and randomly assigned to cerclage or no cerclage if the cervix was short, cerclage placement in women with no prior spontaneous preterm birth did not result in significant reduction in birth <35 weeks (21 versus 31 percent without cerclage: relative risk 0.84, 95% CI 0.60-1.17) [10].

Bed rest does not prolong pregnancy and increases the risk for thromboembolic events. (See "[Preterm birth: Risk factors, interventions for risk reduction, and maternal prognosis](#)", section on '[Bedrest is not helpful](#)'.)

Singleton pregnancy, prior spontaneous preterm singleton birth — Women with a prior spontaneous preterm birth are at high risk for recurrence. These high-risk women are placed on progesterone supplementation ([hydroxyprogesterone caproate](#) by intramuscular injection) and may have cervical insufficiency. (See "[Preterm birth: Risk factors, interventions for risk reduction, and maternal prognosis](#)", section on '[History of spontaneous preterm birth](#)'.)

We initiate TVU cervical length screening in these women at 14 to 16 weeks of gestation (the earlier the prior spontaneous preterm birth, the earlier the screening) and perform serial examinations ([algorithm 1](#)). In women with a short cervix (≤ 25 mm) and prior spontaneous preterm birth, we place a cerclage to reduce the risk of recurrent spontaneous preterm birth. The rationale/evidence for this approach and management of these pregnancies are discussed in detail separately. (See "[Cervical insufficiency](#)", section on '[Ultrasound-based cervical insufficiency](#)'.)

Singleton pregnancy, no prior birth, but risk factors for spontaneous preterm birth — For women with singleton pregnancies and risk factors for spontaneous preterm birth but no prior spontaneous preterm birth, we use the same screening approach that we use for women without a previous spontaneous preterm birth: screen for a short cervix (≤ 25 mm) using a single TVU examination at approximately 20 weeks (18 to 24

weeks) and treat women with a short cervix with vaginal progesterone ([algorithm 1](#)). (See '[Singleton pregnancy, no prior spontaneous preterm singleton birth](#)' above.)

We do not use a different screening protocol for these women because their pregnancy outcome needs to be established before committing them to serial cervical length surveillance and possibly a cervical procedure (cerclage) that may be unnecessary. The management of these pregnancies is discussed in detail separately. (See "[Cervical insufficiency](#)", [section on 'Women with no prior second-trimester pregnancy loss/extremely preterm birth, but risk factors for cervical insufficiency'](#).)

Singleton pregnancy, prior spontaneous twin birth — The best approach to women with a prior spontaneous twin birth is controversial. Some studies have reported that a prior spontaneous twin birth is associated with an increased the risk of spontaneous preterm birth in the subsequent singleton pregnancy [[59-61](#)]. The increased risk appears to be limited to previous twin births <34 weeks [[59,61](#)]. Therefore, if the prior twin preterm birth was ≥ 34 weeks, we manage the subsequent singleton pregnancy the same as in women with no prior preterm spontaneous birth. If <34 weeks, we offer progesterone supplementation ([hydroxyprogesterone caproate](#)) by intramuscular injection) and monitor cervical length, as described above for singletons. (See '[Singleton pregnancy, prior spontaneous preterm singleton birth](#)' above.)

PROCEDURE FOR SONOGRAPHIC MEASUREMENT OF CERVICAL LENGTH

Timing and frequency — As discussed above, we base the timing and frequency of cervical length measurement on the patient's prior obstetric history:

- Women with no prior spontaneous preterm birth are screened once at approximately 20 weeks (18 to 24 weeks) of gestation [[52](#)].
- Women with a prior spontaneous preterm birth usually begin screening at about 16 weeks of gestation and the frequency depends on the measurement ([algorithm 1](#)). Serial screening was effective in large trials of this population [[31,62](#)].

Reproducible measurement of cervical length becomes possible usually at approximately 14 weeks of gestation and consistently by 16 to 18 weeks, when the cervix normally becomes distinct from the lower uterine segment [[56](#)]. Cervical length measurements before 14 weeks of gestation have limited clinical value [[56,63](#)]. However, in some particularly high-risk pregnancies, such as those with prior second-trimester losses and/or large (or multiple) excisional biopsies, cervical shortening has been seen as early as 10 to 13 weeks of gestation and was associated with a high risk of second-trimester loss [[56](#)]. Screening is discontinued at 24 weeks because all intervention trials have begun treatment by 24 weeks of gestation. After 30 weeks, cervical length measurement is not useful for predicting spontaneous preterm birth because the cervix physiologically starts to shorten at this time, even in women destined to deliver at term.

Use of transvaginal sonography — We perform cervical length screening with transvaginal ultrasound (TVU) [[64](#)]. TVU examination is the preferred method for measuring cervical length as TVU cervical measurements are more reproducible and reliable than those obtained by transabdominal ultrasound and more sensitive for prediction of spontaneous preterm birth [[65-72](#)]. It is also important to note that all randomized trials supporting the efficacy of treatment of women with a short cervix used TVU to measure cervical length [[12,32,62,73-77](#)].

The poorer performance of transabdominal ultrasound has been attributed to multiple factors, including: (1) the bladder often needs to be filled to obtain a good image, resulting in elongation of the cervix and masking of any funneling of the internal os; (2) fetal parts can obscure the cervix, especially after 20 weeks; (3) the distance from the probe to the cervix results in degraded image quality; and (4) obesity and manual pressure interfere with the image [[72](#)].

However, as discussed above, another common practice is to measure cervical length transabdominally during the second-trimester fetal anatomic survey ultrasound in patients who are thought to be at low risk of spontaneous preterm birth: If the cervix is short or is not adequately seen, then a TVU examination is

performed for a definitive measurement. All women with risk factors for spontaneous preterm birth undergo transvaginal ultrasound cervical length screening.

An American Institute of Ultrasound in Medicine practice guideline for performance of obstetric ultrasound examination advises that if the cervix appears short or is not adequately seen during transabdominal evaluation, a TVU or transperineal approach can be considered [78]. In patients who have a well-imaged long cervical length on transabdominal sonography, a prospective study concluded that TVU may be avoided [79].

Technique — Some clinicians find the cervix is easier to locate sonographically if a digital examination is performed first as gel from the examiner's glove left in the cervical canal makes the external os more echogenic. In addition, digital examination aids in the assessment of risk of premature delivery by providing information on cervical dilation, position, and consistency - features not optimally assessed by ultrasound. However, experienced sonographers generally omit digital examination, and we do not perform it.

The basic steps for the TVU technique are:

- The patient should empty her bladder prior to the examination.
- Ultrasound gel is placed on a transvaginal probe before covering it with a condom (or specialized probe cover), and then more ultrasound gel is placed on top of the cover. If the membranes are ruptured, both the cover and the gel should be sterile.
- With the real-time image in view, the transducer is gently inserted into the anterior fornix until the cervix is visualized while avoiding excessive pressure on the anterior cervical lip. The image of the cervix is enlarged to fill at least one-half of the ultrasound screen and oriented so that cephalad is to the left of the screen. Fetal membranes in the cervical canal or beyond the cervix should be noted, if present.
- The amniotic fluid in the lower uterine segment is assessed and then the lowest edge of the empty maternal bladder. The internal os is then located, often just below this edge.
- The appropriate sagittal long-axis view for measuring cervical length includes the usually V-shaped notch at the internal os, the triangular area of echodensity at the external os, and the endocervical canal, which appears as a faint line of echodensity or echolucency between the two (figure 1). Excess pressure on the cervix can artificially increase its apparent length. This can be avoided by first obtaining an apparently satisfactory image, withdrawing the probe until the image blurs, and then reapplying only enough pressure to restore the image (image 1).
- Cervical length is represented by the line made by the interface of the mucosal surfaces (the closed portion of the cervix). It is usually the distance between calipers placed at the notches made by the internal os and external os. If the internal os is open (image 2), cervical length is measured from the tip of the funnel to the external os (figure 1). Cervical length should only be determined from images in which the lowermost edge of the empty maternal bladder and the internal and external os are visible and when the anterior and posterior lips of the cervix are of approximately equal thickness. If the cervix appears asymmetric (thin anteriorly and thicker posteriorly), this suggests excessive probe pressure.
- At times, the cervical canal is curved. In these cases, the length of the cervix can be measured in either of two ways:
 - The length of a single, straight line from the internal to external os can be measured.
 - The sum of two separate, straight lines joined at an angle along the curved length of cervix is determined: This sum is used for the cervical length if the distance between the angle and a straight line from the internal to external os is >5 mm (image 3) as it may provide a more accurate measurement [31].

We avoid tracing the cervical canal because it introduces unpredictable operator variation. A curved cervix usually means a long cervix and thus a low risk for spontaneous preterm birth, while a short cervix is

usually straight.

- When three measurements have been obtained that satisfy measurement criteria and vary by less than 10 percent, the shortest of these is chosen and recorded as the "shortest best." Choosing the shortest of three excellent images reduces interobserver variation. We do not determine the best measurement by image quality because this introduces an unpredictable variable.
- Moderate to firm manual transabdominal pressure applied across the fundus in the direction of the uterine axis for 15 seconds [80] can aid the examination by revealing a "dynamic" cervix (ie, the development of short cervical length in a cervix seemingly initially of normal length) [31,81]. It is important to allow at least five minutes for the total examination and a couple of minutes between the gentle application of fundal pressure and recording the presence of a short cervix as it takes time for development of dynamic and/or "transfundal pressure elicited" changes in the cervix [82].

If a short (or shorter) cervical length is seen after application of fundal pressure, the length of the residual closed portion of the cervix is taken three times, with the shortest length recorded in millimeters as the best estimate of the true length of the cervix. This length best correlates with duration of pregnancy. Only one measurement should be reported: the shortest best cervical length (mm) of all measurements taken.

Pitfalls in measuring cervical length — The following pitfalls can lead to suboptimal measurement of cervical length, typically resulting in overestimation:

- **Excessive pressure** – Placing excessive pressure on the cervix during the examination is a common mistake in performing TVU. This creates an artificially longer cervix due to compression of the anterior cervical lip and lower uterine segment. As discussed above, this may be avoided by withdrawing the probe when the internal and external os are visualized until slight blurring occurs, and then the probe is inserted slightly until a clear image returns. The anterior and posterior lips of the cervix should be of approximately equal thickness (figure 1).
- **Not allowing enough time to view dynamic changes** – Measuring cervical length too quickly is common and can result in an inaccurate measurement. It is important to allow adequate time (approximately five minutes) for any effects of transient pressure on the cervix to resolve.
- **Uterine contractions** – Contractions during the examination can cause a false impression of a long cervix. If the internal os is not clearly visualized and a contraction is present, the sonographer needs to wait until the contraction resolves before the cervical length can be measured accurately. Contraction of the lower uterine segment can mimic funneling with a normal residual cervical length.
- **Underdevelopment of the lower uterine segment** – As discussed above, before 14 weeks, it is more difficult to differentiate between the lower uterine segment and true cervix as the pregnancy has not yet expanded to the whole uterus. Placenta previa may create this same problem, resulting in an artificially increased cervical length.

If the lower uterine segment is underdeveloped, it can be difficult to identify the true internal os, and some myometrium may be included in the cervical length measurement. This should be suspected when the cervix appears longer than 50 mm or the internal os is cephalad above the bladder reflection [18]. A difference in echotexture between myometrium and true cervical stroma often can be appreciated during real-time scanning and provides a means for differentiating between the two structures.

- **Prior cervical surgery** – Prior cervical surgery may alter the appearance of the cervix, making the identification of measurement landmarks difficult.
- **Air bubbles** – Hasty placement of lubricant into the transducer cover may generate small air bubbles that create a poor image.

Cervical findings other than length — During the ultrasound examination, additional findings associated with spontaneous preterm birth may be noted.

- **Separation of the membranes** from the decidua and debris/sludge (hyperechoic matter in the amniotic fluid ([image 4](#))) close to the internal os suggest subclinical infection and an increased risk of spontaneous preterm delivery [[83-85](#)]. The composition of the debris is unclear; it may be a blood clot, meconium, vernix, or cellular material related to infection/inflammation [[86](#)].
 - **Funneling** is the protrusion of the amniotic membranes into the cervical canal. Funneling has been variably defined according to the depth of protrusion [[1](#)] and/or the ratio of the funnel depth to the length of funnel plus the remaining closed cervix [[81](#)]. As the cervix effaces, the relationship between the lower uterine segment and the axis of the cervical canal also changes and is described according to the shape of the letters "T," "Y," "V," and "U" (mnemonic: Trust Your Vaginal Ultrasound) ([figure 2](#)) [[16](#)]. "T" represents the normal relationship of the area where the endocervical canal meets the uterine cavity, whereas "U" represents almost complete effacement and signifies the highest risk for spontaneous preterm birth. Representative endovaginal ultrasound images that display these changes are shown in the following ultrasounds ([image 5A-C](#)).
- The length of the funnel is often uncertain because landmarks, such as the shoulder of the internal os, may not be distinct; therefore, we do not measure funnel length or use it for clinical management. In fact, while funneling is associated with a short cervix, it is not an independent predictor of preterm labor risk when the closed length of the cervical canal is considered [[31,81](#)]. As discussed above, when funneling is present with a normal residual cervical length, it is usually related to a contraction of the lower uterine segment and has little to no clinical significance.
- Assessment of **cervical tissue density, cervical axis** relative to the uterine corpus, and other cervical characteristics does not significantly improve predictive value for spontaneous preterm birth over cervical length alone [[31,81,87](#)].

Online resources — The [Cervical Length Education and Review program](#) (CLEAR) is available online and provides educational lectures, optional examinations, and scored image reviews to teach clinicians a standard, accurate method for measuring cervical length. An online tutorial is also available from the [Fetal Medicine Foundation \(United Kingdom\)](#).

Quality assurance — TVU should be performed in accordance with all of the technical steps described above to obtain adequate measurements of cervical length. With proper technique, intra- and interobserver variation are <10 percent. We suggest performing at least 20 TVU cervical length examinations under supervision before generating clinical reports of TVU cervical length independently.

MULTIPLE GESTATION — Short midtrimester cervical length on TVU in asymptomatic twin pregnancies is also predictive of an increased risk of spontaneous preterm birth [[72,88,89](#)]; however, the value of progesterone for prevention of spontaneous preterm birth is less well-established compared with singleton gestations, and cerclage does not appear to be useful. (See "[Twin pregnancy: Prenatal issues](#)", [section on 'Unproven interventions to prevent or delay preterm labor and delivery'](#).)

In a 2017 meta-analysis of individual patient data from six randomized trials of women with twin gestations and midtrimester cervical length ≤ 25 mm, vaginal progesterone reduced preterm birth <33 weeks compared with no treatment/placebo (relative risk [RR] 0.69, 95% CI 0.51-0.93; 50/159 [31 percent] versus 62/144 [43 percent]) [[90](#)]. The relative risks of neonatal death, respiratory distress syndrome, and birth weight <1500 g were also reduced significantly, on average by 30 to 50 percent. Based on these data, which should be confirmed in larger trials, we and others screen twin pregnancies for short cervical length and treat those with a short cervix with vaginal progesterone (see "[Progesterone supplementation to reduce the risk of spontaneous preterm birth](#)", [section on 'Twin pregnancy'](#)), while some other UpToDate authors are awaiting confirmation in larger trials. (See "[Twin pregnancy: Prenatal issues](#)", [section on 'Unproven interventions to prevent or delay preterm labor and delivery'](#).)

In the United States, the Society for Maternal-Fetal Medicine has not endorsed routine cervical length screening in all multiple gestations, based on lack of evidence of interventions shown to improve outcome

[44,91]. However, these guidelines were published before the 2017 meta-analysis cited above and have not been updated. FIGO endorses routine cervical length screening, without an exclusion for multiple gestations [47].

We do not screen triplet and other high order pregnancies for short cervix because of absence of adequate data about screening or efficacy of progesterone supplementation or cerclage [92].

SOCIETY GUIDELINE LINKS — Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "[Society guideline links: Preterm labor and birth](#)".)

SUMMARY AND RECOMMENDATIONS

- Cervical length is measured by determining the length of closed cervix between the internal os and external os. It should only be determined from images in which the lowermost edge of the empty maternal bladder and the internal and external os are visible and when the anterior and posterior lips of the cervix are of equal thickness ([figure 1](#)). (See '[Procedure for sonographic measurement of cervical length](#)' above.)
- A decrease in cervical length in the second trimester is predictive of spontaneous preterm birth, and the risk increases as cervical length decreases. In contrast, a gradual decline in cervical length after 32 weeks can be normal and not predictive of spontaneous preterm birth. (See '[Rationale for measuring cervical length](#)' above.)
- The diagnosis of short cervix is defined by cervical length ≤ 25 mm by transvaginal ultrasound examination before 24 weeks of gestation. (See '[Diagnosis of short cervix](#)' above and '[Use of transvaginal sonography](#)' above.)
- We suggest routine transvaginal ultrasound screening for short cervix in singleton (**Grade 2B**) and twin pregnancies (**Grade 2C**) since appropriate interventions to reduce the risk of spontaneous preterm birth are available. The following algorithm summarizes our approach ([algorithm 1](#)). (See '[Universal versus selective cervical length screening](#)' above and '[Clinical approach](#)' above and '[Use of transvaginal sonography](#)' above and '[Multiple gestation](#)' above.)
- Women with prior spontaneous singleton preterm deliveries who develop cervical length ≤ 25 mm may have cervical insufficiency. These women are initially administered progesterone ([hydroxyprogesterone caproate](#) by intramuscular injection) based on their past pregnancy history and then offered the addition of a cerclage upon identification of a short cervix. (See "[Cervical insufficiency](#)", [section on 'Ultrasound-based diagnosis](#)' and "[Cervical insufficiency](#)", [section on 'Ultrasound-based cervical insufficiency](#)'.)
- The best approach to women with a prior spontaneous twin preterm birth is controversial. Some studies have reported that a prior spontaneous twin birth < 34 weeks is associated with an increased the risk of spontaneous preterm birth in the subsequent singleton pregnancy. If the prior twin preterm birth was ≥ 34 weeks, we manage the subsequent singleton pregnancy the same as in women with no prior preterm spontaneous birth. If < 34 weeks, we offer progesterone supplementation ([hydroxyprogesterone caproate](#)) by intramuscular injection) and monitor cervical length, as described above for singletons. (See '[Singleton pregnancy, prior spontaneous twin birth](#)' above.)

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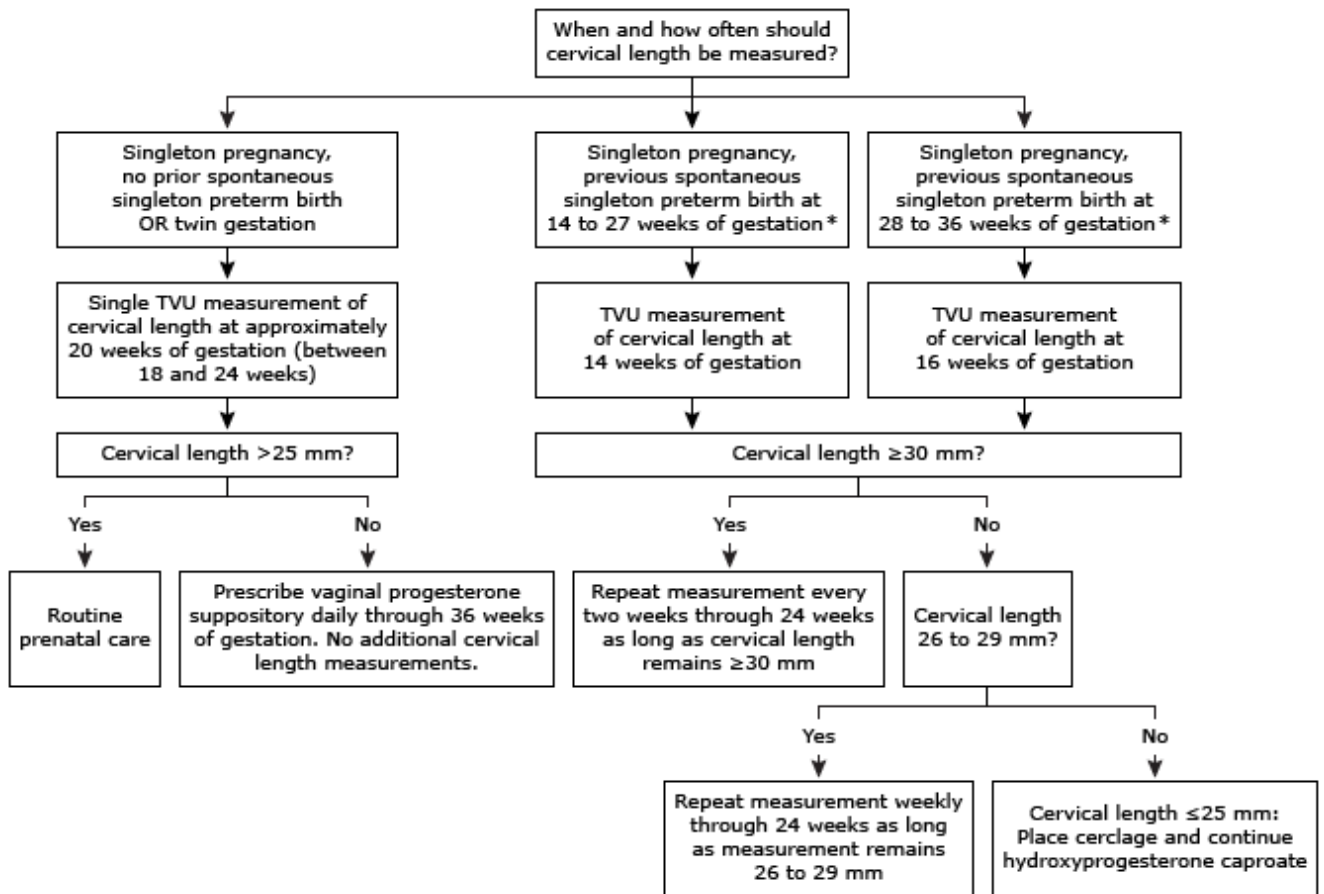
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Topic 450 Version 64.0

GRAPHICS

Approach to transvaginal sonographic screening of cervical length in pregnancy and management of pregnant women with a short cervix



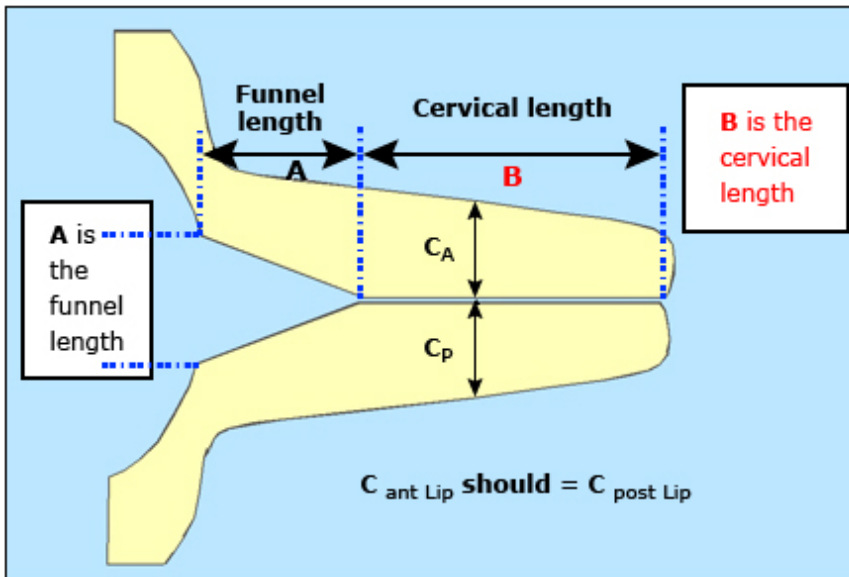
The best approach to women with a prior spontaneous twin birth is controversial. Some studies have reported that a prior spontaneous twin birth is associated with an increased the risk of spontaneous preterm birth in the subsequent singleton pregnancy. The increased risk appears to be limited to previous twin births <34 weeks. Therefore, if the prior twin preterm birth was ≥ 34 weeks, we manage the subsequent singleton pregnancy the same as in women with no prior preterm spontaneous birth. If <34 weeks, we offer progesterone supplementation (hydroxyprogesterone caproate by intramuscular injection) and monitor cervical length, as described for singletons. This is the author's approach to monitoring cervical length and management of women with a short cervix. This remains a controversial area, and variations of this approach exist worldwide.

TVU: transvaginal ultrasound.

* In addition to cervical length screening, offer hydroxyprogesterone caproate beginning at 16 weeks of gestation and continuing through the 36th week of gestation to reduce the risk of recurrent spontaneous preterm birth.

Graphic 107318 Version 5.0

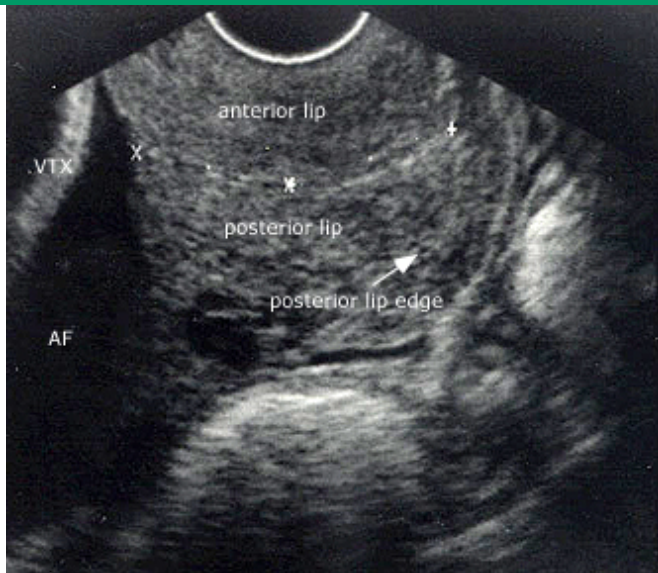
Measurement of the cervix



Funnel length should not be measured or recorded as it is not an independent predictor of preterm labor risk when the closed length of the cervical canal is considered.

Graphic 82336 Version 3.0

Normal cervix



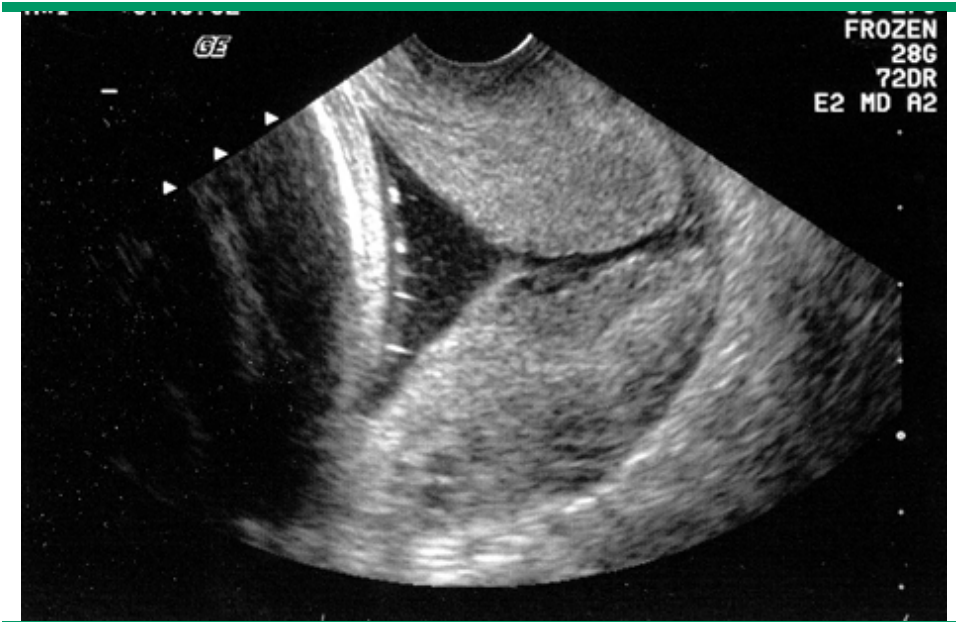
Ultrasound of normal cervix with equal thickness of anterior and posterior cervical lips. X marks the internal cervical os; + marks the external cervical os; the echodense line connecting the two points is the endocervical canal.

AF: amniotic fluid; VTX: fetal head.

Courtesy of Jeffrey Johnson, MD.

Graphic 72281 Version 2.0

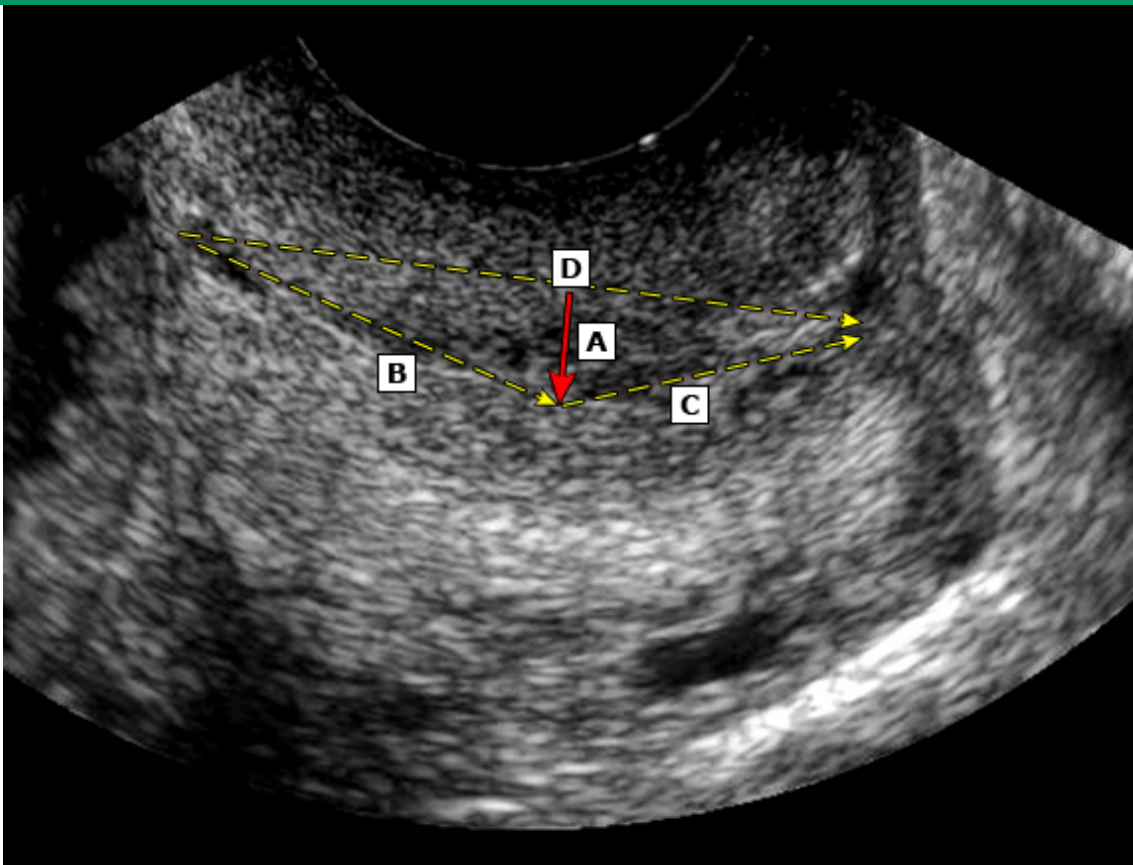
Endovaginal ultrasound image of the cervix in a woman with preterm labor



Courtesy of Jay D Iams, MD.

Graphic 62467 Version 2.0

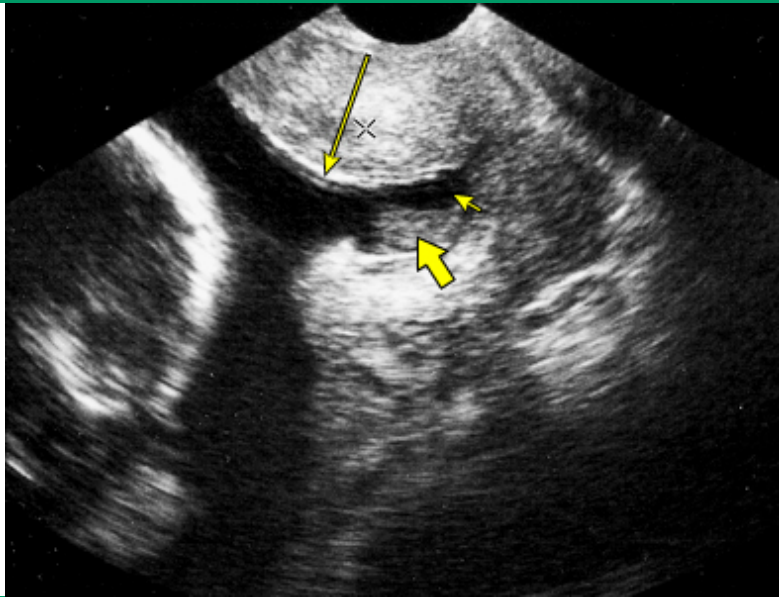
Cervical length in a curved cervix



Evaluation of cervical length in a patient with a curved cervix. If the widest distance (A, red arrow) between the dashed yellow lines is greater than 5 mm, use the sum of B and C as the best measurement of cervical length. If less than or equal to 5 mm, use D as the best measurement of cervical length.

Graphic 61433 Version 3.0

Ultrasound image of membrane separation

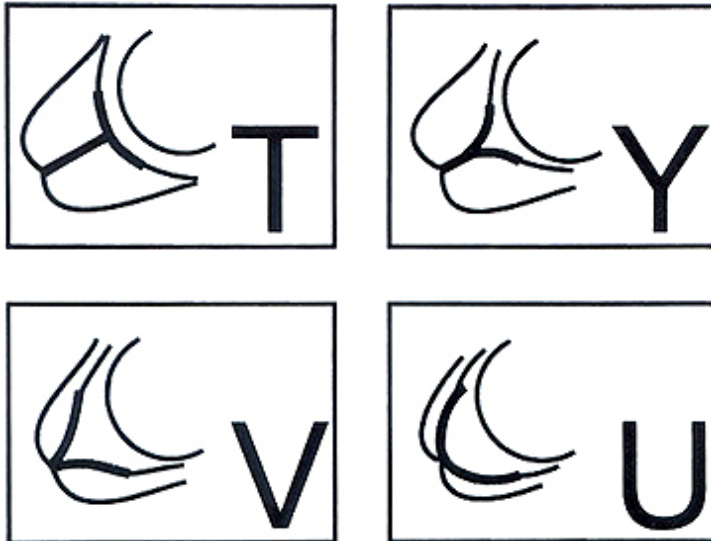


Transvaginal midline sagittal ultrasound image of the cervix showing funneling (long arrow), membrane separation from the decidua (along the anterior lip of the cervix) (short arrow), and debris (diffuse area of echodensity resting within the amniotic fluid of the funnel on the posterior cervix; thick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

Courtesy of Jay D Iams, MD.

Graphic 70493 Version 4.0

Diagram of cervical effacement

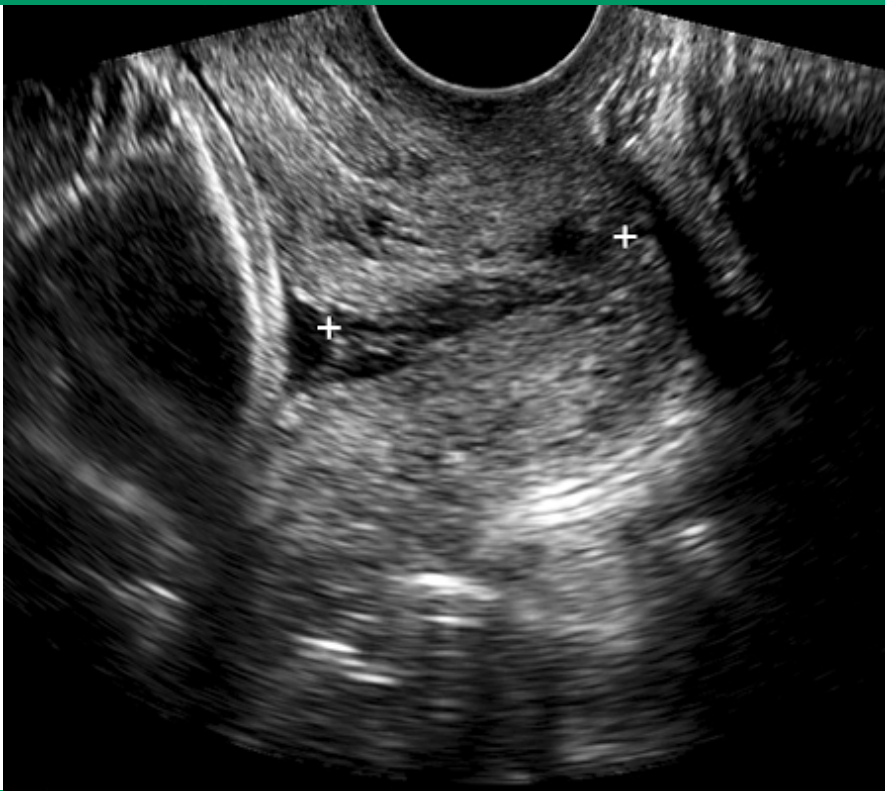


Progression of cervical effacement at the internal cervical os from completely uneffaced (T) to completely effaced (U).

Adapted from: Zilianti M, Azuaga A, Calderon F, et al. Monitoring the effacement of the uterine cervix by transperineal sonography: a new perspective. J Ultrasound Med 1995; 14:719.

Graphic 72366 Version 3.0

Ultrasound normal T cervix

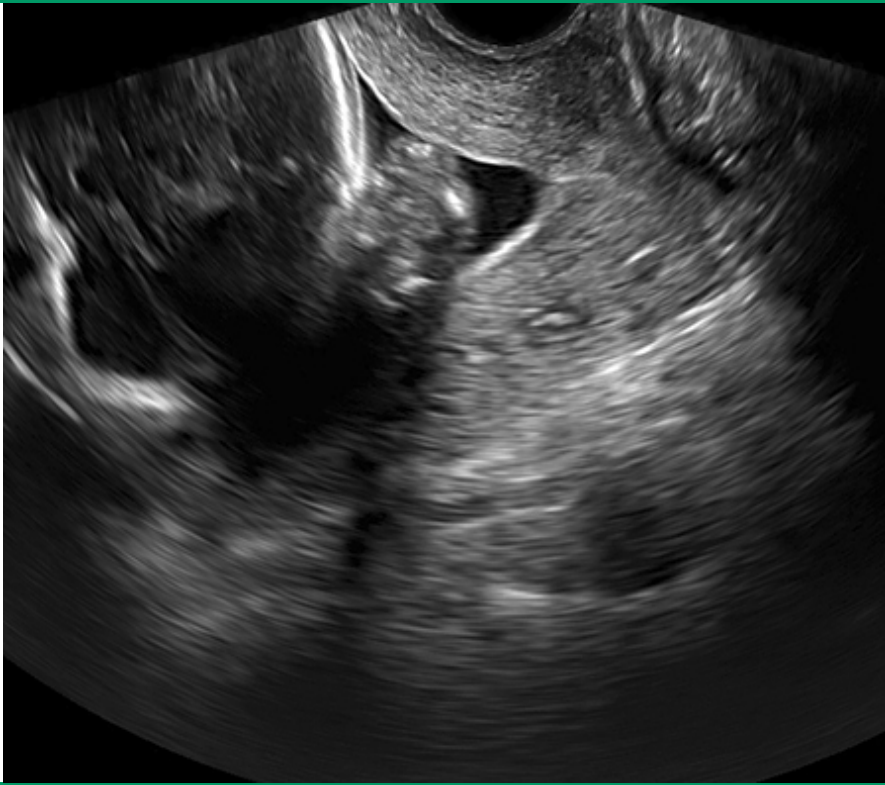


Normal cervix, no funneling ("T-shaped"). Note prominent endocervical mucus, small Nabothian cyst near external os. Lower uterine segment thick and not developed.

Courtesy of Jeffrey R Johnson, MD.

Graphic 77352 Version 4.0

Ultrasound Y funnel cervix

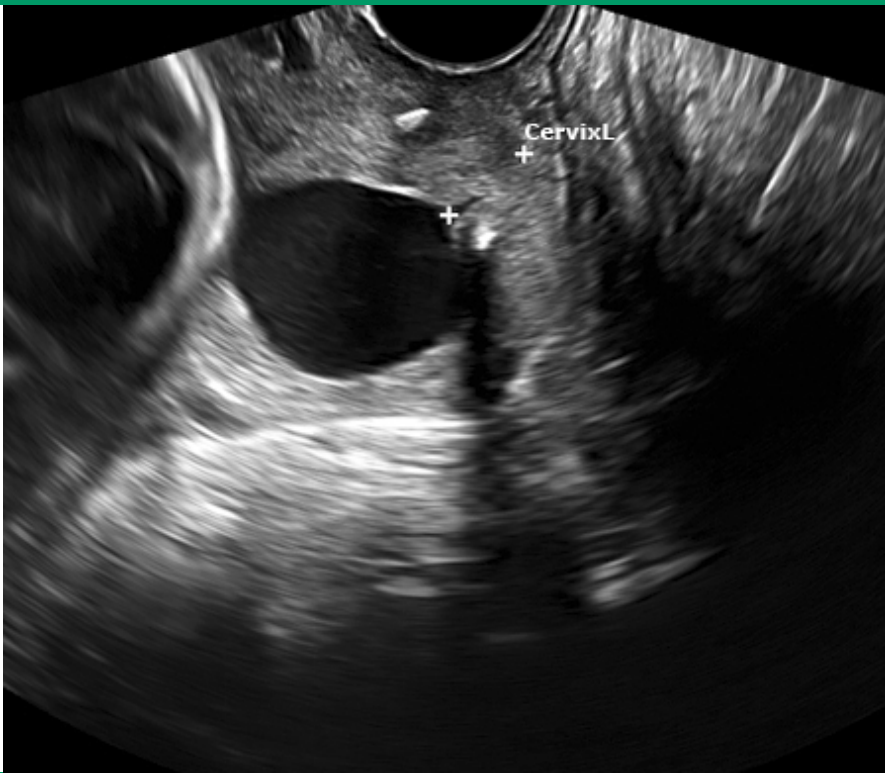


Funneling cervix, with walls of funnel in "Y-shaped" configuration. Membranes are not visible separately, and there is no evidence of prolapsed membranes beyond internal os.

Courtesy of Jeffrey R Johnson, MD.

Graphic 66107 Version 3.0

Ultrasound U funnel cervix



"U"-shaped cervix with membranes seen extending to the cerclage. Calipers measure the cervical length. Nearly completely effaced cervix, with "U"-shaped funnel.

Courtesy of Jeffrey R Johnson, MD.

Graphic 52234 Version 5.0

Contributor Disclosures

Vincenzo Berghella, MD Nothing to disclose **Lynn L Simpson, MD** Nothing to disclose **Deborah Levine, MD** Nothing to disclose **Vanessa A Barss, MD, FACOG** Nothing to disclose

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