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Measurement of the Cervix and Progesterone—
the Solution to PTL?

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Preterm birth (PTB): birth at >20 and <37 completed weeks of gestation

PTB = major ob healthcare problem of global significance
PTB: the single major cause of death and disability in children up to 5 years of age in the developed world
PTB: the leading single cause of global perinatal mortality and morbidity
Approximately 15M babies born preterm each year worldwide, and ~1M of these children die

Preterm infants: also at significantly greater risk of serious perinatal complications
Significant proportion experience life-long disability and health issues (although many children born preterm may lead a normal and healthy life)
Impact on individuals, families, and society is considerable
Healthcare costs associated with perinatal care and life-long disability
A short cervix, defined as a transvaginal sonographic cervical length (CL) ≤ 25 mm in the mid-trimester of pregnancy, is an important risk factor for spontaneous PTB and has emerged as one of the strongest and most consistent predictors of PTB in asymptomatic women with singleton or twin gestations.


The etiology of preterm cervical shortening, one of the harbingers of PTB, 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,
- biological variation

Preterm delivery - Is a simple measurement of the cervix (+ a shot/application of progesterone) the answer?

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Disclosure

I have no conflict of interest with respect to any of the material presented in this lecture.
I am an author for UpToDate
I am a consultant for Samsung
I will not discuss off-label or unapproved uses of drugs or devices.

Objective

- Define normal and short cervix
- Describe scanning of the cervix
- Summarize guidelines for the sonographic evaluation of the pregnant cervix
- Summarize treatment alternatives to prevent preterm labor when cervix is short

Clinical questions to answer

- Who should be screened?
- How best to scan the cervix?
- What is a short cervix?
- What should the ultrasound sonographer/sonologist/nurse do when a short cervix is diagnosed?
- What are the recommendations for follow up surveillance in patients with a short cervix?
- Should amniocentesis be offered to patients with a short cervix?
- How should patients at risk for preterm delivery (e.g. h/o cervical surgery, preterm delivery without short cervix, multiple gestations) be followed?
- What is the best treatment option for a short cervix?
Who should be screened?

EVERYBODY*

*Maybe, maybe not

Singleton, no previous PTB or risk factors
Singleton, previous PTB or risk factors
Multiple, no previous PTB or risk factors
Multiple, previous PTB or risk factors

Approaches to examining the cervix

- Transabdominal
- Transperineal
- Transvaginal
AIUM guidelines

- The endocavitary probe should be covered with a barrier (condom or probe cover)
- Users need to be aware of latex sensitivity and have non-latex barriers available
- Users should wear gloves throughout the procedure
- Care should be taken to clean hands and surfaces after the procedure
- The probe should be cleaned with soap and water immediately after the procedure.
- High-level disinfection of the probe is required between patients.

How to examine the cervix?

Transabdominal vs. Transvaginal ultrasound

- TA: requires full bladder
- TV: easy to perform, reproducible
- TV: acceptable to patients
- Transabdominal cervical length may falsely “elongate” the cervix, secondary to requirement for full bladder (mean difference 5.2 mm, +/-14.3, P < .001)
- Transvaginal ultrasound can assess for funneling and sludge
- Cost effective analyses have been based off of transvaginal CL screening in all patients

Transabdominal evaluation of uterine cervical length during pregnancy fails to identify a substantial number of women with a short cervix

Objectives: To assess the diagnostic performance of transabdominal sonographic measurement of cervical length in identifying patients with a short cervix

- 220 Consecutive, singleton
- Median GA: 24 3/7wks (6 2/7-39

TA and TV scan (and 3D cervical volume in100

Overall moderate correlation between TA and TV cervical length measurement with no significant difference in mean cervical length

However, cervical length differed significantly by method with respect to the diagnosis of a short cervix

Measurement of the cervix - Abramowicz
TA cervical length identified only 43% (9/21) of patients with a short cervix. In the remaining 12 patients, TA US overestimated the cervical length on average by 14mm (5.6-26mm).

Is there a transabdominal cut-off?

In Hernandez et al's study if 30mm cut-off was used by transabdominal measurement, 3 of 12 missed cases of short cervix (25%) would be detected.

Pre-void TA cervical length <36mm has 96.1% sensitivity in identifying CL <25mm.

Pre-void TA cervical length <35mm has 100% sensitivity in identifying CL <20mm.
Normal sonographic cervical Anatomy

- Empty maternal bladder
- Visualize internal os, external os, cervical canal and endo-cervical glands
- Avoid undue pressure on the cervix
- Anterior lip width = Posterior lip width
- Cervix should occupy > 75% of the image
- Measure the closed portion of the cervix (not the funnel, if present)
- Perform 3 measurements over > 3 minutes
- Record the shortest length that meets criteria, not the pretty picture or the average length

Romero and Hassan, AIUM Lecture
Pearl: a short cervix is never curved (R. Romero)

Normal Values of Cervical Length During Gestation

- Low-risk population (n=669)
- TV scan

15mm 2nd centile
20mm 5th centile
25mm 10th centile
35mm 50th centile
45mm 90th centile
Measurement of Sonographic Cervical Length

- Transvaginal ultrasound
- Empty bladder
- Sagittal view

Measurement of the Cervix

A is the Funnel Length. B is the Cervical Length. C represents the Anteversion and Postversion.

Record
B = THE Cervical Length
- Abdominal pressure applied to the fundus for 15 seconds: aid in revealing "dynamic" cervix (ie, the development of short cervical length in a cervix seemingly initially of normal length).
- Allow 1-2 minutes between fundal pressure and recording the presence of a short cervix (it takes time for development of dynamic and/or "transfundal pressure elicited" changes in the cervix)


http://www.perinatalquality.org/inter
Common Pitfalls

- Excessive probe pressure (long cervical length due to artifact)
- Full bladder (long cervical length due to artifact)
- Unequal size and density of the anterior and posterior lips of the cervix
- Endocervical canal not visualized

Avoid the presence of a full bladder.

<table>
<thead>
<tr>
<th>Full bladder</th>
<th>Empty bladder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical length 35 mm</td>
<td>Cervical length 17 mm</td>
</tr>
</tbody>
</table>

Trust Your Vaginal Ultrasound
Measurement of the cervix - Abramowicz

When to screen?

Women with no prior preterm birth:
18 to 24 weeks of gestation.

Women with a prior preterm birth:
start at 14 to 16 weeks of gestation.
**Parameters used to assess the risk of PTB during TVUS**

- Cervical shortening
- Funnel
- Dilatation of the cervical canal
- Dynamic changes
- Amniotic fluid sludge

**Cervical Shortening**

**A short cervix is a powerful predictor of spontaneous preterm birth.**

What is a short cervix?

35 mm  14 mm

Prediction of risk for preterm delivery by ultrasonographic measurement of cervical length


First study to evaluate the relationship between cervical length and preterm delivery (University of Michigan).

The shorter the cervix, the greater the risk of preterm delivery

Measurement of the cervix - Abramowicz

What is the definition of a short cervix?

- It depends on patient history and gestational age
  - >30mm, no intervention
  - <25mm = interventions offered
    - 25-29mm =?

The definition of a sonographic short cervix is dependent on the patient population.

- Low-risk asymptomatic patients
- High-risk singleton gestations
- Multiple gestations
- Patients in preterm labor
Low-risk patients

<15 mm
50% risk of preterm birth
<32 weeks


High-Risk Patients
(History of Preterm Delivery)

<25 mm
At least 6-fold relative risk of preterm birth
<35 weeks


Measurement of the cervix - Abramowicz
Measurement of the cervix - Abramowicz

Conclusion: In women with a short cervix, who are otherwise low risk, we could not show a significant benefit of progesterone in reducing adverse neonatal outcome and PTB.

Currently, there is insufficient evidence to recommend routine screening of asymptomatic or symptomatic pregnant women with TVU CL. ... there is a non-significant association between knowledge of TVU CL results and a lower incidence of PTB at less than 37 weeks in symptomatic women.

Unanswered questions

- What happens after the diagnosis of a short cervix – is follow up ultrasound indicated?
- How often?
- What about patients with cerclage?
- What about multiple gestations?
- Should an amniocentesis be offered?
- Should all patients with a short cervix be examined or evaluated in L&D triage?

322 abstracts, of which 293 were excluded (did not meet eligibility criteria). Remaining 29 studies: reviewed in detail.

...cervical length measured by transvaginal ultrasonography in asymptomatic high-risk women is predictive of spontaneous preterm birth. The most common cervical length cut-off was <25 mm and the most common gestational age of preterm birth was less than 35 weeks’ gestation.
Measurement of the cervix - Abramowicz

Amniocentesis?
- Considering cerclage and <24 weeks = yes
- <24 weeks and no cerclage = yes
- Asymptomatic non-measurable cervix = yes
- Asymptomatic >24 weeks = maybe if sludge is present?
- Symptomatic >24 weeks = yes

A SONOGRAPHIC SHORT CERVIX AS THE ONLY CLINICAL MANIFESTATION OF INTRA-AMNIOTIC INFECTION

Objective: To determine the rate of microbial invasion of the amniotic cavity (MIAC) and intra-amniotic inflammation in asymptomatic patients with mid-trimester short cervix (<25mm)

Cervix<25mm, 14-24 weeks
Inflammation/infection* found in 9% (5 of 57)
Treatment with Azithromycin, iv, 7d and repeat culture negative
75% (3) delivered at term; 25% (1) delivered preterm

*U. Urealyticum and F. nucleatum

Amniocentesis for Selection Before Rescue Cerclage

Cervix with an internal os dilated at least 2 cm and 50% effaced, with membranes visible at the external os.
Transabdominal amniocentesis offered.
Rescue cerclage after amniocentesis: significantly longer mean admission-to-delivery interval, higher mean GA at delivery, higher mean BW, higher neonatal survival rate than group with rescue cerclage w/o amniocentesis and group w/no cerclage after amniocentesis (P < .001).
CONCLUSION: Amniocentesis before rescue cerclage identified women w/ subclinical chorioamnionitis who would not benefit from cerclage.
**Amniotic fluid inflammation with negative culture and outcome after cervical cerclage**

Objective: To determine whether amniotic fluid inflammation in the absence of infection is associated with adverse pregnancy outcomes.

Intra-amniotic concentrations of IL-6 >11.3 ng/mL was associated with significantly shorter interval from cerclage to delivery and increased rate of neonatal death compared to controls.

Intra-amniotic IL-6 concentrations may help identify those at higher risk of early preterm delivery with non-elective cerclage.

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**Amniotic Fluid “Sludge”**

Dense aggregates of particulate matter in close proximity to the internal cervical os.