Cervical length: How to measure and what to do?

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Normal cervical length between 14 – 28 weeks

CL not affected by parity, race/ethnicity or maternal height
Definition of short cervix

- CL by transvaginal ultrasound (TVU) at 16-28 weeks is
  - $\leq 20$ mm in women with no h/o preterm delivery
  - $< 25$ mm in women with a h/o prior preterm delivery

- CL < 25mm (10%ile) in 2nd trimester is associated with ↑ risk of spontaneous PTB
  - Especially < 24 weeks
  - Especially with h/o prior PTB

- NO threshold value below which preterm delivery ALWAYS occurs
  - Iams et al NEJM 1996: at 24 weeks
    - Only 18% women with CL < 25mm delivered < 35 weeks
    - Only 50% women with CL < 13 mm (1st %) delivered < 35 weeks
  - Vaisbuch et al: AJOG 2010
    - 75% women with no measurable CL at 14-28 weeks delivered < 32 weeks

- Change in CL over time (up or down) also predictive
Cervical length screening

- Controversial who should be screened
- 2013 Cochrane review: insufficient evidence to recommend routine cervical length screening for all pregnant women
  - Trials evaluated did not have clear protocol for management and had heterogeneous populations
  - Factors that affect performance of CL screening include:
    - Prior PTD
    - Singleton/multiple gestation
    - Symptomatic vs. asymptomatic
    - Prior cervical surgery
    - Intact vs. ruptured membranes
Guidelines from national organizations

- SMFM 2012: “cervical length screening in singleton gestations w/o prior PTB cannot yet be universally mandated.” But implementation of such a screening strategy can be viewed as reasonable.

- ACOG Practice Bulletin 2012: neither mandated universal screening in women w/o prior PTB nor recommended against such screening. However, in women undergoing OB US, ACOG recommends that the cervix be examined when clinically appropriate and technically feasible.

- Society of Obstetricians and Gynaecologists of Canada (SOGC) 2011: routine TV CL assessment was not indicated in women at low risk
Singletons: interventions are available to reduce chance of PTB
Singleton, no prior preterm birth

- Single exam at 18-24 weeks
- CL ≤ 20 mm (1% screen positive)
- Vaginal progesterone 90 – 200 mg until 36 weeks
  - ↓ PTB by 40% and ↓ neonatal morbidity and mortality*
- Appears cost-effective**

**Cahill et al AJOG 2010, Werner et al Ultrasound Obstet Gynecol 2011
Singleton, no prior preterm birth cont’d

- Pessary:
  - 2012 RCT cervical pessary or expectant management for CL ≤ 25 mm at 20-23 weeks*
  - Delivery < 28 weeks: 4/190 (2%) vs. 16/190 (8%): OR 0.23, 95% CI 0.06-0.74
  - Delivery < 34 weeks: 12/190 (6%) vs. 51/190 (27%): OR 0.18 95% CI 0.06-0.37
  - Caveat: open-label design, no placebo control, relatively small #s PTBs

- Cerclage
  - Not recommended without h/o prior SPTB
  - Meta-analysis

*Goya et al. Cervical pessary in pregnant women with a short cervix (PECEP) Lancet 2012
Singleton, prior preterm birth

Berghella approach to TVU CL screening of singletons

<table>
<thead>
<tr>
<th>Past pregnancy hx</th>
<th>TVU CL screening</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior PTB 14-27 wks</td>
<td>Between 14-24 weeks</td>
<td>Every 2 weeks as long as CL $\geq$ 30 mm*</td>
</tr>
<tr>
<td>Prior PTB 28-36 wks</td>
<td>Between 16-24 weeks</td>
<td>Every 2 weeks as long as CL $\geq$ 30 mm*</td>
</tr>
<tr>
<td>No prior PTB but risk factors for cervical insufficiency</td>
<td>One exam 18-24 weeks</td>
<td>Once**</td>
</tr>
</tbody>
</table>

*Increase to weekly if 25-29 mm. If < 25mm consider cerclage
**If $\leq$ 20 mm vaginal progesterone
Multiple Gestations: CL screening

- TVU CL is predictive of PTB in twins
- No definitive intervention has been shown to reduce PTB in twins with short CL
- Cerclage: not useful, and possibly harmful
- Vaginal pessary: secondary analysis of RCT (ProTWIN) including 133 twins with TVU CL < 38 mm (25th centile) at less than 23 weeks: decrease PTB*
  - Delivery < 28 w: 4% (3/78) vs. 16% (9/55): OR 0.23 95% CI 0.06-0.87
  - Delivery < 32 w: 14% (11/78) vs. 29% (16/55): OR 0.49 95% CI 0.24-0.97
  - Composite poor perinatal outcome: 12%(9/78) vs. 29% (16/55): OR 0.40 95% CI 0.19-0.97

*Liem et al Lancet 2013
Multiple Gestations: CL screening

- Progesterone for twins?
- *Meta-analysis 13 trials including 3,768 women
  - Vaginal progesterone or 17-OHP vs placebo or non-intervention in 2\textsuperscript{nd}-3\textsuperscript{rd} trimester
    - In subgroup with CL ≤ 25 mm at < 24 weeks:
      - 17OHP not beneficial in reducing PTB or adverse perinatal outcome in 175 women
      - Vaginal progesterone not beneficial in reducing PTB < 34 weeks in 58 women but was associated with a significant 43% decrease in adverse perinatal outcome
- **Another meta-analysis also showed no prevention PTB but showed decrease in composite neonatal morbidity and mortality in 51 twins with a TV CL ≤ 25 mm in 2\textsuperscript{nd} trimester
- Trends in both showed decrease PTB (ns) which may be significant in larger studies

*Schuit E et al BJOG 2014   ** AJOG 2012
If you are performing CL screening, do it right!

<table>
<thead>
<tr>
<th>Study</th>
<th>&quot;Failed&quot; Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm Prediction Study (MFMU Network)</td>
<td>20%</td>
</tr>
<tr>
<td>SCAN Trial (MFMU Network)</td>
<td>15%</td>
</tr>
<tr>
<td>NuMOM2b Network</td>
<td>30%</td>
</tr>
<tr>
<td>CerviLenz Study</td>
<td>11.5%</td>
</tr>
<tr>
<td>PREGNANT trial</td>
<td>10%</td>
</tr>
</tbody>
</table>

Multiple studies demonstrate that a surprisingly high percentage of incorrect images were submitted during image review even after training for cervical length measurements.
If you are performing CL screening, do it right!

The CLEAR program provides:

1. Free course on cervical length measurements
2. Web-based examination
3. AMA PRA Category 1 CME credits or SDMS CME credits
4. Cervical length image review
5. Documentation of completion of the CLEAR program for participants completing the course, exam, and image review

The CLEAR program costs and options:

<table>
<thead>
<tr>
<th>CLEAR Registration Options</th>
<th>Cost</th>
<th>ACOG Credit</th>
<th>SDMS Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures Only</td>
<td>Free</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Lectures &amp; Examination</td>
<td>$75</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>plus Image Review</td>
<td>$75</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Total Program Cost / CME</td>
<td>$150</td>
<td>2.5 hours CME</td>
<td>3.0 hours CME</td>
</tr>
</tbody>
</table>

Please contact us if you have suggestions or questions at CLEARSupport@perinatalquality.org.
Transvaginal Cervical Sonography

Illustration by James Cooper MD
Found in Callen, 4th edition
Sonographic Landmarks for Cervical Length
Cervical Scan Technique

- Check the Equipment
  - Appropriately cleaned
  - Use 5 to 7 MHz endovaginal probe
    - Don’t use 8 MHz – poor tissue penetration
  - Make sure the image is set to “EV”
    - Not OB or Abd
Cervical Length – How to do it

• Minimal urine in bladder
• Slowly introduce probe; when you meet the cervix, pull back until image blurs then reapply with the slightest pressure
• Take 3 measurements and use “shortest best”
  • Do not take average because 1st measure is often 3-5mm longer than 2nd and 3rd
• Scan should last at least 5 min to observe any dynamic changes such as funneling
Cervical Scan Technique

- Look in top ½ of image for maternal bladder & amniotic fluid

- Find these landmarks in sequence:
  - Amniotic Fluid & Fetus → Bladder → Internal Os → Cervical Canal, and then → External Os
  - Rotate probe to see best long axis view of the canal

- Anterior and posterior cervical width is same

- Entire canal well seen

- Both internal and external os identified

- Measure length repeatedly until ▲ is < 10%
Where to Put the Calipers?

- Where the anterior and posterior walls of the canal touch
- Spend enough time to see whether a small echolucent area is stable or is going to open up
Measurement of the Cervix

A is the Funnel length

B is the Cervical length

C_Ant Lip should = C_Post Lip

Berghella et al; Ultrasound Obstet Gynecol 1997
Burger et al; Ultrasound Obstet Gynecol 1997
Normal Cervix

- Bladder
- Fetal Head
- Posterior Cervical Lip
- Int Os
- Ext Os

Dist = 2.55cm
Cervical Shortening

- Cervical shortening generally follows a pattern which is a continuum
- Zilianti – “Trust your vaginal ultrasound”
T-shape / No funneling
Y-shaped funnelling
V- shaped Funneling
Funneling

ULTRASOUND
The 2 F words: Funnelling and Fundal Pressure

- Funnelling is not as strong a predictor of PTB as cervical length – which is affected anyway if funneling is present

- Fundal pressure changes:
  - Some studies show relationship with PTB – others, not
One or Two Measurements?
Don’t Trace to Measure the Cervical Length

If the $\Delta$ is $> 3$ mm, use two measures
Can one effectively screen with TA scans?

- Friedman. Am J Obstet Gynecol April 2013

- If CL >3.5cm by TAS, 96% chance the TVS will show CL >2.5cm.

- If <3.5cm by TAS, 40% specific but 100% sensitive for CL <2.5cm
Cervical Length in patients with preterm contractions

- CL to identify which patients are really in preterm labor
- 216 pts with painful preterm contractions (24-36 wks)
  - 43 pts – cervical length < 1.5 cm
    - 16 of these (37%) delivery < 7 days
- However, 132 had CL > 1.5 cm and only one delivered with 7 days
- Negative predictive value of > 99%

Tsoi et al Ultrasound Obstet Gynecol 2003
Cervical length in threatened PTL in singletons with intact membranes

<table>
<thead>
<tr>
<th>CL</th>
<th>Delivery within 48 hrs</th>
<th>Delivery within 7 days</th>
<th>Delivery &lt; 35 wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 mm</td>
<td>9/20 (45%)</td>
<td>16/20 (80%)</td>
<td>17/20 (85%)</td>
</tr>
<tr>
<td>6-10 mm</td>
<td>8/28 (28.6%)</td>
<td>12/28 (42%)</td>
<td>16/28 (57%)</td>
</tr>
<tr>
<td>11-15 mm</td>
<td>4/47 (8.5%)</td>
<td>14/47 (30%)</td>
<td>21/47 (44.7%)</td>
</tr>
<tr>
<td>16-20 mm</td>
<td>0/76 (0%)</td>
<td>0/76 (0%)</td>
<td>5/76 (6.6%)</td>
</tr>
<tr>
<td>&gt; 20 mm</td>
<td>0/339 (0%)</td>
<td>1/339 (0.3%)</td>
<td>17/339 (5.0%)</td>
</tr>
</tbody>
</table>

Tsoi E, et al. Ultrasound Obstet Gynecol 2005
CL and preterm contractions

- Ultrasound Obstet Gynec 2010;35:54-64
- If cx is > 3 cm, <5% deliver < 1 wk
Bottom line

- CL screening still controversial but reasonable
- Must know HOW to measure CL accurately
- Consider CLEAR training
- Singletons: options for intervention may include vaginal progesterone, pessary, cerclage (if high risk)
- Multiples: not conclusive but ? pessary ? vaginal progesterone are reasonable approaches