Why Measure the Cervix?

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a. Preterm birth prediction and prevention

b. Society recommendations

c. It's fun

d. There's no good reason

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Preterm birth prediction and prevention

- **Risk factors**

    - History of preterm birth
    - Short cervix (usually defined $\leq$25mm)
    - *History + short cervix = highest risk*

Disease prediction & prevention

- **Approaches**

  - **Primary**
    - Protect healthy people from developing the disease
      - Education, lifestyle changes, nutrition, etc
  - **Secondary**
    - Early detection to slow or halt disease
      - Screening useful *only if specific requirements are met*
  - **Tertiary**
    - Manage when disease occurs
      - Typical allopathic approach, but often too late

Disease prediction & prevention

- **Approaches**

Relatively ineffective for preterm birth

Effective for preterm birth if specific requirements are met

Completely ineffective for preterm birth

Preterm birth prediction & prevention

- **Requirements of a screening test**

  - **Disease**
    - Clinically important, clearly defined, with a well known prevalence and recognizable early asymptomatic phase

  - **Technique**
    - Well described, safe and acceptable, has a reasonable cutoff identified, reproducible results (reliable), and accurate results (valid)

  - **Cost-effective & feasible intervention is available**
    - Early intervention is effective, screening and treating abnormals is cost-effective, facilities for screening and treatment are readily available

Preterm birth prediction & prevention

- **Cervical length as a screening test**

Criterion: Disease	Comments
Disease is clinically important	PTB is leading global cause of perinatal morbidity/mortality
Disease is clearly defined	Birth <37weeks
Disease prevalence is well known	~10% worldwide
Disease natural history is known / Recognizable early asymptomatic phase	Cervical length inversely related to sPTB risk, and early cervical change (e.g. funneling) is identifiable

Preterm birth prediction & prevention

- ## Cervical length as a screening test

Criterion: Technique	Comments
Screening technique well described	Several articles document technique
Screening is safe and acceptable	Multiple studies confirm safety and patient acceptability
A reasonable cutoff is identified	In US population, 20mm is the 5th percentile, 25mm 10% percentile*
Results are reliable (reproducible)	<10% intra- and inter-observer variability
Results are accurate (valid)	Better than manual exam; predictive in all populations studied

*Iams JD, Goldenberg RL, Meis PJ et al, The length of the cervix and the risk of spontaneous premature delivery. NICHD MFMU Network. N Engl J Med 1996

Preterm birth prediction & prevention

- **Cervical length as a screening test**

Criteria: Intervention, cost-effectiveness, feasibility	Comments
'Early' intervention is effective	RCTs and meta-analyses show benefit of vaginal progesterone*
Screening and treating abnormals is cost-effective	Studies support cost-effectiveness^
Facilities for screening are readily available	Standard to offer USN for fetal anatomy screening at 18-24 weeks
Facilities for treatment are readily available	Vaginal progesterone is easy to obtain and administer as outpatient, pessary and cerclage are available at specialized centers

*Romero, Nicolaides, Conde-Agudelo et al, Vaginal progesterone decreases preterm birth ≤34 weeks of gestation in women with a singleton pregnancy and a short cervix: an updated meta-analysis including data from the OPPTIMUM study, UOG 2016
^Einerson BD, Grobman WA, Miller ES. Cost-effectiveness of risk-based screening for cervical length to prevent preterm birth. Am J Obstet Gynecol 2016
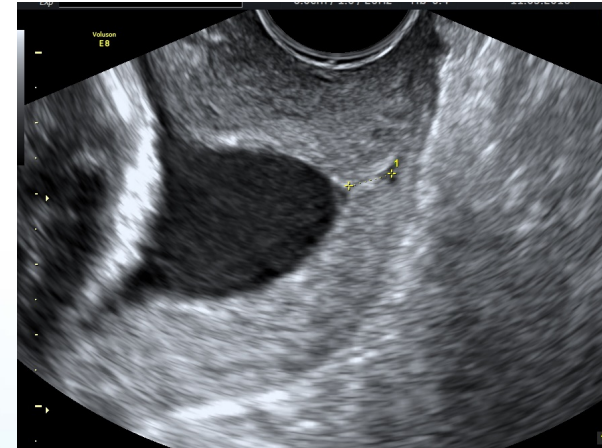
Society Recommendations

- Women with singleton pregnancy + history of preterm birth should undergo surveillance
  - grade 1A (SMFM), level A (ACOG)

- Clinicians performing and/or interpreting cervical length exams should follow a specific (transvaginal) protocol
  - grade 2B (SMFM), level C (ACOG)

- Universal screening is reasonable but not mandatory
  - grade 2B (SMFM), level B (ACOG)

- Routine screening should not be performed for multiples, placenta previa, PPROM, or after cerclage
  - grade 2B (SMFM)

SMFM Consult Series #40, The role of routine cervical length screening in selected high- and low-risk women for preterm birth prevention, 2016.
ACOG practice bulletin #130, Prediction and prevention of preterm birth 2012, reaffirmed October 2016.

Society Recommendations

- **High-risk women (history of preterm birth)**

- Measure cervical length (transvaginally) serially from 16-24 weeks*

  - $\geq$30mm: Repeat in 2 weeks

  - 25-29mm: Repeat in 1 week

  - <25mm: consider cerclage

    - Even if using 17OHPC (trend toward benefit)

  - $\leq$20mm: consider vaginal progesterone (IF declined 17OHPC^)

    - No role for combined vaginal & intramuscular

*Before 16 weeks, lower uterine segment is underdeveloped, after 24 weeks interventions are limited
^Level A recommendation is 17OHPC weekly from 16-20 weeks to 36 weeks

Society Recommendations

- **Low-risk women (including nulliparous)**

  - Measure cervical length at 18 -22 weeks (if screening)
    - <20mm: Offer vaginal progesterone
      - *No role for cerclage in most women without previous preterm birth*
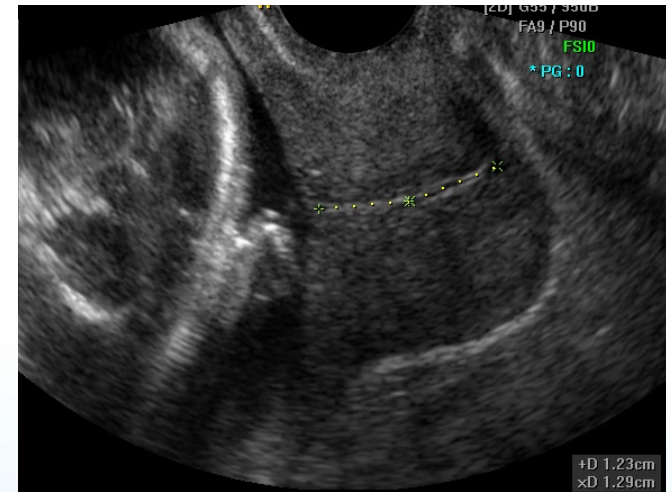
Society Recommendations

- **Acute threatened preterm labor**

  - Reasonable triage strategy*
    - $\geq$30mm: NPV 96-100% (reassuring)
    - <20mm: consider intervention (steroids, etc)
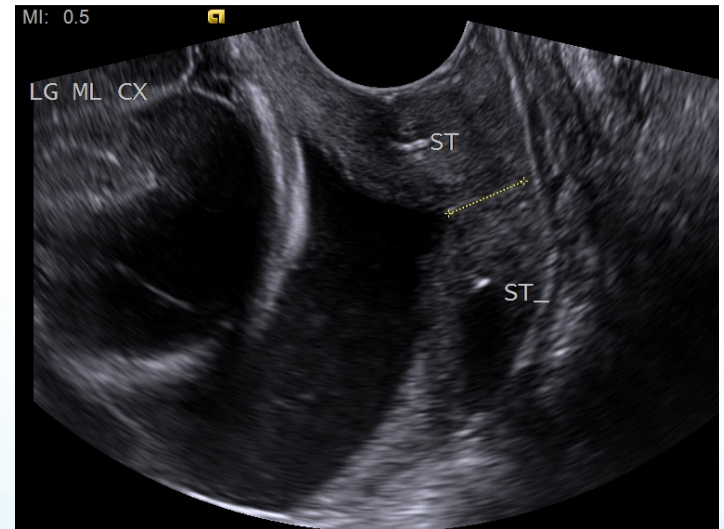   - 20-29mm: other considerations (e.g. fetal fibronectin) may be useful
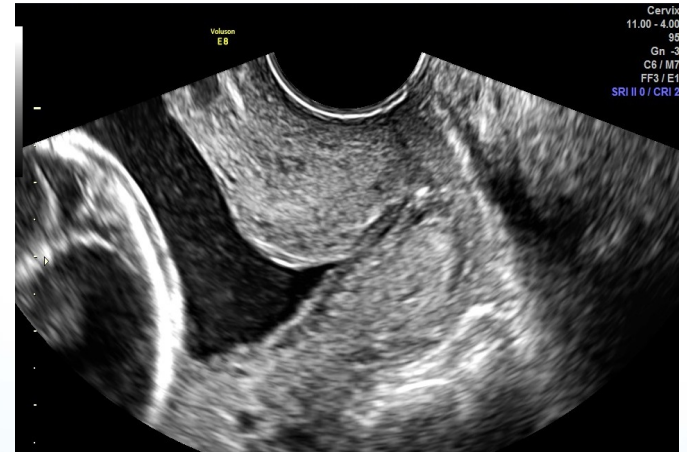
*Depends on gestational age & other factors

Society Recommendations

- **Other Applications**

- Cervical length not recommended for routine management of:
    - Cerclage
    - Placenta previa
    - Preterm premature rupture of membranes
    - Multiple gestation

Society Recommendations

- **Training (why)**

  - Incorrect measurement/ interpretation leads to over- and under-treatment

  - Surprisingly high percentage of incorrect images submitted (after training) for cervical length studies

Study	"failed" images
Preterm Prediction Study (MFMU Network)	20%
SCAN Trial (MFMU Network)	15%
NuMOM2b Network	30%
CerviLenz Study	11.5%
PREGNANT Trial	10%

Society Recommendations

- **Training (how)**

  - Recommended for all who perform and/or interpret images

    - CICAR (Perinatal Quality Foundation/SMFM, USA)
      - https://clear.perinatalquality.org

    - The Fetal Medicine Foundation (Fetal Medicine Foundation, UK)
      - https://fetalmedicine.org

Why Measure the Cervix (Summary)

a. **Meets criteria for effective screening test**

b. **ACOG and SMFM recommendations**

cIeaR Training

- **Didactic (2 lectures)**

- **Online image review/practice**

- **Image review submission**
  - **Submit 5 images (5 different exams)**
    - Datasheets online www.perinatalquality.org
    - Upload or mail images
    - Receive results by email
    - Review image scores online
  - **If unsuccessful, resubmission**
    - 3 images if cumulative score 60-79%, or if lack of success due to a single image or criterion)
    - 5 images if cumulative score <60%

CLEAR Training

CLEAR Image Review Questions (n=9)	YES	NO
Transvaginal Image	⊙	O
Cervix Occupies 2/3 of Image	O	⊙
Anterior = Posterior Width	⊙	O
Maternal Bladder Empty	O	⊙
Internal Os Seen	⊙	O
External Os Seen	⊙	O
Cervical Canal Seen Throughout	⊙	O
Caliper Placement Correct	⊙	O
Cervix Mobility Considered	⊙	O
	7	2

Score = 7/9

clea**R** Training

- **Criteria for success**

  - Cumulative score $\geq$80%
  - Each image scores at least 7
  - No single criterion is missed on every image
  - All 5 images from different women (not duplicates)

cleaR Training

- **Internal quality review**

  - All batches with cumulative score of 65-79% evaluated by senior reviewer
  - Senior reviewer determines final score
  - Random 5% of submitted batches sent to all reviewers for scoring (internal control)

cleaR Training

BOX 1

Steps for proper cervical length measurement

(1) Ensure patient has emptied her bladder.
(2) Prepare the cleaned probe using a probe cover.
(3) Gently insert the probe into the patient's vagina.
(4) Guide the probe into the anterior fornix.
(5) Obtain a sagittal, long-axis image of the entire cervix.
(6) Remove the probe until the image blurs and then reinsert gently until the image clears (this ensures you are not using excessive pressure).
(7) Enlarge the image so that the cervix occupies two thirds of the screen.
(8) Ensure both the internal and external os are seen clearly.
(9) Measure the cervical length along the endocervical canal between the internal and external os.
(10) Repeat this process twice to obtain 3 sets of images/ measurements.
(11) Use the shortest best measurement.

Cervical Length Education and Review (www.perinatalquality.org/CLEAR), a program of training and certification, is offered through the Perinatal Quality Foundation.

SMFM. Role of routine cervical length screening for preterm birth prevention. Am J Obstet Gynecol 2016.