OBSTETRICS

Can transabdominal ultrasound be used as a screening test for short cervical length?

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OBJECTIVE: Universal transvaginal cervical length screening can be associated with a significant logistical burden. We hypothesized that there is a threshold cervical length measured by transabdominal ultrasound above which risk for short transvaginal cervical length is extremely low.

STUDY DESIGN: This prospective cohort study evaluated a consecutive series of women offered universal transvaginal cervical length screening during anatomy ultrasound. Transabdominal measurement of the cervix—obtained before and after voiding for each patient—was performed before transvaginal ultrasound. The study was powered to detect a transabdominal cervical length cutoff with 95% sensitivity (95% confidence interval, 90–99%) for transvaginal cervical length of ≤25 mm.

RESULTS: One thousand two hundred seventeen women were included in the analysis. Prevoid transabdominal cervical length ≤36 mm detects 96% of transvaginal cervical lengths ≤25 mm with 39% specificity. A prevoid transabdominal cervical length ≤35 mm detects 100% of transvaginal cervical lengths ≤20 mm with 41% specificity. Transabdominal images of the cervix could not be obtained in 6.2% of women prevoid and 17.9% of women postvoid.

CONCLUSION: Transabdominal cervical length screening successfully identifies women at very low risk for short transvaginal cervical length. Transabdominal screening may significantly reduce the burden of universal cervical length screening by allowing approximately 40% of women to avoid transvaginal ultrasound. To ensure high sensitivity of transabdominal screening, approximately 60% of patients will still require a transvaginal study.

Key words: cervical length screening, prematurity prevention

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Two randomized trials demonstrated that vaginal progesterone reduces the risk of spontaneous preterm birth in women with short midtrimester cervical length diagnosed by transvaginal (TV) ultrasound.[1,2] However, the prevalence of a short cervix in a general obstetric population is low.[1-3] Although recent decision analyses found universal TV ultrasound and treatment with vaginal progesterone to be cost effective,[4,5] universal screening requires a significant dedication of resources that may not be available at all centers. Universal screening would entail performing millions of additional transvaginal studies annually in the United States.

★ EDITORS' CHOICE ★

Some research studies have suggested that assessment of the cervix by transabdominal (TA) ultrasound may be a useful initial screening test to detect short cervix diagnosed by TV ultrasound[6,7] thereby more efficiently identifying candidates for vaginal progesterone. However, other studies have found TA ultrasound screening to be a poor test for detecting short cervix (Table 1).[8,9] Disagreement in the literature regarding the sensitivity of TA screening may be secondary to the relatively small numbers of patients with short cervix included in each study because of the rare occurrence of this condition in an unselected population.

We hypothesized that there is a threshold cervical length measured by TA ultrasound above which the risk of short cervical length (≤25 mm) measured by TV ultrasound is extremely low. To test this hypothesis we determined (1) the proportion of women in whom maternal cervical length could be imaged adequately by TA ultrasound at 18 to 24 weeks' gestation; and (2) the test characteristics for TA ultrasound as a screening test to detect women with short cervix on TV ultrasound within a universal screening protocol. The identification of a TA cervical length threshold above which TV ultrasound does not have to be performed has the potential to reduce the clinical burden posed to prenatal ultrasound units by universal TV cervical length screening.

Materials and Methods

This prospective cohort study evaluated consecutive patients who underwent anatomy ultrasound in the maternal-fetal medicine division at the Hospital of the University of Pennsylvania between January 2012 and June 2012. Approval for this study was granted by the institutional review board of the University of Pennsylvania (protocol no. 815974). Cervical length measurement data were prospectively collected as part of a qual-

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TABLE 1
Major recent studies comparing TA and TV ultrasonographic cervical length assessment

Study	Gestational age	Number of patients	Bladder status during TA assessment	Mean TA cervical length	Mean TV cervical length	Main findings
Hernadez-Andrade et al[9]	Mean: 24.4 wks Range: 6.3–39 wks	220	Prevoid	34.6 mm	34.8 mm	TA ≤25 mm 43% sensitive for TV ≤25 mm. TA ≤30 mm 57% sensitive for TV ≤25 mm.
Stone et al[7]	Range: 18–20 wks	203	Postvoid	36.6 mm	39.1 mm	In discrepant cases, TA measurements ≤33 mm were shorter than TV measurements in 97% of cases.
Saul et al[6]	Range: 14–34 wks Mean: 22.2 wks	191	Postvoid	35.7 mm	36.1 mm	TA ≤30 mm 100% sensitive for TV ≤25 mm. TA ≤33 mm 100% sensitive for TV ≤30 mm.
To et al[8]	Range: 22–24 wks Mean: 23 weeks	149	Bladder volume calculated	34 mm	37 mm	Cervix visualized transabdominally in 49% of cases overall. Visualization more likely with increased bladder volume.

TA, transabdominal; *TV,* transvaginal.

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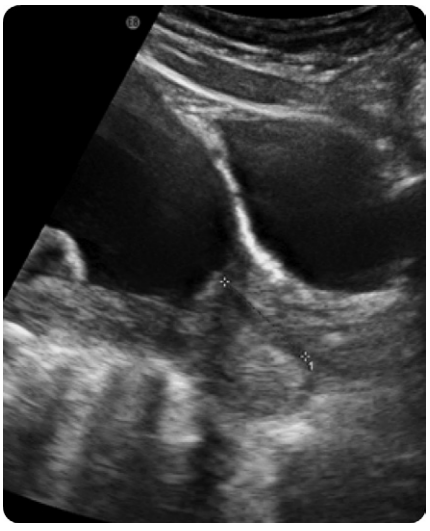
ity assurance initiative. Demographic and medical data were collected through review of electronic medical records.

At the study center TV assessment of the cervix was offered as routine care during anatomy ultrasound. Patients were included if they were between 18 weeks' 0 days' and 23 weeks' 6 days' gestational age and had a singleton gestation at the time of examination. Patients beyond 23 weeks' 6 days' gestational age were excluded because prior studies have not evaluated the benefit of initiating vaginal progesterone beyond this gestational age.[1,2] Two other categories of women were excluded: (1) women with cerclage already in place and (2) women with a prior spontaneous preterm birth already receiving 17-alpha hydroxyprogesterone caproate (17P) who were either not eligible or would not elect for cerclage if found to have a short cervix (based on the findings of Owen et al[10]). Ultrasound is not offered to these patients because detection of a short cervix would not alter preterm birth prevention strategies. For women with a prior preterm birth who would undergo cerclage if found to have a short cervix, only the TV ultrasound performed during fetal anatomic survey at 18-24 weeks was included in this analysis.

For each patient included in the study, prevoid and postvoid TA cervical length measurements were performed before TV ultrasound. Patients were given instructions during prenatal care to refrain from voiding in the 2 hours before their study. Pre- and postvoid measurement were obtained because some experts have expressed concern that bladder status may affect TA measurement.[9] Sonographers were instructed that if TA cervical length measurements were not readily attainable, the examination time of the study should not be extended to allow bladder filling and TA views should be noted as unobtainable.

Before including patients in the study, sonographers received an in-service training program, which reviewed landmarks for assessing the cervix transabdominally based on the study by Saul et al.[6] Sonographers were instructed to obtain TA images in the midsagittal plane obtaining the following landmarks: the cervical/vaginal interface, the internal cervical os, the external cervical os, the outline of the cervical corpus, and the full length of the cervical canal. TA as-

FIGURE 1
Prevoid TA cervical length



TA, transabdominal.

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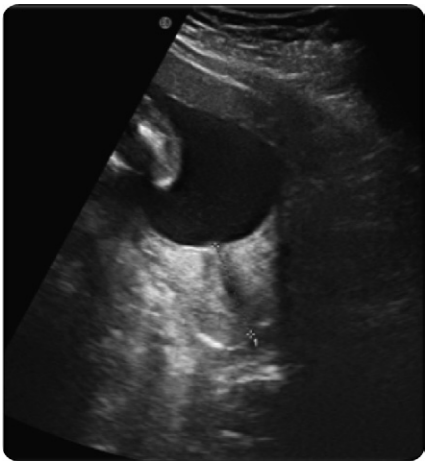
FIGURE 2
Postvoid TA cervical length



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