

Transvaginal Ultrasound as an Indicator of Preterm Birth

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Abstract

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Preterm Birth is delivery that occurs when the mother's gestational age is 20-36 weeks starting from the first day of the last menstrual period with a fetal weight still below 2500 grams. In preterm birth there are regular uterine contractions that cause thinning or dilation of the cervix before 36 weeks of gestation is complete. Approximately 50% of sequelae that occur in children are due to preterm birth. It is known that cervical dilatation in pregnant women is associated with preterm birth, so there are several screening methods that are used to predict preterm birth, including cervical length examination. Transvaginal ultrasound examination is a safe method of examination to measure cervical length objectively. Cervical length less than or equal to 25 mm or cervical dilatation 70% to 100% are expected to have preterm birth.

Introduction

Preterm birth is when birth happens prematurely between 20 – 36 weeks of pregnancy. It is thought that preterm birth accounted for about 9,5% of all births worldwide. Preventions that are being done to inhibit the labor are administering tocolytic drugs. It could be subsequently classified based on clinical presentation, including preterm premature rupture of membrane (PPROM), spontaneous preterm birth, or preterm birth due to maternal or fetal reasons. Risk factors of this preterm birth are the history of previous preterm birth, preeclampsia, multiparities, premature rupture of membrane, and length of the cervix.¹ Measurement of cervical length using transvaginal ultrasonography has been proven to predict preterm birth in low risk asymptomatic women and pregnant women with threatened preterm birth.

The annual birth rate in Indonesia reaches 5 million births every year, with a maternal mortality rate of 126 deaths in

100,000 birth, one of the highest in South East Asia in 2017.² One of the developmental goals needed to be reached in 2030 could be implementing sustainable development goals (SDGs). One priority program that reflects a country's healthcare developmental level and quality of life is the neonatal mortality rate as one indicator. Based on the Demographic and Health Status Survey in Indonesia in 2017, the neonatal mortality rate was 15 for every 1000 live birth, while the children mortality rate was 24 for every 1000 live birth. The leading cause of this perinatal morbidity and mortality is preterm birth.

Literature Review

Transvaginal Ultrasonography

Transvaginal ultrasonography is a method to assess pregnancy conditions and women's reproduction organs by introducing a probe stick of 5-7,5 cm long into the vagina. The probe will radiate high-frequency sound waves to bring the images of internal organs into the monitor.

Transvaginal ultrasonography itself has a higher resolution of 5-7,5Mhz than abdominal ultrasonography. To increase the picture quality, transvaginal ultrasonography uses a vagina anatomical approach to reduce the distance between probe and pelvic structure.

Preterm birth

As mentioned before, preterm birth is when birth happens prematurely between 20 – 36 weeks of pregnancy with a fetal weight under 2500 grams. A regular and continuous contraction causes the cervix to thin and dilate before 36 weeks.

One of the most significant issues with infant morbidity and mortality is preterm birth.³ There have been several attempts in the last few decades to increase the survival of low-birth-weight neonates. Some include using a corticosteroid, increasing mechanical ventilation, administering exogen surfactants, and nutritional therapy.

However, the drop in neonatal maternal nutrition is not accompanied by a reduction in the morbidity rate. It is believed that around half of all childhood sequelae are the result of premature delivery.⁴

Transvaginal Ultrasound as a Predictor of Preterm Birth

Cervical dilatation in pregnant women has long been related with premature birth; hence, numerous screening measures, including cervical examination, are employed to predict preterm birth. Several prospective cohort studies have assisted in determining the mean cervical length of pregnant women at risk of preterm birth.⁵ Pregnant women with a shorter or dilated cervix have an increased risk of premature delivery. With a cervical length of less than 30 mm or a cervical dilatation of 70 to 100 percent, a premature birth is likely.⁶

In recent decades, ultrasound examination (USG) in pregnant women has been the subject of numerous studies. Changes in cervical length that occur very early in asymptomatic patients are only

detectable with transvaginal ultrasonography. Examination using transvaginal ultrasound has a higher image resolution than abdominal ultrasound because the quality of transvaginal ultrasound images is unaffected by air in the intestines, obesity, or scar tissue on the abdominal wall. Transvaginal ultrasound examination is a more secure means of objectively measuring cervical length than digital examination, transabdominal ultrasound, or transperineal ultrasound.⁴

As illustrated in Figure 1, cervical dilatation commences at the internal os. The typical cervical length threshold of 25mm can be used to predict premature birth. In contrast, a cervical length of less than 25 mm before 28 weeks gestation is considered short and may signal premature birth. Pregnant women with a cervical length 25 mm and contractions had a risk of preterm birth that was double that of women with a cervical length 25 mm and no contractions.⁷

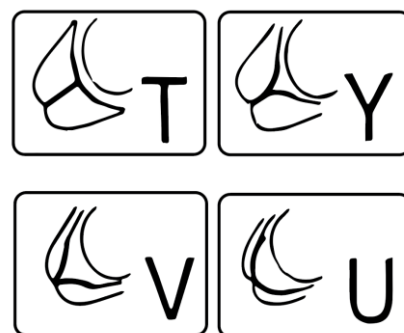


Figure 1. Schematic representation of cervical maturation from closed (T) to open (U) status⁸

Conclusion

Cervical dilatation in pregnant women has long been related with preterm birth. Changes in cervical length that occur very early in asymptomatic patients are only detectable with transvaginal ultrasonography. Examination using transvaginal ultrasound is more secure means of objectively measuring cervical length than digital examination, transabdominal ultrasound, or transperineal ultrasound.

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