

## Clinical Study

# Can Transabdominal Scan Predict a Short Cervix by Transvaginal Scan?

**Jayaraman Mavila Nambiar, Muralidhar Vaman Pai, Arevidya Reddy, and Pratap Kumar**

*Department of Obstetrics and Gynaecology, KMC, Manipal 576104, India*

Correspondence should be addressed to Jayaraman Mavila Nambiar; [drramnambiar@gmail.com](mailto:drramnambiar@gmail.com)

Received 18 February 2017; Accepted 30 March 2017; Published 9 April 2017

Academic Editor: Peter E. Schwartz

Copyright © 2017 Jayaraman Mavila Nambiar et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Background.* To determine whether transabdominal screening can be used to screen women with short cervix on transvaginal scan. *Methods.* The study was done between 18 and 20 weeks of gestation. Transabdominal scan was done and cervical length was measured. Transvaginal scan was also done and cervical length was measured. An attempt was made to find out whether transabdominal scan can be used to predict a cervical length of 25 mm by transvaginal scan. *Results.* In our study the cut-off for transabdominal scan for detecting a short cervix of 25 mm by transvaginal scan was 29 mm. A transabdominal cervical length of 29 mm could predict a short cervix of 25 mm by transvaginal scan by 100% sensitivity and 92.4% sensitivity. *Conclusion.* A cut-off of 29 mm by transabdominal scan is very accurate in predicting a short cervix of 25 mm by transvaginal scan.

## 1. Introduction

Treatment of short cervix detected by transvaginal scan by progesterones has been very effective in preventing preterm labour [1, 2]. Although cervical length was measured initially by transabdominal screening, currently the recommended method is to measure transvaginally. Transvaginal measurement of cervical length is more accurate than transabdominal measurement [3, 4]. The use of progesterone in patients with short cervix is also cost effective [3]. Incidence of short cervix in general population is extremely low requiring many women to undergo transvaginal scan [5]. Transvaginal measurement of cervical length is now a routine part of 18–20 weeks' scan. Transvaginal scan is however very uncomfortable for the patient and many refuses to undergo transvaginal scan. Some authors have suggested that transabdominal scan can predict a short cervix by transvaginal scan [6]. Some other studies have found futility of transabdominal scan in predicting a short cervix by transvaginal scan [7]. Hence, we conducted a study to find out the correlation between cervical length by transabdominal scan and transvaginal scan. Both transabdominal and transvaginal scan were done to determine the cervical length. An attempt was made to find out which cervical length by transabdominal scan that would

predict a transvaginal cervical length of less than 25 mm. The main aim of study was to find out whether transabdominal scan can predict a cervical length of 25 mm by transvaginal scan.

## 2. Materials and Methods

The study was conducted as a prospective observational study in a tertiary care hospital between October 2014 and September 2016. Institutional ethical committee clearance was taken (IEC number: IEC 662/2014). Informed consent was obtained from all patients. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. All uncomplicated singleton pregnant women between 18 and 20 weeks entered the study. Patients with multiple gestation, fetus with anomalies, and intrauterine death were excluded from the study. Cervical length was measured at the time of the scan both transabdominally and transvaginally. Philips HD 11XE machine was used for the scan. Transabdominal scan was done by 5 MHz probe and transvaginal scan was done with 8 MHz probe. In transabdominal scan a mid-sagittal section of cervix was obtained and cervical length

TABLE 1: Total number of scans done.

|                                  | Transabdominal scan + transvaginal scan (cases) | Declined transvaginal scan |
|----------------------------------|---|----------------------------|
| Total number of scans done (513) | 474 (92.39%)                                    | 39 (7.60%)                 |

TABLE 2: Demographic characteristic of the study population.

|  |                    |
|--|--------------------|
| Mean age of the study population             | 27.27 ± 4.87 years |
| Mean gestational age at the time of scan     | 19.66 ± 0.28 weeks |
| Mean gestational age at the time of delivery | 38.01 ± 1.89 weeks |
| Primigravida                                 | 366                |
| Multigravida                                 | 108                |

was measured from internal os to external os. Patients who underwent transabdominal scan had their bladder half filled. In transvaginal scan probe was placed in anterior fornix and cervical length was measured from internal os to external os after magnifying the image. Cervical length of 25 mm by transvaginal scan was defined as short cervix. An attempt was made to correlate the cervical length by transabdominal scan which can predict a transvaginal cervical length of 25 mm. Data was analysed by SPSS 16 software. The aim of the study was to find out whether transabdominal scan predict a short cervix of 25 mm by transvaginal scan. The configuration of internal os was not considered in this study.

### 3. Results

A total of 513 patients underwent scan. Out of which only 474 (92.3%) were willing to undergo both transabdominal and transvaginal scans (Table 1). The demographic characteristic of the study population is described in Table 2. Mean cervical length obtained in our study is mentioned in Table 3. The mean cervical length was shorter in both transabdominal and transvaginal group if they had preterm labour (Table 3). A cervical length of 25 mm is considered as short cervix. We constructed a ROC curve to find out which cervical length by transabdominal scan would describe a cervical length of 25 mm (Figure 1). A cervical length of 29 mm by transabdominal route would predict a cervical length of 25 mm with 100% sensitivity and 92.4% specificity.

### 4. Discussion

A cervical length of 25 mm is said to be predictive of preterm labour. However, this is done transvaginally which is most accurate for predicting preterm labour. Transvaginal scan is uncomfortable and many patients decline this scan. We in this study tried to measure cervix transabdominally and tried to find out a value which would predict a cervical length by transvaginal scan of 25 mm. We found that a cervical

TABLE 3: Cervical length observed in our study.

|                     |         | Mean cervical length (cms) | Standard deviation (cms) |
|---------------------|---------|----------------------------|--------------------------|
| Transabdominal scan | Term    | 3.46                       | 0.45                     |
|                     | Preterm | 2.58                       | 0.48                     |
| Transvaginal scan   | Term    | 3.15                       | 0.45                     |
|                     | Preterm | 2.1                        | 0.47                     |

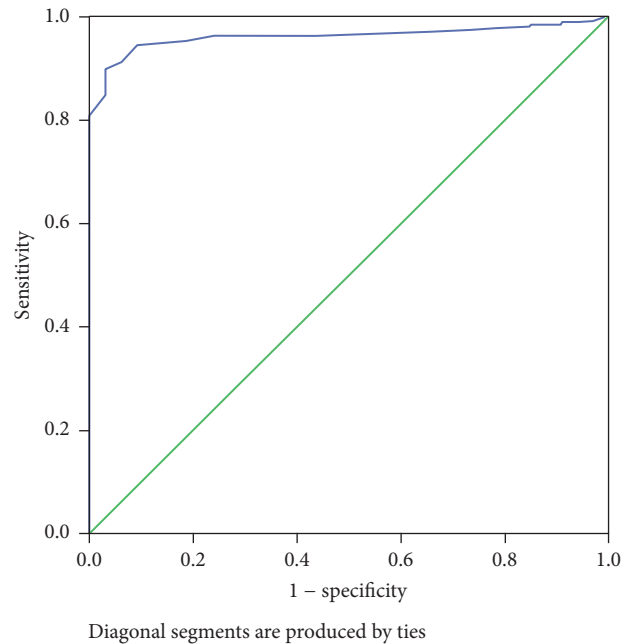


FIGURE 1: ROC curve for detecting a short cervix by transabdominal scan.

length measurement of 29 mm would accurately predict a cervical length of 25 mm transvaginally. We constructed a ROC curve and found that a cervical length of 29 mm by transabdominal scan was 100 percent sensitive and 92.2% specific for detecting a cervical length of 25 mm by transvaginal scan. Other studies have produced conflicting reports regarding the detection of short cervix by transvaginal scan and their correlation with transabdominal scan. We found that a value of 29 mm by transabdominal scan was 100% sensitive for detection for short cervix by transvaginal scan. Our study suggests that transabdominal screening predicts short cervix with reasonable accuracy. A cervical length was 29 mm by transabdominal scan which was highly sensitive for prediction of short cervix by transvaginal scan. We did not observe any difficulty in imaging the cervix by transabdominal scan in any patient. Thus, transabdominal screening can predict a short cervix and women can avoid a transvaginal scan if transabdominal scan shows a cervical length of more than 29 mm. Performing transvaginal scan for detecting a short cervix adds considerable time to the ultrasound examination. By doing transabdominal screening considerable time can be saved.

The study was done between 18 and 20 weeks of gestation. Further studies are needed to determine whether transabdominal cervical length is good beyond this gestation.

Stone et al. suggested that transabdominal cervical length was shorter at shorter transvaginal cervical lengths [8]. Saul et al. suggested that a 30 mm cut-off by transabdominal scan can predict a short cervix by transvaginal scan [6]. Hernandez-Andrade et al. however found that a transabdominal scan cervical length of 30 mm was relatively insensitive for predicting a short cervix by transvaginal scan [9]. Hernandez-Andrade et al. also observed difficulty in viewing the cervix transabdominally. Westerway et al. found that transabdominal screening is insensitive for detecting short cervix [7]. Hence, we may do initially do a transabdominal scan and if cervical length is more than 29 mm patient may be reassured without undergoing a transvaginal scan. Clement et al. reported that some women do find transvaginal scan unacceptable during antenatal scans [10]. Cervix can be easily visualised by transabdominal scan by most observers. Transvaginal screening of cervix however needs more training and sonographers are needed to do at least 50 scans before doing a transvaginal assessment of cervix [4, 11]. Transabdominal measurement of cervical length can have several confounding factors like bladder filling and presence of presenting part [12, 13]. We however did not observe any difficulty in observing the cervix transabdominally during our study. Transvaginal measurement of cervical length is an excellent way of measuring cervical length; however, many women refuse to undergo a transvaginal evaluation of cervix.

## 5. Conclusion

In our study a cervical length of 29 mm by transabdominal scan could accurately predict a short cervix of 25 mm by transvaginal scan. Hence, patients undergoing scan for cervical length may be screened with transabdominal scan and, if cervical length is more than 29 mm, may avoid a transvaginal scan which is uncomfortable for the pregnant woman.

## Conflicts of Interest

There are no conflicts of interest in this study.

## Authors' Contributions

Dr. Jayaraman Mavila Nambiar, Dr. Muralidhar Vaman Pai, Dr. Arevidya Reddy, and Dr. Pratap Kumar have been actively involved in the study, conceived and designed the experiment, and performed the experiments.

## Acknowledgments

The authors would like to thank Dr. Shripad Hebbar, Dr. Jyothi Shetty, Dr. Lavanya Rai, and Dr. Sapna V. Amin for their valuable support during the study.

## References

- [1] E. B. Fonseca, E. Celik, M. Parra, M. Singh, and K. H. Nicolaides, "Progesterone and the risk of preterm birth among women with a short cervix," *The New England Journal of Medicine*, vol. 357, no. 5, pp. 462–469, 2007.
- [2] S. S. Hassan, R. Romero, D. Vidyadhari et al., "Vaginal progesterone reduces the rate of preterm birth in women with a sonographic short cervix: a multicenter, randomized, double-blind, placebo-controlled trial," *Ultrasound in Obstetrics and Gynecology*, vol. 38, no. 1, pp. 18–31, 2011.
- [3] J. Sonek and C. Shellbaas, "Cervical sonography: a review," *Ultrasound in Obstetrics and Gynecology*, vol. 11, no. 1, pp. 71–78, 1998.
- [4] V. Berghella, "Novel developments on cervical length screening and progesterone for preventing preterm birth," *BJOG: An International Journal of Obstetrics and Gynaecology*, vol. 116, no. 2, pp. 182–187, 2009.
- [5] E. F. Werner, C. S. Han, C. M. Pettker et al., "Universal cervical-length screening to prevent preterm birth: a cost-effectiveness analysis," *Ultrasound in Obstetrics and Gynecology*, vol. 38, no. 1, pp. 32–37, 2011.
- [6] L. L. Saul, J. T. Kurtzman, C. Hagemann, M. Ghamsary, and D. A. Wing, "Is transabdominal sonography of the cervix after voiding a reliable method of cervical length assessment?" *Journal of Ultrasound in Medicine*, vol. 27, no. 9, pp. 1305–1311, 2008.
- [7] S. C. Westerway, L. H. Pedersen, and J. Hyett, "Cervical length measurement: comparison of transabdominal and transvaginal approach," *Australasian Journal of Ultrasound in Medicine*, vol. 18, no. 1, pp. 19–26, 2015.
- [8] P. R. Stone, E. H. Y. Chan, L. M. E. McCowan, R. S. Taylor, and J. M. Mitchell, "Transabdominal scanning of the cervix at the 20-week morphology scan: comparison with transvaginal cervical measurements in a healthy nulliparous population," *Australian and New Zealand Journal of Obstetrics and Gynaecology*, vol. 50, no. 6, pp. 523–527, 2010.
- [9] E. Hernandez-Andrade, R. Romero, H. Ahn et al., "Transabdominal evaluation of uterine cervical length during pregnancy fails to identify a substantial number of women with a short cervix," *Journal of Maternal-Fetal and Neonatal Medicine*, vol. 25, no. 9, pp. 1682–1689, 2012.
- [10] S. Clement, B. Candy, V. Heath, M. To, and K. H. Nicolaides, "Transvaginal ultrasound in pregnancy: its acceptability to women and maternal psychological morbidity," *Ultrasound in Obstetrics and Gynecology*, vol. 22, no. 5, pp. 508–514, 2003.
- [11] C. Vayssiere, C. Moriniere, E. Camus et al., "Measuring cervical-length with ultrasound: evaluation of the procedures and-duration of a learning method," *Ultrasound in Obstetrics & Gynecology*, vol. 20, pp. 575–579, 2002.
- [12] G. C. Mason and M. J. A. Maresh, "Alterations in bladder volume and the ultrasound appearance of the cervix," *British Journal of Obstetrics and Gynaecology*, vol. 97, no. 5, pp. 457–458, 1990.
- [13] J. E. Brown, G. A. Thieme, D. M. Shah, A. C. Fleischer, and F. H. Boehm, "Transabdominal and transvaginal endosonography: evaluation of the cervix and lower uterine segment in pregnancy," *American Journal of Obstetrics and Gynecology*, vol. 155, no. 4, pp. 721–726, 1986.