Ultrasound Evaluation of Difference in Endometrial Thickness in Infertile and Fertile Females

Shishir Kumar, Priti Kapoor, Satish Nawre

ABSTRACT

Endometrium has an important role in the success of a pregnancy, providing the site for implantation and supporting the pregnancy to fruition. There is a correlation noted between the thickness of the endometrium and the accomplishment of implantation. Endometrial thickness was measured on ultrasound examination of 50 women, who were being investigated for primary infertility and 50 age-matched healthy fertile women serving as control group, in all the three phases of the menstrual cycle. The endometrium of infertile women was found to be thinner during all the three phases of the menstrual cycle as compared with that of the fertile women in the control group. Difference in the thickness was found to be statistically significant in each phase of the menstrual cycle.

Keywords: Endometrial thickness, Infertility, Intracyclic endometrial response.

INTRODUCTION

“Infertility” is defined as failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse [The World Health Organization (WHO) – The International Committee for Monitoring Assisted Reproductive Technology glossary]. Infertility may be primary or secondary. When a woman is unable to bear any child, either due to the inability to become pregnant or the inability to carry a pregnancy to a live birth (thus, including spontaneous miscarriage/birth of a stillborn child), she would be classified as having primary infertility. When a woman is unable to bear a child, either due to the inability to become pregnant or the inability to carry a pregnancy to a live birth following a previous successful pregnancy (resulting in a live birth), she would be classified as a case of secondary infertility.

Imaging plays an important role in the workup for a case of female infertility. Ultrasound is readily available, inexpensive, noninvasive, radiation free, relatively less time consuming, and an easily repeatable mode of investigation. It helps in determining the morphology of the uterus and ovaries, in assessing the uterine and ovarian perfusion, and in evaluating endometrial thickness, volume, and vascularity among other things.

AIMS AND OBJECTIVES

• To measure intracyclical endometrial thickness in women with primary infertility during immediate postmenstrual, midcycle, and late menstrual periods.
• To measure intracyclical endometrial thickness on similar intracyclical days in age-matched group of fertile female patients.
• To compare findings in both the groups.

MATERIALS AND METHODS

Ethical clearance to conduct the study was obtained from MGM University ethical committee. Permission to conduct the study at MGM Radiology Department was obtained from MGM authorities. Written informed consent was taken from all participants. Information recorded in the questionnaire and clinical forms were used exclusively for studies. The study was carried out on females attending the outpatient department of the Department of Obstetrics and Gynecology, MGM Medical College & Hospital, Kamothe and Kalamboli, Navi Mumbai, India, who were referred to the Department of Radio-Diagnosis for ultrasonography (USG) examination.

Inclusion Criteria

About 50 women of child-bearing age matching the criteria for being diagnosed as cases of primary infertility (as per definition of infertility given by WHO) were selected with due consent and ethical clearance to study endometrial thickness on three intracyclical days, namely immediate postmenstrual, midcycle, and late menstrual period. Simultaneously, age-matched, 50 healthy fertile females coming for nonpregnancy-related complaints to the USG outpatient department, who were willing to participate in the study, were included as the control group.
Exclusion Criteria

Women with history of any previous operative manipulation, hormone replacement therapy, ovarian-stimulant drugs, and presence of any concomitant systemic disease were excluded from the study.

Detailed gynecological history about duration and pattern of the menstrual cycle was taken for each individual in both the groups of the women so as to determine the days for the USG examination for evaluation of the endometrial thickness.

The gray scale real-time USG examination was performed using GE Logiq P5 system and Philips HD 11 and HD 15 XE systems. Transabdominal scans in both groups of patients were performed using 3.5 to 5.5 MHz convex transducer.

Serial observations were recorded in both groups of patients. Analysis of findings in both the groups of women (using p value) was carried out.

RESULTS

There was significant difference in mean endometrial thickness of the two groups. In fertile women, endometrial thickness was greater than in the infertile women in all the three phases of menstrual cycle, as shown in Graph 1 and Table 1.

DISCUSSION

The prime role of the endometrium is to provide an optimal site for implantation and placentation. The functional capacity of endometrium and its ability to support a pregnancy can be assessed in many ways. Even though endometrial biopsy still remains the gold standard, physical characteristics of the endometrium can be effectively evaluated noninvasively with a USG examination and the measurement of the endometrial thickness. Many research studies have conclusively established a correlation between endometrial thickness and pregnancy outcome.3,4 Endometrial growth may be considered as a functional bioassay for ovarian hormonal activity and can be mapped with USG. The endometrium responds to rising estrogen levels that accompany folliculogenesis.5,6

Ultrasound is the best modality to measure endometrial thickness as it is noninvasive, affordable, without danger of radiation-exposure, and is easily accessible. It has high specificity and sensitivity. Transvaginal ultrasound is the more reliable method to measure the endometrial thickness. However, in our study, we have restricted our study to only transabdominal as the asymptomatic group of volunteers that served as the control group was unwilling to get subjected to transvaginal sonography. Our findings in difference between mean endometrial thickness of fertile and infertile women match well with previous studies.7

Osemwenkha and Osaikhuwuomwan8 concluded that a thicker endometrial lining is associated with higher pregnancy rates. Kader et al9 concluded that when the endometrial thickness is less than 8 mm, and the trilaminar endometrial pattern not seen, pregnancy is unlikely and embryo transfer should be cancelled and embryos frozen for future transfer to increase the success rate. Dynamic change in endometrial thickness in assisted conception cycles was first described by Rabinowitz et al.10 Using transvaginal scanning, Gonen et al11 suggested that endometrial thickness, on the day before oocyte recovery, was significantly greater in the ladies, who got pregnant later, than in those women who did not get pregnant later, and postulated that it may be a good prognostic indicator to predict the likelihood of implantation.

Khalifa et al12 reported that an endometrial thickness of 7 mm and below should be accepted as a reliable sign of suboptimal implantation potential.

CONCLUSION

Uterine receptivity is an important factor that affects embryo implantation. The two criteria for optimal uterine receptivity that are commonly used in studies are the thickness and the pattern of the endometrium, as assessed by USG. While in our study, we chose to
consider only the endometrial thickness, both endo-
metrial thickness and pattern are generally acknowl-
edged as predictors of the outcome of pregnancy.13
The endometrial thickness was measured in this study
for a group of 50 fertile and 50 infertile females in all
three phases of the menstrual cycle and the results were
compared using p value. The mean ± standard deviation
for endometrial thickness was higher in fertile females
than infertile females in all the three phases of menstrual
cycle (Graph 1, Table 1).

REFERENCES

1. World Health Organization. Sexual and reproductive health:
   Infertility definition and terminology – clinical definitions.
ductivehealth/topics/infertility/definitions/en/.
2. Ganguly S, Unisa S. Trends of infertility and childlessness in
   India: Findings from NFHS Data. Facts Views Vis Obgyn 2010
3. Check JH, Nowroozi K, Choe J, Dietterich C. Influence of endo-
   metrial thickness and echo patterns on pregnancy rates during
4. Dickey RP, Olar TT, Curole Dn, Taylor SN, Rye PH. Endometrial
   pattern and thickness associated with pregnancy outcome after assisted reproduction technologies. Hum Reprod 1992
5. Baerwald AR, Pierson RA. Endometrial development in asso-
   ciation with ovarian follicular waves during the menstrual
6. Fleischer AC, Herbert CM, Sacks GA, Wentz AC, Entman SS,
8. Osemwenkha AP, Osaikhuwomwan JA. Correlation between endometrial thickness and IVF outcome in an African popula-
   Sep;52(3):446-450.
12. Khalifa E, Brzyski RG, Oehninger S, Acosta AA, Muasher SJ. Sonographic appearance of the endometrium: the predictive
13. Kupesic S, Bekavac I, Bjelos D, Kurjak A. Assessment of endo-