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An observational study of endometrial pattern in implantation

Research Article

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Abstract

Background: *Garbhasambhav Samugri* is a concept in Ayurveda which describes factors to bring healthy offspring into the society. The *kshetra* is one of the four essential factors for the formation and development of the embryo, and the term *kshetra* is used grossly for women but is specifically used for *garbhashaya* (uterus). According to modern science, embryo implants in the endometrial lining of uterus. All components of the endometrium undergo cyclic changes which is called as endometrial cycle. The endometrial cycle prepares the endometrium for implantation of the fertilized ovum coming towards the uterus. The main changes in the endometrium are increase in thickness, growth of uterine glands and increase in thickness and fluid content of endometrial stroma. These changes are reflected as various pattern in the ultrasound. This study will give useful information about which morphological pattern of endometrium is best suitable for implantation.Objectives: The objective of this study is to understand effects of endometrial pattern on implantation, as fertilised egg implants in the endometrial lining of the uterus. Material & Methods: Anonymous data of transvaginal colour doppler ultrasound examination done, on the day of rupture of follicle of menstrual cycle, on 160 women, willing to conceive, has been collected from gynaecologist, from this collected data, results regarding endometrial pattern were derived. Results: It was observed that implantation occurs only in cases having endometrium with trilaminar pattern. Conclusion: Implantation occurs only when endometrium has a trilaminar pattern consisting of a prominent outer and central hyperechoic line and inner hypoechoic region.

Key Words: Endometrium, Endometrial pattern, Implantation.

Introduction

Garbhasambhav Samugri is a concept in Ayurveda which describes factors to bring healthy offspring into the society. The *kshetra* is one of the four essential factors for the formation and development of the embryo, and the term *kshetra* is used grossly for women but is specifically used for *garbhashaya* (uterus). (1,2,3,4,5,6,7)

According to modern science, the embryo implants in the endometrial lining of the uterus. (8)

Endometrium comprises surface epithelium, glands, stroma and blood vessels. (9)

All the components of the endometrium undergo cyclic changes under the influence of varying cyclic ovarian hormones which is called as menstrual cycle or endometrial cycle. (9) The endometrial cycle prepares the endometrium for implantation of the fertilized ovum coming towards the uterus. (8)

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The main changes in the endometrium are increase in thickness, growth of uterine glands and increase in thickness and fluid content of the endometrial stroma. (8)

These changes are divided into four phases which are menstrual phase, regenerative phase, proliferative phase and secretory phase. (9)

To study endometrial changes during endometrial cycle ultrasound is a safe, non-invasive, diagnostic tool. The changes in endometrium during these phases observed by ultrasound are as shown in fugures.

During menses, the endometrial cavity is visualised which is separated by low-level echoes representing blood and mucus (fig 1). During the early proliferative phase, the endometrium appears as a thin reflective line in the uterine cavity (fig 2). During late proliferative, endometrium is thick hyperechoic (fig 3). At ovulation, the endometrium is hypoechoic, surrounded by a prominent, highly reflective echo, giving rise to the term 'triple-line' echo sign (fig 4). Just before menstruation, the endometrium can be visualised as a thick hyperechoic structure passing centrally down the uterine cavity (fig 5).

This study will give useful information about which morphological pattern of endometrium is best suitable for implantation.

Ultrasound scans of the normal endometrium through the menstrual cycle (12)

Fig 1. Menstruation (days 1–4) - Blood is seen within the cavity.

Fig 2. Regenerative or early proliferative phase (days 1–8) - Thin endometrium. (Pattern B)

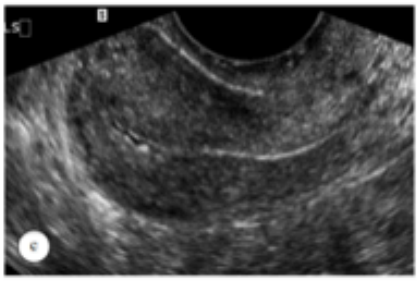


Fig 3. Late proliferative (days 9–12) - Thick, increasingly hyperechoic endometrium.

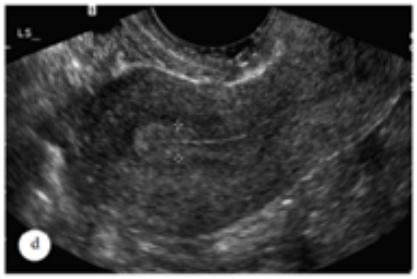


Fig 4. Periovulatory (days 12–15) - Hypoechoic with a hyperechoic rim. (Pattern A)

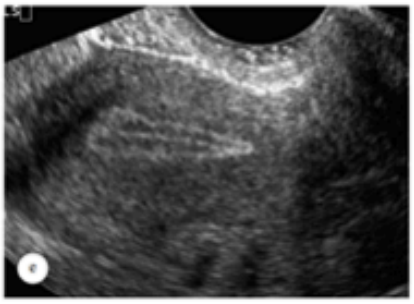


Fig 5. Secretory (day 16 to menstruation) - Irregular and hyperechoic.

Aim & Objective

Aim

Evaluate implantation rates in women having Endometrial Pattern A & Endometrial Pattern B

Objective

The objective of this study is to find out which morphological pattern of endometrium is best suitable for implantation.

Materials & Methods

This work was carried out after getting the permission from institutional ethical committee (BVDUCOA/EC/-1302 dated:19/11/2019).

Anonymous data about endometrial pattern on the day of rupture of follicle of menstrual cycle of 160 women willing to conceive using transvaginal ultrasound was collected from the gynaecologists. And also, whether she was implanted or not implanted was collected from the gynaecologists.

On this data following steps were applied

- All cases are categorised into two groups namely Pattern A & Pattern B.
- For each group percentage of implanted cases were calculated

From this data relation between endometrial pattern and implantation is derived.

Format of Collected Data

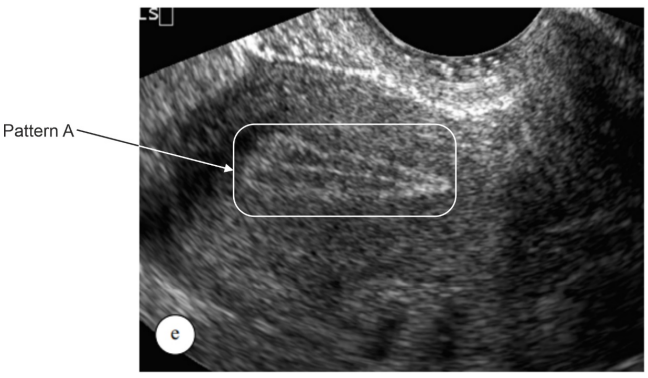
Table 1 – Format of collected data

Sr. no.	Age in yrs.	Height in cm	Endometrial Pattern on the Day of Rupture of Follicle	Implanted/Non-Implanted (Y/N)
1				
2				

Endometrial Pattern

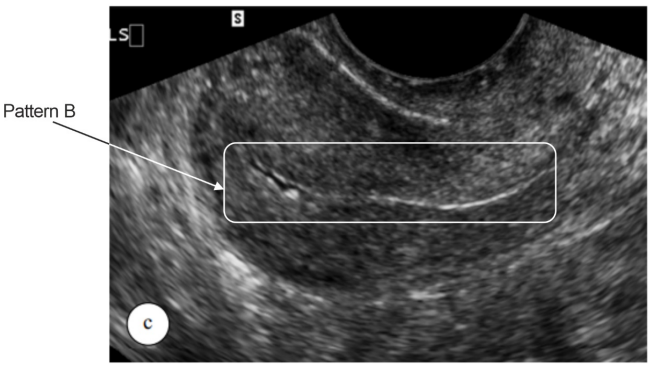
Pattern A - a trilaminar pattern consisting of a prominent outer and central hyperechoic line and inner hypoechoic region. (10, 11)

Fig. 6 Pattern A



Pattern B - consists of an intermediate isoechogenic pattern with the same reflectivity as the surrounding myometrium and a poorly defined central echogenic line. (10,11)

Fig 7. Pattern B



Study design – Observational study.

Inclusion criteria

1. Married Women
2. Age between 20 and 30 years
3. Women having normal and regular menses.

Exclusion criteria

1. Women having abnormal uterine cavity.
2. Women having uterine disorders, cervix disorders, tubal disorders, ovarian disorders and vaginal disorders.
3. Partner having semen abnormality.

Results and Discussion

Distribution of cases according to endometrial pattern

Table 2 - Distribution of cases according to endometrial pattern

Pattern	Implanted cases	Non-Implanted cases	Total cases	% of implanted cases
A	38	104	142	26.76
B	0	18	18	0

From table 2, out of 160 cases 142 cases have endometrial pattern A and 18 cases have endometrial pattern B. Out of 142 cases having A pattern, 38 cases are implanted and 104 cases are non-implanted. Out of 18 cases having B pattern, zero cases are implanted. Implantation rate in cases having endometrial pattern A is 26.76 percent. Implantation rate in cases having endometrial pattern B is zero percent. It is observed that, implantation occurs only in cases having pattern A.

This study is carried out on the day of rupture of follicle of menstrual cycle. Endometrial Pattern A (Triple-line pattern) reflects endometrial proliferation. The absence of a triple-line pattern (Pattern B) may be a sign of premature secretory changes in the endometrium. (12,13) Though in cases with Pattern B, there is ovulation but endometrium doesn't show proliferative changes properly, hence implantation rate is zero.

Our data contrast with the results of other authors. Zhao J showed Clinical pregnancy rates for pattern A was 55.2%, and of Pattern B was 50.9% (13). Also Bassil S. et. al., Khalifa E. et. al. showed similar pregnancy rates between endometrial patterns A and B (14,15).

Conclusion

Implantation occurs only when endometrium has a trilaminar pattern consisting of a prominent outer and central hyperechoic line and inner hypoechoic region.

Future Work

Although endometrial pattern is an important factor, there are also other factors which can be studied by histopathology of endometrium.

Endometrial histopathology is needed to be studied in detail.

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