

### **Color Doppler Study of Endometrial Spiral Artery in Unexplained Infertility**

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#### **Abstract**

#### **Introduction**

Infertility, defined as failure to conceive within one year despite normal cohabitation (Zabek 1996; Barbieri 1996) or within two years according to the European Society for Human Reproduction and Embryology (Forti and Krausz 1998), presents in 10-15% of all couples. Typically, 80% of couples (aged 18-28 years) will conceive over a one-year period and another 10% conceive during the following year. The rate of infertility has slowly been increasing (Stephen and Chandra 1998; Silverberg 2000). The prevalence of unexplained infertility is about 15-30% and diagnosis of unexplained infertility is made only after exclusion of other causes of infertility.<sup>[1]</sup>

Unexplained infertility may reflect a diminished ovarian reserve, a disorder of oogenesis or suboptimal endometrial receptivity. There are so many test available that may reveal ovarian dysfunction and endometrium is assessed by its thickness and describing its appearance.<sup>[2]</sup> Blood flow to endometrium come from radial artery which divides before the myo-endometrial junction to form basal artery that supply portion of endometrium and the spiral artery that supply the endometrial surface.<sup>[3]</sup>

In fertile women uterine spiral artery perfusion has been found to improve during the luteal phase which coincide

with the implantation window, endometrial receptivity is regulated by many factors which include uterine perfusion.<sup>[4]</sup>

Doppler ultrasonography is an important tool and a non invasive procedure to assess uterine perfusion. So the aim of this study is to evaluate the mid luteal phase endometrial spiral artery blood flow in unexplained infertility patient and compare the parameters with fertile control in order to reveal the possible role of uterine artery perfusion in etiopathogenesis of unexplained infertility.

**Material and metods-** The study was approved by the ethical committee of the Era's Lucknow Medical College and Hospital Lucknow and consent was taken from every woman before enrolling in the study. Two group each of 27 cases aged 20 -25 years were studied during the period from May2015- April 2017. A control group of fertile women who delivered within one year before the admission and did not have intrauterine device or use of oral contraceptives with normal physical and pelvic examination ,and a study group of women with unexplained infertility were included according to the following criteria: 1- unprotected regular intercourse.2-normal semen analysis.3- serum progesterone at the mid luteal phase> 10ng/ml 4- patent fallopian tubes and

normal pelvic cavity diagnosed by hysterosalpingography and laparoscopy.

Three dimension trans vaginal colour Doppler ultrasound (GE logic P9) with 7.5 MZ vaginal probe was done at 21 day of menstrual cycle. After placing the transducer in to the vagina, transverse and saggital images at the uterus and ovaries were obtained. Colour Doppler examination of the endometrium was performed with a 1.1 KHZ pulse repetition frequency to evaluate a minimum flow velocity at 5cm /sec. In the spiral arteries. Triplex mode examination included grey scale image combined with colour frame and a flow spectrum on the spectral flow wave, resistance (RI) and pulsatility (PI) indexes were measured automatically by using the software program in the equipment. Data entry and analysis were performed using statistical package for the social sciences (SPSS) version18. Quantitative data were presented as mean and standard deviation. Student's t-Test was used to compare means of two independent groups. Result was considered statistically significant at a p value of <0.05.

**Results-**No significant difference was observed in terms of demographic characteristics like age and BMI ( $p>0.05$ )Table-1. Endometrial spiral arteries PI and RI values were found to be  $0.96\pm 0.60SD$  and  $0.59\pm 0.13SD$  in midluteal peri-implantation period of the fertile control sgroup. For study group , mean PI and RI values were calculated as  $1.32\pm 0.69SD$  and  $0.83\pm 0.19SD$ .The difference for PI ( $p<0.001$ ) and RI ( $p<.042$ ) were statistically significant. (Table-2)

**Discsussion-**There is evidence suggesting that uterine arterial flow may be a factor affecting successful implantation during spontaneous and IVF cycle. It has also be shown that when endometrial blood flow is poor, implantation is less likely to occur<sup>5</sup>. We therefore hypothesised that impaired blood flow could be an

important factor in unexplained infertility. Where there is no other definite cause could be detected.

In our study we observed a significantly lower impedance in uterine vasculature in fertile control group in comparison to unexplained infertility group. These results agree with previous studies done by Selda Yusal et al. (2012)<sup>6</sup> who demonstrated significantly high PI (pulsatility index) and RI (resistive index) in endometrial spiral artery in unexplained infertile group in comparison to fertile group. In another study done by Mohamed Abdel Razik et al. (2015)<sup>7</sup> High vascular resistance was found in the uterine and ovarian artery in the luteal phase in infertile group in comparison to fertile group. V. Lilic et al. (2007)<sup>8</sup> was found that good uterine flow is necessary for good pregnancy rates and that higher uterine arterial resistance was associated with low pregnancy rate and poor outcome, while L. Wang et al (2010)<sup>9</sup>. Did not find any association between uterine artery blood flow indices and endometrial receptivity or pregnancy outcome.

Treatment of unexplained infertility are empirical and all are designed to increase gamete density, bringing together more than usual number of eggs and sperms in a timely way as in ovarian stimulation and IUI. A possible treatment of these patient is uterine perfusion enhancer as sildenafil, low dose aspirin and glyceryl trinitrate . So here we concluded that Mid- luteal or peri-implantation period Doppler measurement should be considered in infertility patients and if impedance to uterine vasculature is found to be high these patients might be amenable to treatment by perfusion enhancer drug. More studies are needed to support this conclusion and to evaluate the possible role of perfusion enhancer drugs in women with unexplained infertility.

**Table 1-Comparison of Age &BMI between the studied group.**

	<b>Unexplained infertility group ( n=27)</b> <b>Mean+-SD</b>	<b>Fertile group (n=27)</b> <b>Mean+-SD</b>	<b>P value</b>
<b>Age</b>	26.52+-3.09	26.85+-3.34	0.705
<b>BMI</b>	21.57+-2.74	20.81+-1.66	0.211

**Table- 2 Comparison of pulsatility index and resistance index of spiral artery between studied groups**

<b>Variables</b>	<b>Cases</b>	<b>Control</b>	<b>t value</b>	<b>p value</b>
Pulsatility index				
Range	0.6-3.1	0.6-3.29		
Mean	1.32	0.96	2.046	<0.001
S.D.	0.69	0.60		
Rasistance index				
Range	0.6-1.4	0.4-0.8		
Mean	0.83	0.59	5.282	<.042
S.D.	0.19	0.13		

**References**

1. The Practice Committee of the American Society for Reproductive Medicine, authors. Effectiveness and treatment for unexplained infertility. *Fertil Steril.* 2006;86:S111-4. [Pubmed]
2. Turbull LW, Lesny P and Killick SR. (1995): assessment of uterine activity prior to embryo transfer: a review of currently available imaging modalities. *Hum Reprod* 1:505-514.
3. Lesny P, Kellick SR, Tetlow RL et al. (1999): Ultrasound evaluation of uterine zonal anatomy during invitro fertilization and embryo transfer. *Hum Reprod* 14 1593-1598.

4. Isakson R, Tiitinen A, Reinikainen LM, Cacciatore B, Comparison of uterine and spiral artery blood flow in women with unexplained and tubal infertility. *Ultrasound obstet and gynaecol.* 2003;21:174-80.
5. Yang J-H, Wu M-Y, Chen C-D, Jiang M-C, Ho H-N, Yang Y-S. Association of endometrial blood flow as determined by a modified colour Doppler technique with subsequent outcome of in-vitro fertilization. *Hum Reprod* 1999; 14:1606-1610.
6. Selda Uysal, Elif Pelin Zun Ozbay et al. Endometrial Spiral artery doppler parameter in unexplained infertility patients: is endometrial perfusion and impotant factor in etiopathogenesis. *J Tyrk Journal Gynecol assoc.* 2012;13(3): 169-171.
7. Mohamed Abdel Razik, Mohamed Abdel Hady Farag, Mohamed Sheta. Uterine & ovarian arteries blood flow during the mid luteal phase in women with unexplained infertility. *Middle East Fertility Society Journal.* Sept. 2015;20(3):209-212.
8. V. Lilic, A. Tubis-Pavlovic, D. Radovic-Janosevic, A.Petric, M. Stefanovic, R. Zivadinovic. Assessment of endometrial receptivity by color Doppler and ultrasound imaging. *Med Pergl,* 60(2007), pp. 237-240.
9. L. Wang, L. Qiao, R. Li, X. Zhen, Z. Liu. Role of endometrial blood flow assessment with color Doppler energy in predicting pregnancy outcome in IVF/ET cycles. *Reprod Biol Endocrinol,* 8(2010), p. 122.