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ENDOMETRIAL EVUALUATION IN INFERTILITY: STUDY OF 50 CASES

Gynaecology

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ABSTRACT

BACKGROUND:: Various disorders lead to infertility in women of reproductive ages. This study was performed to describe the common ENDOMETRIAL causes of infertility and sonographic ,histerosalpingographic, and endometrial biopsy evaluation of these causes for midwives.

Introduction- Successful implantation depends on interaction between a blastocyst and receptive endometrium. Different strategies have been developed to evaluate endometrial receptivity, such as the histologic dating of an endometrial biopsy or more commonly a non-invasive ultrasound examination of the endometrium.

Aims and objectives-

To study the endometrialstatus in infertility cases by following parameters:

1.TVSon day 12-13 (pre ovulatory period) -endometrial thickness, pattern and sub-endometrial blood flow.

2.HSG-also used for evaluation of uterine cavity.

3.Histopathology and TB PCR of premenstrual endometrial biopsy.

Material and methods: It is a prospective study, carried out in the Department of Obstetrics and Gynecology, Institute of Medical Sciences in collaboration with the Department of Radiodiagnosis, Banaras Hindu University, over a period of 2 years. Hundred patients with infertility attending Female OPD (FOPD) of SSH, BHU were the subject. Patients complaining of infertility, aged 19-45 years, sexually active were subjected to detailed history & clinical examination, HSG, TB PCR and histopathology of premenstrual endometrial tissue and TVS & color Doppler study (endometrial thickness, pattern and vascularity). Measurements were analyzed relative to outcome.

Results: Maximum rate of conception was seen with endometrial thickness 10-14mm (61.54%) and with triple line pattern of endometrium. There was no conception in zone I flow and maximum conception rate (25%) was seen when zone III flow was present. Majority of patients with genital tuberculosis had their endometrial thickness <7mm and absent triple line endometrium reflects poor receptivity of the endometrium and local endometrial factor as a cause for infertility.

Conclusion: Our results show that no single parameter is specific enough to predict conception. Further study is needed to make a definitive conclusion.

KEYWORDS:

INTRODUCTION

According to World Health Organization (WHO) infertility is "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse"[1]. Infertility varies across regions of the world and is estimated to affect 8 to 12 per cent of couples worldwide[2,3].

Different strategies have been developed to evaluate endometrial receptivity, such as the histologic dating of an endometrial biopsy or more commonly a non-invasive ultrasound examination of the endometrium.

Commonly used sonographic markers include endometrial thickness and pattern. With the advent of Doppler ultrasound, studying endometrial blood flow has emerged as an important means of evaluating endometrial receptivity. A triple layered endometrial pattern and an endometrial thickness greater than 7 mm have been proposed as markers of endometrial receptivity, but have yielded a high percentage of false-positive results. A good blood supply to endometrium is generally considered necessary for implantation.[4]

AIMS AND OBJECTIVES OF THE STUDY

To study the endometrial status in infertility cases by -

1. Ultrasound and Doppler- non invasive, accurate and safe. By 2D power Doppler ultrasound, on day 12-13 (pre ovulatory period) we have taken endometrial thickness, pattern and sub-endometrial blood flow.
2. HSG- Mainstay in infertility imaging. Apart from the patency of tubes, also used for evaluation of uterine cavity.
3. Endometrial biopsy, taken in premenstrual period, sent for histopathology and TB PCR.

MATERIALS AND METHODS

The present study was carried out in the Department of Obstetrics and Gynecology, Institute of Medical Sciences in collaboration with the Department of Radiodiagnosis, Banaras Hindu University.

Type of study : Prospective study
Duration of study : July 2014- June 2016
Place of patient work up- Sir Sunder Lal Hospital, BHU

Selection of the Patients:

Hundred patients with infertility attending Female OPD (FOPD) of SSH,BHU were the subject of the present study.

a) Inclusion criteria:

Patients complaining of infertility, aged 19-45 years, sexually active were subjected to -

- Detailed history & clinical examination.
- HSG
- TB PCR and histopathology of endometrial tissue
- Pelvic Ultrasound & color Doppler study

b) Exclusion criteria:

- Mullerian agenesis
- Male infertility

Consent:

Initially approval of the university's ethical committee was obtained to conduct the present study.

Written informed consent was obtained from all the patients enrolled regarding history, abdominal, per speculum and per vaginal examination.

Consent was also obtained for doing HSG, Pelvis ultrasound & color

Doppler and TB-PCR, HPE test of endometrial sample.

After consent proper history was taken including name, age, years of marriage, type of infertility, present complaints, menstrual cycles, medical illness and its treatment or surgical intervention if any followed by through clinical examination done including local n systemic examination. Then they are gone under investigation including

1. Pelvic USG with Colour Doppler
2. Hysterosalpingogram (HSG)
3. TB-PCR and histopathology of endometrial tissue

STATISTICALANALYSIS

The statistical analysis was done using SPSS (Statistical Package for the Social Sciences version 16. for Windows version 16.0 software). The Chi- square and Fisher's test was used. P<0.05 were considered to be statistically significant.

RESULTS AND DISCUSSION

Among patients evaluated, 77% cases were of primary infertility, 23% of secondary infertility.

Among patients evaluated, maximum patients (42%) had tubal factor (HSG), 22% had positive endometrial TB PCR, 17% had non-secretory endometrium in HPE of premenstrual endometrial biopsy (anovulatory cycles) and 12 % had PCOS. The etiology was unexplained in 28% cases after work up.

Forty-two (42%) patients were in age group of 19-25 years, whereas 41% patients were in age group of 26-30 years, 14% in age group of 31-35 years and 3% were >35 year age group.

Maximum patients (66%) had 1-5 years duration of infertility, 25% with duration of 5.1-10 years and 9% had duration more than 10 years. Mean duration of infertility was 4.895 years.

49% of patients under study had education upto matriculation, 47% had upto graduation / post-graduation and 4 % were illiterate.

Approximately half of patients (51%) belonged to rural area and half (49%) of them belonged to urban area. In rural habitat, 47.06% patients had tubal factor, 17.65% had endometrial TB PCR positive, 13.73% had anovulatory cycle, 5.88% had PCOD and 23.5% had unexplained infertility. In urban habitat, 36.73% patients had tubal factor, 26.53% had endometrial TB PCR positive, 20.41% had anovulatory cycle, 18.37% had PCOD and 32.65% had unexplained infertility.

Majority of the patients (45%) belonged to lower middle class followed by 34% to middle class, 11% to upper middle class, 8% to lower class and 2% to upper class.

Maximum patients (82%) were housewife, only 18% were working. Majority of the patients (68%) had BMI between 18.5-24.99 kg/m2, 15% had <18.5, 15 % had between 25-29.99 and 2% had BMI >30 kg/m^2.

Among the patients presenting with symptoms/signs of pelvic inflammatory disease majority (19%) had complaints of per vaginal discharge, followed by pain abdomen (9%), dyspareunia (8%) and backache (7%). On per speculum examination, 23% had vaginal discharge. Cervical motion tenderness was present in 12%.

Majority of patients (56%) had regular menstrual cycles, 19% had dysmenorrhea, 12 % had hypomenorrhea, 9% had oligomenorrhea and 4% with secondary amoenorrhea.

15% patients had history of previous genital tuberculosis or ATT intake and 7% patients had history of pelvic surgery.

In 60 (77.92%) patients of primary infertility and 20 (86.96%) of secondary infertility there was normal secretory endometrium. Anovulatory endometrium seen in 15 (19.48%) cases of primary infertility and 2 (8.70%) cases of secondary infertility. 2 cases of primary infertility showed endometrial tuberculosis. 1 case of secondary infertility showed simple cystic hyperplasia.

Endometrial TB PCR test was positive in 20 (90.9%) cases of primary infertility and 2 (9.1%) cases of secondary infertility.

On hysterosalpingographic evaluation 44% cases had normal findings, whereas 42% had tubal factor, 22% had endometritis and in 8% both tubes and endometrium were involved.

In patients with tubal factor infertility, 14 patients (33.33%) were positive with endometrial TB PCR whereas only 8 (13.7%) patients without tubal factor were positive for endometrial TB PCR. The results were statistically significant (P value 0.01-0.025).

Vaginal discharge was present in 33.33% patients with tubal factor infertility but only 15.51% patients without tubal factor infertility had vaginal discharge. The results were statistically significant (P value 0.01-0.05).

Majority of patients (52%) had their endometrial thickness 7-9mm, 33% had <7mm, 13% had 10-14mm and only 2% had >14mm ET in USG.

In patients with tubal factor infertility, endometrial thickness in majority of patients (50%) was between 7-9 mm followed by endometrial thickness < 7mm in 35.71% patients and endometrial thickness was 10-14 mm in 14.29% patients.

Majority of patients (63.64%) with positive endometrial TB PCR had their endometrial thickness <7 mm, 18.18% had endometrial thickness 10-14mm, 13.64% had endometrial thickness 7-9mm and only 4.56% had endometrial thickness >14 mm.

In infertile patients with anovulatory cycles (HPE of premenstrual EB-Non secretory pattern), majority (41.18%) had their endometrial thickness 7-9 mm, 23.53% had < 7 mm, 23.53% had 10-14mm and only 11.76% had >14mm.

In patients with PCOD, 41.67% patients had <7mm ET, 41.67% had 7-9mm ET, 8.33% had 10-14mm ET and 8.33% had >14mm ET.

In patients with unexplained infertility, majority of patients (67.86%) had 7-9 mm endometrial thickness, 17.86% had 10-14mm and 14.28% had <7mm ET.

Majority of patients with genital tuberculosis (59.09%) had thin endometrium (<7mm), whereas only 25.64% without genital TB had ET <7 mm. The results are highly significant (p value <0.005). Chi square value is 8.683.

Majority of patients (48%) had type C or triple line endometrium, 37% had type B and 13% had type A endometrial pattern. 2 patients with infertility had endometrial calcification on USG.

In patients with tubal factor infertility, 16 patients (38.09%) had triple line pattern, 16 patients (38.09%) had type B and 10 patients (23.81%) had type A endometrial pattern on USG.

In genital tuberculosis patients, 10 patients (50%) had type B, followed by 6 patients (27.27%) had type A and only 5 patients (22.73%) had triple line pattern.

In infertile patients with anovulatory cycles (HPE of premenstrual EB-Non secretory pattern), majority (58.82%) had triple line, 4 patients (23.53%) had type B and 3 patients (17.65%) had type A endometrial pattern on USG.

In PCOD patients, 5 patients (41.67%) had triple line, 5 patients (41.67%) and 2 patients (16.66%) had type B endometrial pattern.

In unexplained infertility, 15 patients (53.57%) had triple line and 13 patients (46.43%) had type B endometrial pattern.

In patients with genital tuberculosis, only 27.27% patients had triple line endometrial pattern (statistically significant, p value is 0.025-0.05).

The endometrial blood flow was in Zone 1 in 16% patients, 40% patients had blood flow in Zone II and 44% had in Zone III.

In patients with genital tuberculosis, only 4 patients (18.18%) had endometrial blood flow in Zone III (statistically significant, p value <0.01, chi square value is 7.630).

SUMMARY

Our study was intended to evaluate the endometrium in different causes of infertility by TVS and Doppler, non invasive method to assess the endometrial receptivity and premenstrual endometrial tissue histopathology and TB PCR test.

- Most common cause in our study was tubal factor infertility (42%). The high prevalence of pelvic infection and the lack of an efficient programme for its prevention and treatment have led to high level of tubal infertility in India.
- The mean age and mean duration of infertility in India is lower than western world.
- Genital tuberculosis is the major causative factor for severe tubal disease in developing countries like India. To confirm the diagnosis of genital tuberculosis, TB PCR of endometrium or menstrual blood should be done in all cases.
- Histopathology of endometrial biopsy in infertility studies is the simplest, quickest, cheapest and useful method of determining the occurrence of ovulation.
- Majority of patients with genital tuberculosis had their endometrial thickness <7mm and absent triple line endometrium reflects poor receptivity of the endometrium and local endometrial factor as a cause for infertility. Zone III flow was absent in 81.82% patients with genital tuberculosis. A s the prevalence of genital tuberculosis in infertile patients is very high in India, so we recommend routine TB PCR in patients with such ultrasound findings, to rule out genital tuberculosis as a cause of infertility, which may otherwise remain unexplained.
- In our study, maximum rate of conception was seen with endometrial thickness 10-14mm and only one patient conceived when endometrial thickness was <7mm. Use of endometrial thickness as a parameter for prediction of conception has a low specificity and low PPV but its main advantage lies in its high NPV in cases where endometrial thickness is not reached.
- Poor endometrial development, as assessed by the presence of a hyperechogenic endometrial pattern on the day of HCG administration/before ovulation, had a strong NPV of 85.7-100% for conception. Conversely, a triple layer pattern, although associated more frequently with a conception cycle, proved to have a low PPV of 33.1-47.8% and a low specificity of 9.2-42.8% to predict a clinical pregnancy. High NPV is important for counseling.
- There was no conception in patients with zone 1 flow and maximum conception rate (25%, which is equivalent to normal per cycle fecundity) was seen when zone III flow was present.
- For absent zone III flow in prediction of conception, sensitivity and Negative Predictive Value was 100%. Specificity was 19.2% and Positive Predictive Value was 20.24%.

CONCLUSION

Our results show that no single parameter is specific enough to predict conception. These parameters had low specificity and positive predictive values but sensitivity and negative predictive value are high indicating that if adverse parameters (endometrial thickness <7mm, no triple line pattern and absent zone III flow) are present on TVS Color Doppler, we can predict endometrial receptivity. However, further study is needed to make a definitive conclusion

REFERENCES

1. WHO-ICMART revised glossary
2. Sciarra J. Infertility: an international health problem. Int J Gynaecol Obstet 1994; 46 : 155-63.
3. Population Council. Infertility. Looking back, looking forward: a profile of sexual and reproductive health in India. New Delhi, Population Council; 2004. p. 67-72.
4. Divya Sardana, Amit Jitendra Upadhyay et al. Correlation of subendometrial-endometrial blood flow assessment by two-dimensional power Doppler with pregnancy outcome in frozen-thawed embryo transfer cycles- a prospective study. Hum Reprod Sci. 2014 April-June; 7(2):130-135
5. Dr Shyam Pyari Jaiswar. Female Genital Tuberculosis: A Diagnostic Dilemma! The Journal of UP Chapter of Obstetrics and Gynecology 2015;23:5-14
6. Neeta Singh, Anupama Bahadur, et al. Predictive value of endometrial thickness, pattern and sub-endometrial blood flows on the day of hCG by 2D doppler in in-vitro fertilization cycles: A prospective clinical study from a tertiary care unit. Hum Reprod Sci. 2011Jan-Apr; 4(1): 29-33
7. Uterine scoring system for reproduction (Deptt of Reproductive Medicine, M Applebaum, The Chicago Medical School 3333 Green Bay Road. North Chicago, USA)
8.
9. Singh KK, Muralidhar M, Kumar A, Chattopadhyaya TK, et al. Comparison of in house polymerase chain reaction with conventional techniques for the detection of Mycobacterium tuberculosis DNA in granulomatous lymphadenopathy. J Clin Pathol 2000;53:355-61. [PUBMED]
10.
11. Rimek D, Tyagi S, Kappe R. Performance of an IS6110-based PCR assay and the COBAS AMPLICOR MTB PCR system for detection of Mycobacterium tuberculosis complex DNA in human lymph node samples. J Chin Microbiol 2002;40:3089-92. [PUBMED].
12.
13. Marc A. Fritz and Speroff. Clinical Gynecologic Endocrinology and Infertility. 8th ed. Philadelphia : Wolters Kluwer/ Lippincot Williams & Wilkins; 2011, p. 1155.
14. Marc A. Fritz and Speroff. Clinical Gynecologic Endocrinology and Infertility. 8th ed. Philadelphia : Wolters Kluwer/ Lippincot Williams & Wilkins; 2011, p. 1156.
15. World Health Organization. Infecundity, infertility, and childlessness in developing countries. DHS Comparative Reports No 9. Calverton, Maryland, USA: ORC Macro and the World Health Organization; 2004.
16. Westrom L. Joesoef R, Reynolds G, et al. Pelvic inflammatory disease and fertility. Sex Transm Dis 1992;19:185-192.
17. Lepine LA, Hillis SD, Marchbanks PA, et al. Severity of pelvic inflammatory disease as a predictor of the probability of live birth. Am J Obstet Gynecol 1998;178:977-981.
18. Practice committee of American Society for Reproductive Medicine in collaboration with Society for Reproductive Endocrinology and Infertility. Optimizing natural fertility. Fertil Steril 2008;90:S1-S6.
19. Pallone SR, Bergus GR. Fertility awareness-based methods:another option for family planning. J Am Board Fam Med 2009;22:147-157.
20. Practice committee of American Society for Reproductive Medicine. Optimal evaluation of the infertile female. Fertil Steril 2006;86: S264-S267.
21. Practice committee of American Society for Reproductive Medicine. Use of clomiphene citrate in women. Fertil Steril 2006;86:S187-S193.
22. Thessaloniki ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Consensus on infertility treatment related to polycystic ovary syndrome. Fertil Sterile 2008;89:505-522.
23. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Work-shop Group. Revised 2003 consensus on diagnostic criteria and long term health risks related to polycystic ovarian syndrome (PCOS). Hum Reprod 2004;19:41-47.
24. Guyton AC and Hall JE, eds. (2006). "Chapter 81 Female Physiology Before Pregnancy and Female Hormones". Textbook of Medical Physiology 11th ed.) Elsevier Saunders. pp. 1018ff. ISBN 9780721602400
25. Dallenbach- Hellwag G. The endometrium of infertility. A review. Pathol Res Pract. 1984 Jul; 178(6):527-37. (PubMed)
26. Czernoblisky B. Endometritis and infertility. Fertil Steril. 1978 Aug;30(2):119-30. (PubMed)
27. Jindal UN, et al. Hum Reprod.2012 (PubMed)
28. V. Bhanothu, J. Theophilus, R. Rozati. Detection of Mycobacterium tuberculosis among infertile patients suspected with female genital tuberculosis. Am J Infect Dis Microbiol, Volume 2, Issue 2, 2014, pp. 22-23 (PubMed)
29. 26. Bakos O, Lundkvist O, Bergh T. Transvaginal sonographic evaluationof endometrial growth and texture in spontaneous ovulatory cycles- a descriptive study. Hum Reprod. 1993;8:799-806
30. 27. Kupesic S. The first three weeks assessed by transvaginal colour Doppler. J Perinat Med. 1996;24:301-17.
31. 28. Ijiland MM, Evers JLH, Dunselman GAJ,van Katwijk C, Lo CR, Hoogland HJ. Endometrial wave like movements during menstrual cycle. Fertil Steril. 1996;65:746-9.
32. 29. Rainne-Fenning NJ, Campbell BK, Kendall NR, Clewes JS, Johnson IR. Quantifying the changes in endometrial vascularity throughout the menstrual cycle with three dimensional power Doppler angiography. Hum Reprod. 2004;19:330-8.
33. 30. Killam AP, rosenfeld C, Battaglia FC, Makowsi EL, Meschia G. Effect of estrogens on the uterine blood flow in oophorectomized ewes. Am J Obstet Gynecol. 1973:115;1045-50.
34. 31. DickeyRP, Olar TT,Taylor SN,Curole DN, Harrigil k. Relationsip of biochemical pregnancy to preovulatory endometrial thickness and pattern in patients undergoing ovulation induction. Hum Reprod. 1993; 8;327-30.
35. 32. Boue J, Boue A, Lazar P. Retrospective and prospective epidemiological studies of 1500 karyotyped spontaneous human abortions. Tetrology. 1973;12:11-26
36. 33. Applebaum M, Cadkin AV. Decidual flow- an early sign of pregnancy. Ultrasound Obstet Gynecol 1992;2:65.
37. 34.
38. 35. Hum Reprod. 2012 May;27 (5) 1368-74
39. 36. Sharma V*, Saxena V and Khatri SL Histopathological Study of Endometrium in Cases of Infertility . J Clin Exp Pathol 2016, 6:272
40. 36. Khanna A, Aggrwal A. Markers of genital tuberculosis in infertility. Singapore Med J 2011; 52(12): 864
41. 37. O.S. Philipov, A.A. Radionchenko, V.P. Bolotova, N.I. Voronovskaya & T.V. Potemkina Estimation of the prevalence and causes of infertility in Western Siberia. Bulletin of the World Health Organization, 1998, 76 (2): 183-187
42. 38. Shi-Ling Chen, Fang-Rong Wu; Combined analysis of endometrial thickness and

pattern in predicting outcome of in vitro fertilization and embryo transfer; a retrospective cohort study. Reproductive Biology and Endocrinology 2010
43. 39. Geetika Goel, Ritu Khatuja, Geeta Radhakrishnan : Role of newer methods of diagnosing genital tuberculosis in infertile women. Indian J Pathol Microbiol 2013:56:155-57.
44. 40. Gupta N, Sharma JB, Mittal S, Singh N, Misra R, Kukreja M. Genital tuberculosis in Indian infertility patients. Int J Gynaecol Obstet 2007;97:135-8.
45. 41. Thangappah RB, Paramasivan CN, Narayanan S. Evaluating PCR, culture and histopathology in the diagnosis of female genital tuberculosis. Indian J Med Res 2011;134:40-6.
46. 42. Kumar P, Shah NP, Singhal A, Chauhan DS, Katoch VM, Mittal S, et al. Association of tuberculous endometritis with infertility and other gynecological complaints of women in India. J Clin Microbiol 2008;46:4068-70. [PUBMED]
47. 43. Baxi A, Hansali N, Manila K, Priti S, Dhawal B. Genital tuberculosis in infertile women: Assessment of endometrial TB PCR results with laparoscopic and hysteroscopic features. J Obstet Gynaecol India 2011;61:301-6.
48. 44. Bhanu NV, Singh UB, Chakraborty M, Suresh N, Arora J, Rana T, et al. Improved diagnostic value of PCR in the diagnosis of female genital tuberculosis leading to infertility. J Med Microbiol 2005;54:927-31
49. 45. Kohli MD, Nambam B, Trivedi SS, Sherwal BL, Arora S, Jain A. PCR based evaluation of tubercular endometritis in infertile women of North India. J Reprod Infertil 2011;12:9-14.
50. 46. Prasad S, Singhal M, Negi SS, Gupta S, Singh S, Rawat DS, et al. Targeted detection of 65 kDa heat shock protein gene in endometrial biopsies for reliable diagnosis of genital tuberculosis. Eur J Obstet Gynecol Reprod Biol 2012;160:215-8.
51. 47. Parikh FR, Nadkarni SG, Kamat SA (1997) Genital tuberculosis – a major factor causing infertility in Indian Women. Fertil Steril67:497-500
52. 48. Paul C. Adamson, Kari Kruup, Alexandra H. : Prevalence & correlates of primary infertility among young women in Mysore, India: Indian J Med Res 134, October 2011.
53. 49. M. Aghahoseini, K. Tuba, V. Marsousi. Aseesment of endometrial- subendometrial blood flow detected by color Doppler sonography and uterine receptivity in infertile women. Medica Iranica, Vol.46, No. 6 (2008)
54. 50. J Zaidi S Campbell R Pitroff S L. Tan Endometrial thickness, morphology, vascular penetration and velocimetry in predicting implantation in in vitro fertilization programmer. Ultrasound Obstet Gynecol 1995:191-198
55. Jadhav MV, Raichur BS (1987) Special stains in study of normal and abnormal endometrium. Indian J PatholMicrobiol 30: 307-311.
56. Mridu M, Khanna S, Kahlon SK (1993) Genital Tuberculosis.Asian j obstet 1993.
57. Kumar A Gupta N (2000) Genitaln Tuberculosis. Asian J ObstetGynaecol.
58. Shastrabudhe NS, Shinde S, Jadhav MV (2001) Endometrium in Infertile Women. J ObstetGynaecol.
59. Pai, Meghna M and Pai, Muralidhar V and Roopa, PS and Kumar, Pratap (2016) Does thin endometrium in Infertile Women Indicate Genital Tuberculosis? Journal of Evolution of Medical and Dental Sciences, 5 (18).. pp. 905-907. ISSN 2278-4802
60. Al- Shawaf, T., Yang, D., Al-Magid, Y. et al. (1993) Ultrasonic monitoring during replacement of frozen/thawed embryos in natural and harmonic replacement cycles. Hum. Reprod., 8, 2068-2074.
61. 57. Alam, V., Bernardini, L., Gonzales, J. et al. (1993) A prospective study of echographic endometrial charcteristics and pregnancy
62. 58. Oliveira, J.B.A., Baruffi, R.L.R., A.L. et al. (1993) Endometrial Ultrasonography as a predictor of pregnancy in an in-vitro fertilization programmer. Hum Reprod., 8, 1312-1315.
63. 59. Coulam, C.B., Bustillo, M., Soenksen, D.M and Britten,S. (1994) Ulttrasonographic predictors of implantation after assisted reproduction. Fertil Steril., 61, 972-975.
64. 60. Strohmer, H., Obruca, A., Radnevk, M. and Feichtinger, W. (1994) Relationship of the individual uterine size and the endometrial thickness in stimulates cycles. Fertil. Steril., 61, 972-975.
65. Bustillo, M., Krysa, L.W. and Coulam, C.B. (1995) Uterine receptivity in an oocyte donation programmer. Hum. Reprod., 10, 442-445.
66. Sher, G., Dodge, S., Maassarani, G., Knutzen, V. et al. (1993) Management of suboptimal sonographic endometrial patterns in patients undergoing in-vitro fertilization and embryo transfer. Hum. Reprod., 8, 347-349.
67. 63. Check J.H. Nowroozi, K., Choe, J., Lurie, D. and Dietterich, C. (1993) The effect of endometrial thickness and echopattern on in vitro fertilization outcome in a donor oocyte embryo transfer cycle. Fertil Steril., S9, 72-75.
68. 64. Ueno, J., Oehninger, S., Bryjski, R.G. et al (1991) Ultrasonographic appearance of the endometrium in natural and stimulated in- vitro fertilization cycles and its correlation with outcome. Hum. Reprod., 6, 901-904
69. 65. Gonen, Y, and Casper R F (1990) Prediction of implantation by the sonographic appearance of the endometrium during controlled ovarian stimulation for in vitro fertilization (IVF). J In Vitro Fert Embryo Transf., 7, 146-152.
70. 66. Grunfeld, L., Walker, B., Bergh, P.A. et al. (1991) High resolution endovaginal ultrasonography of the endometrium: a non invasive test for endometrial adequacy. Obstet. Gynecol., 78, 200-204.
71. 67. Serafini, P., Batzofin, J., Nelson, J. and Olive, D. (1994) Sonographic uterine predictors of pregnancy in women undergoing ovulation induction for assisted reproductive treatments, Fertil, Steril., 62, 815-822.
72. 68. Shevach Friedler, Josheph G.Schenker, Arie Hermen and Aby Lewin The role of ultrasonography in the evaluation of the endometrial receptivity following assisted reproductive treatments: a critical review Human Reproduction Update 1996, Vol. 2, No. 4
73. 69. Sharara F I, Lim J, McClamrock H D. Endometrial pattern on the day of oocyte retrieval is more predictive of implantation.success than the pattern or thickness on the day of hCG administration. J. Assist Reprod Genet. 1999;16:523-528.
74. 70. Neeta Singh Gurunath Sumana. Suneeta Mittal Genital tuberculosis: a leading cause for infertility in women seeking assisted conception in North India Arch Gynecol Obstet (2008) 278: 325-327
75. Shrish S. Nandedkar, Ekta Patidar, Dhiraj B. Gada, Kamal Malukani, Kavita Munjal, Amit Verma. Histomorphological patterns of endometrium in infertility. The Journal of Obstetrics and Gynecology of India 2015, Vol. 65, 5, 328-334.
76. Girish C J, Manjunath M. L Morphological patterns of endometrium in infertile women-a prospective study. International Journal of Applied biology and Pharmaceutical Technology. 2011, Vol.2:3
77. Jindal UN, Verma S, Bala Y. Favorable infertility outcomes following anti-tubercular treatment prescribed on the sole basis of a positive polymerase chain reaction test for endometrial tuberculosis. Hum Reprod 2012;27:1368-74. [PUBMED]
78. Malpani A, Malpani A. Anti-tubercular treatment, genital TB and infertility. Hum Reprod 2012;27:3120. [PUBMED]
79. 11. Rashidi BH, Sadeghi M, Jafarabadi M, Nejad EST. Relationships between pregnancy rates following in vitro fertilization or intracytoplasmic sperm injection and endometrial thickness and pattern. Eur J Obstet Gynecol Reprod Biol. 2004;120:179–84. [PubMed]
80. 12. Noyes N, Hampton BS, Berkeley A, Licciardi F, Grifo J, Krey L. Factors useful in predicting the success of oocyte donation: A 3-year retrospective analysis. Fertil Steril. 2001;76:92–7. [PubMed]
81. 13. Mercé LT, Barco MJ, Bau S, Troyano J. Are endometrial parameters by three-dimensional ultrasound and power Doppler angiography related to in vitro fertilization/embryo transfer outcome? Fertil Steril. 2008;89:111–7. [PubMed]