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THE EFFECT OF ENDOMETRIAL PATTERN AND THICKNESS ON PREGNANCY RATE IN CONTROLLED OVARIAN HYPERSTIMULATION - INTRAUTERINE INSEMINATION

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ABSTRACT

Objective: In order to evaluate the endometrium by ultrasound in patients undergoing controlled ovarian hyperstimulation (COH) with clomiphene citrate (CC) and human menopausal gonadotropin (HMG) with intrauterine insemination (IUI) to determine the relationship between endometrial pattern and thickness on pregnancy rate (PR).

Methods: In this prospective study, 108 infertile couples underwent COH with CC and HMG. The patients were categorized in 4 groups according to etiology. Overall 261 COH-IUI cycles with CC-HMG were evaluated. Thickness of the endometrium was measured and its pattern was classified according to its echogenicity.

Results: In the homogenous group the pregnancy rate (PR)/cycle was 16.7%, and in the trilaminar group it was 15.5%. This difference was not statistically significant (p>0.05). The mean endometrial thickness in trilaminar and homogenous groups was 8.92±1.18 mm, and 8.72±1.56 mm respectively. In cycles in which conception occurred, the mean endometrial thickness was significantly higher in trilaminar and homogenous groups (p<0.001).

In patients with a trilaminar pattern, the pregnancy was equal with those who had a homogenous pattern. The endometrial thickness was a major factor in determining PRs. There was no significant difference between PRs in cycles with trilaminar and homogenous patterns according to the etiology of infertility.


Keywords: Transvaginal sonography, Endometrial pattern, Endometrial thickness, pregnancy rate.

INTRODUCTION

Measurement of endometrial thickness during the treatment cycle is used routinely to assess uterine re-
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cceptivity and predict implantation. Throughout the men-
stral cycle, the endometrium progresses through sev-
eral stages of maturation. In the proliferative phase, the
endometrium thickens and is homogenous; by the late
proliferative phase, it converts to a trilaminar pattern, which probably arises from the central opposing sur-
faces of the endometrium and the outer echogenic basa-
lis layers of the endometrium.

Sonography has been used as a non-invasive tech-
nique to monitor infertile women for over two decades.
The advent of transvaginal sonography greatly increased
the visualization of the endometrium, allowing for more
accurate and detailed evaluation.

Despite the widespread use of high resolution ultra-
sound equipment, the clinical significance of differences
in endometrial thickness and appearance has remained
controversial. Some studies have shown that a tril-
aminar endometrial pattern adds prognostic value on
pregnancy rate. Few studies have suggested that the
sort of endometrial pattern is more effective than en-
dometrial thickness for achieving a pregnancy. Some
studies demonstrated low pregnancy rate in the pres-
ence of thin endometrial layers, but one could not
confirm this association.

Patients with a thin endometrium present the clinici-
ian with the dilemma of whether to continue the cycle
despite a possibility of reduced chance of pregnancy or
to cancel the cycle and cryopreserve the embryos.

Some investigators have suggested that both en-
dometrial pattern and thickness influence the outcome
of a treatment cycle, but others argue that one charac-
teristic plays a more important role than the other. So
this leads to a question as to which one of them, en-
dometrial pattern, thickness or both can predict the out-
come of an induction cycle.

In this study we tried to find out whether there was a
relation between endometrial thickness and pattern
on pregnancy rate following IUI cycles and also study
the same correlation in different causes of infertility sepa-
rately.

These hypotheses were tested: 1- there is no differ-
ce in PRs among patients having a trilaminar pattern
and those having a homogenous pattern and 2- endome-
trial thickness is not related to the chance of achieving a
pregnancy.

MATERIAL AND METHODS

The study was carried out from February 2000 to
March 2002, on 108 infertile couples with 261 cycles
undergoing COH-IUI, who referred to our tertiary infer-
tility center. The protocol and consent forms were ap-
proved by Shiraz University of Medical Sciences insti-
tutional review board.

All couples enrolled in the study had an infertility
workup that included: semen analysis (SA), post-co ital
test (PCT), endometrial biopsy, hormonal assay, hyste-
rosalpingography (HSG) and diagnostic laparoscopy
with or without hysteroscopy. After all other major pa-
thologies were excluded (such as mullerian anomaly);
the patients were classified into four groups according
to their diagnosis as follows: male factors, cervical fac-
tors, mechanical factors and unexplained infertility.

The definition of the four classifications according
to cause is as follows:

Male infertility was diagnosed on the basis of abnor-
mal findings in semen analysis according to the World
Health Organization (WHO) criteria. In summary we
considered a volume of less than 2cc, count less than 20
million/mL; motility less than 50% and normal shape less
than 30% as abnormal. Semen analysis was performed at
least two times with an interval of three months. If ab-
normality in the semen analysis was detected, a com-
prehensive urologic evaluation by a specialist was done
to exclude any medical or surgical correctable problem.

We performed IUI for patients with male factor infertility, if
total motile sperm count is equal or more than 5 million.
If sperm quality was too poor, other therapeutic options
such as in vitro fertilization or intracytoplasmic sperm
injection were used. If the semen analysis was normal
and repeat of PCT showed no sperm, dead sperm or shak-
ning movement despite the presence of good mucus, the
patients were classified as cervical factor.

Mechanical factor consists of patients with the fol-
lowing characteristics: uterine and cervical myoma,
peri tubal adhesions caused by infection, and other ad-
hesions caused by previous pelvic operation or endome-
triosis. In the patients with mechanical factor after
laparoscopic adhesiolysis, myomectomy and fulgura-
tion of endometriosis foci, the following treatment pro-
tocol was prescribed.

A couple were considered as unexplained infertility
when the result of semen analysis, post-coital test, hor-
monal assay, endometrial biopsy, hysterosalpingogram
and laparoscopy were normal and the patients were hav-
ing ovulatory cycles, or had normal ovulation after medi-
cal or surgical treatment.

All of the patients were asked to undergo three cycles
of COH-IUI unless pregnancy occurred. The patients
underwent 261 controlled ovarian hyperstimulation
cycles with CC and HMG for IUI. Clomiphene (Iran hor-
mone, Tehran, Iran) was administered orally for 5 days,
100 mg/day starting on day 5 of the cycles and HMG
(Organon, Oss, Netherlands) was injected intramuscu-
larly 150 IU/day from day 8 of the cycle. Sonographic
assessment was performed transvaginally with a 6.5 MHz
endovaginal probe using Medison SA 600 (Medison Inc, Seoul, South Korea) by the same physician on day 10 or 11 of the cycle and according to the size and number of stimulated follicles, HMG was continued until at least 2 dominant follicles with size of $\geq 18$ mm were present. The endometrium was imaged in a longitudinal anteroposterior dimension. The echogenicity of the endometrium was compared with that of the surrounding myometrium and two patterns were noted. A homogeneous pattern was described. A single hyperechoic or isoechoic layer and a trilaminar pattern was identified as a hypoechoic layer with a central hyperechoic line. Then 5000–10,000 IU HCG (Organon, Oss, Netherlands) was injected. Sperm preparation and insemination procedure was performed by standard technique as previously described. If the patients missed a period of 16 – 18 days after the insemination, a quantitative βHCG assay was performed. When the βHCG was positive, it was repeated 2 to 4 days later and after an appropriate rise, a transvaginal ultrasound was performed three weeks after the positive pregnancy test.

Only clinical pregnancies, which were diagnosed by transvaginal ultrasound, were considered in the analysis.

**Statistical analysis**

The data were analyzed using the Chi-square and Fisher’s exact tests. A p value <0.05 was considered statistically significant.

**RESULTS**

During the study, 261 COH-IUI cycles were analyzed in 108 infertile couples. The mean duration of infertility was 5.31±4.2 years in all. The mean duration of infertility in trilaminar and homogenous groups were 4.83±3.54 and 7.66±6.22 years respectively. Among the patients studied, the following percentages were detected: 80.55% primary infertility, 16.66% secondary infertility and 2.77% primary and secondary infertilities. In 42 (16.1%) of the cycles, a homogeneous pattern was noted, whereas 219 (83.9%) of them revealed a trilaminar pattern. The PRs / couples in the homogeneous group was 38.9% compared with 37.8% for the trilaminar group (p value>0.05). The PR / cycle in the homogeneous and trilaminar groups were 16.7%, and 15.5% respectively (p value>0.05).

Among forty-one pregnant women, ten cases were aborted (eight of them with trilaminar pattern and two others with homogeneous pattern); one ectopic pregnancy and two twin pregnancies were seen. There was no significant difference in age, parity, diagnosis and number of total follicles between them (Table I).

The mean endometrial thickness in trilaminar and homogenous groups was 8.42±1.18 mm and 8.72±1.56 mm respectively (p value>0.05) (Table I).

The mean endometrial thickness was 8.46±1.67 mm in conception cycles and 6.64±0.35 mm in nonconception cycles in the group with trilaminar echogenicity (p<0.001). Meanwhile this thickness in the group of patients with homogenous echogenicity was different in conception cycles (8.43±1.83) and in non-conception cycles (6.94±0.51) (p<0.001).

There was no significant difference between PRs in cycles with trilaminar and homogenous echopatterns according to the etiology of infertility (p value>0.05) (Table II).

**DISCUSSION**

Although the receptivity of endometria to implantation is possible with a homogeneous pattern, despite...
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Table II: Pregnancy rate/cycles in trilaminar and homogeneous endometrium regarding different etiologies using Chi-square test.

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Trilaminar pattern</th>
<th>Homogeneous pattern</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male factor</td>
<td>10.90%</td>
<td>9.10%</td>
<td>NS</td>
</tr>
<tr>
<td>Cervical factor</td>
<td>11.50%</td>
<td>11.40%</td>
<td>NS</td>
</tr>
<tr>
<td>Mechanical factor</td>
<td>13.61%</td>
<td>12.50%</td>
<td>NS</td>
</tr>
<tr>
<td>Unexplained infertility</td>
<td>19.00%</td>
<td>18.90%</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS: Not significant.

In our study mean endometrial thickness in two groups of trilaminar and homogeneous patterns were similar. There was a significant difference in the trilaminar and homogeneous group on the basis of endometrial thickness between conception and non-conception cycles. Thus this study rejected the second hypotheses. This result is in contrast with the studies performed by others in patients undergoing ART. Some investigators have shown that higher thickness of the endometrium has a positive effect on PRs. Dickey et al. showed that in patients receiving sequential CC/HMG for COH, a homogeneous endometrial pattern on the day of HCG administration predicts a significantly decreased PR compared with a trilaminar pattern. Check et al. reported that endometrial thickness alone was associated with a higher PR in patients undergoing IVF, but they evaluated only 70 cycles.

Our study showed that there was no significant difference between PRs in cycles with trilaminar and homogeneous echopatterns on the basis of etiology of infertility. This subject has not been studied in the literature till now.

Finally we concluded that endometrial echopattern had no effects on the pregnancy rates in patients undergoing COH-IUI. Thus ultrasonographic analysis of endometrial echogenicity on the day of HCG administration had no predictive value for conception. There was no difference between PRs in cycles with trilaminar and homogeneous pattern according to the etiology of infertility.

REFERENCES

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