



ORIGINAL ARTICLE

# Relationship between ultrasound parameters and intra cytoplasmic sperm injection outcome in polycystic ovarian syndrome treated by non agonist step up stimulation protocol



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## KEYWORDS

Polycystic ovary;  
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Non-agonist protocol;  
Intra cytoplasmic sperm  
injection

**Abstract Objective:** To correlate the ultrasound parameters to the intra-cytoplasmic sperm injection outcome in polycystic ovarian syndrome cases treated by non-agonist chronic step up stimulation protocol.

**Setting:** Agial and Integrated Fertility Centers, Alexandria, Egypt.

**Patients:** Twenty-five cases of polycystic ovarian syndrome fulfilling Rotterdam criteria were enrolled.

**Materials and methods:** Patients received a protocol starting with the administration of urinary human menopausal gonadotrophin (hMG) per day, follow up was done by ultrasound and serum estradiol level with increasing dose until the required response was achieved and if ovarian hyperstimulation syndrome (OHSS) occurred, gonadotrophin was withheld till estradiol declined. Human chorionic gonadotrophin (hCG) was given intramuscularly to achieve oocyte maturation. After 34–36 h of hCG administration oocyte retrieval was performed. The patients received luteal phase support in the form of natural progesterone vaginally. Transvaginal ultrasound was performed two weeks after positive pregnancy test to confirm clinical pregnancy.

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*Main outcome measures:* Number of ampoules, stimulation days, serum estradiol level and progesterone level on day of hCG, number of oocytes retrieved, grading of embryos obtained, endometrial thickness, pregnancy rate, implantation rate, abortion rate, cancellation rate, multiple pregnancy rate and cost.

*Results:* Patients with a higher number of basal antral follicles were associated with a lower number of ampoules needed for stimulation (14.63 vs. 21.64 ampoules) and less stimulation days (7.07 vs. 10.73 days). Patients with a higher number of mature follicles were associated with a higher estrogen level (1561.53 vs. 658.14 pg/ml) and a higher progesterone level on day of hCG (1.10 vs. .62 ng/ml), a higher number of oocytes retrieved (7.18 vs. 4.13 oocytes) and a higher number of embryos transferred (3.06 vs. 2 embryos). The number of mature follicles and the endometrial thickness were higher in the pregnant group (19.78 follicles and 12.94 mm, respectively). The pregnancy rate was 36%, the chemical pregnancy rate was 33.3%, the abortion rate was 22.2% and the ongoing pregnancy rate was (44.4%).

*Conclusions:* The higher the number of the basal antral follicles, the less the number of the ampoules needed for stimulation and the less the stimulation days. The higher the number of mature follicles, the higher the estrogen level on day of hCG, the greater the number of oocytes retrieved and the greater the number of embryos transferred. The stromal thickness has no effect on the pregnancy outcome but the number of mature follicles and the endometrial thickness have a positive correlation with the pregnancy outcome.

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## 1. Introduction

Polycystic ovary syndrome (PCOS) is a heterogeneous collection of signs and symptoms that gathered together to form a spectrum of disorders with a mild presentation in some and severe disturbance of the reproductive, endocrine and metabolic functions in others and is the leading cause of anovulatory infertility. So PCOS represents a common and complex syndrome (1–3).

Rotterdam criteria for the diagnosis of PCOS require two of the following: oligo or anovulation, clinical and or biochemical signs of hyperandrogenism and polycystic ovarian morphology on ultrasound scan (4).

Disorders of PCOS include: reproductive and endocrinal disorders (hyperandrogenism, anovulation, hypersecretion of LH, increased the risk of early miscarriage), metabolic disorders (hyperinsulinemia, type II diabetes, obesity and hyperlipidemia) and disorders of general health (increase cardiovascular disease risk factors and endometrial cancer) (5–8).

Before diagnosis of PCOS, we must rule out other disorders with similar clinical presentations such as: congenital adrenal hyperplasia, cushing's syndrome and androgen secreting tumors (9).

PCOS is a major cause of infertility, thus many women are unable to ovulate and become pregnant. Insulin resistance, deficient endogenous FSH activity and high LH concentrations may all be instrumental in the pathology of anovulation in PCOS patients (10,11).

Treatment of PCOS includes: weight loss, insulin sensitizing drugs (metformin), clomiphene citrate, aromatase inhibitors and gonadotrophin therapy (12–16).

Gonadotrophin regimens include: the classical low dose step up gonadotrophin regimen, the step down gonadotrophin regimen, the conventional step up regimen, the gonadotrophin releasing hormone agonist and the gonadotrophin releasing hormone antagonist (17–20).

The non-agonist protocol has a shorter duration of stimulation, fewer number of ampoules needed for stimulation and, lower cost of ovulation induction which is one of the main limiting side effects of ART but it has a lower percent of oocytes retrieval with poor IVF outcome and a fewer fertilization rate (21).

## 2. Materials and methods

We performed the study on 25 cases of PCOS patients undergoing ICSI. All cases included in the study were subjected to detailed history, complete general and gynecological examination, investigations include basal hormonal analysis (Serum FSH, LH, estrogen, progesterone, prolactin, total testosterone, 17-hydroxy progesterone, DHEA, progesterone level and estrogen level on day of hCG) and vaginal ultrasound (ovarian morphology, ovarian volume and folliculometry).

The non-agonist step up protocol consisted of administering a starting dose of urinary hMG 150 IU per day, follow up was done on day five of stimulation by transvaginal ultrasound and serum estradiol (E2) level, if there was a good response the same dose was continued, if there was no evidence of an ovarian response on ultrasound (i.e., no follicle > 10 mm in diameter, E2 < 150 pg/ml), then the dose was increased by (75 IU) hMG per day until the required response was achieved. If manifestations of OHSS appeared with E2 level (> 3500 pg/ml) and 25% of the follicles were at least 15 mm, the gonadotrophin was withheld (coasting for 2 days) till E2 declined to (2500 pg/ml). Then, hCG (10.000 IU) intramuscular was given to achieve the final oocyte maturation when at least three follicles reached a mean diameter of 18 mm and serum E2 level (> 150–200 pg/ml) per follicle.

After (34–36 h) of hCG administration oocytes retrieval was performed under transvaginal ultrasound guidance.

The patients received luteal phase support in the form of natural progesterone vaginally in a dose of 600 mg/day following oocyte retrieval to maintain the endometrial support.

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