

# The role of laparoscopic drilling in the treatment of polycystic ovarian syndrome

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## Abstract:

PCOS patients diagnose by having two of the following criteria: first oligo- and/or anovulation, second hyperandrogenism (by clinical picture with or without biochemical features), and lastly ultrasound findings of polycystic disease. The underlying cause of PCOS is unknown. Theories about cause may include genetic predisposition. The role laparoscopic drilling for ovaries show advancing in treatment of PCOD in form of restore ovulation specially those patients in whom there is resistant to clomiphene citrate or incompliant for long term therapy.

Aim of the study: in this retrospective study we discuss the role laparoscopic ovarian drilling (LOD) in the correction of ovulation failure in PCOD patients showing primary infertility.

Patients and methods: This study includes 50 patients female, age between (22-35) years old. Inclusion criteria including period of infertility of 1–10 year duration, body weight increase with (BMI 29–35 Kg/m<sup>2</sup>), gynecological problems with abnormal menstruation, clinical pictures goes with high level of androgen hormone like acne vulgaris and hirsutism.

RESULTS: 50 patients were studied here .In 40 patients (80%), they show no menstrual cycle changes. Follow up period was 12 months.30 of patient (60%) had pregnancy; the mean time for the first pregnancy was 3.5months after operation.

## Introduction

There is a great development in understanding the pathology and physiology of polycystic ovary syndrome and this knowledge has a progression especially in the last century. The incidence of PCOD in many studies range from 5% to 14% in women within the years of fertility,<sup>1</sup> this prevalence make the PCOD as one of the important and common endocrine disorder that affect women in their reproductive life.<sup>2</sup> The main and important features of PCOD include first high level of androgen (hyperandrogenism) with abnormal cycle and irregularity, and this will eventually result in infertility.<sup>3</sup> PCOD is a disease of exclusion so that other causes of oligo or

anovulation should be excluded such as congenital adrenal hyperplasia, tumors secreting excess androgen, and hyperprolactinemia.<sup>4</sup>

The abnormality of the CYP11a gene in patients with PCOS may has a major effect in the progression of the disease as this suggested by many studies that perform in vitro on selected theca cells from human ovaries. The CYP11 thought to be responsible for the encoding the cleavage enzyme of the cholesterol side chain which play a significant role in the steroid production as a rate limiting step.<sup>7</sup>

The menstrual abnormalities in PCOS characterized by multiple abnormalities that ranged between irregularity, some times

absent or infrequent .These disturbances usually has history since the first postmenarchal bleeding and the monthly cycle never stable .<sup>8</sup>

Inappropriate secretion of gonadotropin-releasing hormone (GnRH) causing increase level of luteinizing hormone (LH) compared with follicle-stimulating hormone (FSH).<sup>9</sup> The presence of hyperinsulinemia now becomes well documented in patient with PCOD this is due to insulin resistance .The incidence of hyperinulinemia due to insulin resistance range between 25% to 45%.

The prevalence of insulin resistance is mostly found in obese patient making this wide incidence range.<sup>10,11</sup> Insulin resistance represent low glucose absorption in related to a given amount of insulin. Insulin and LH will play a significant role in stimulating ovarian theca cell to secrete more androgen and causes the ovaries to secrete high levels of testosterone and androstenedione.<sup>12</sup>

The obesity in many studies was found I around 50% of cases with PCOD .The increase in body fat was mainly in upper part of body or in the center that will lead to increase the ratio between waist and hip in comparison to women with obesity without PCOD.<sup>13</sup> The distribution of fat in this pattern is regarding as android type of obesity and similar picture can be seen in states with hyperandrogen ,patients with diabetic and in cases of hyperlipidemia.

This distribution of peripheral fat may be associated with visceral fat that may causing increase in insulin resistance in those patients. While women with gynecoid type of obesity will have increase in amount of normal fat in thighs, buttocks and hip areas.<sup>14</sup>

At early times of discovery the PCOS around 1935, the treatment in many centers was the wedge resection in the hope to resume the ovulation. The effect of this procedure was to excise the thick and hyperplastic central ovarian stroma.This

method was used in the treatment of infertility due to anovulation until the time were the medical treatment that casing stimulation of ovulation was discovered (clomiphene citrate, gonadotropins).<sup>16</sup> These drugs and inspite of its effectiveness, but they may associated with significant problems including the risk of hyperstimulation syndrome of ovary and risk of multiple pregnancies.<sup>17</sup>

The first use of electrocautery in PCOD treatment was in 1984, that were during laparoscopic surgery by cauterization of ovarian capsule and this result in a high rate of ovulation and also increase the likelihood of pregnancy.<sup>18</sup> For penetration of capsule of ovary is done either by cautery or some times laser, the laser associated with less risk of adhesion on pelvis postoperatively. The procedure include develop multiple punctures in ovarian capsules by using elecrocuttary or by laser the number of puncture usually 3-6 and there depth about 5-10 mm.Usually the procedure perform on both ovaries even in many studies may show the drilling has the same rate of ovulation in both unilateral and bilateral ovarian .<sup>20</sup>

What is the exact mechanism by which the LOD causes induction of ovulation is still unknown. Many theories and authors suggest that a falling in androgen level and steroids during the procedure and this will cause disturbance in negative feedback mechanism of estrogen hormone on gonadotropin pituitary and this will lead to decrease of intraovarian level of androgens and this will inhibit the development of follicle, or stimulation of growth factors in ovary which eventually cause follicle growth.<sup>21</sup>

#### **Aim of the study:**

The aim in this study is to describe the role of laparoscopic ovarian drilling (LOD) as an effective and successful treatment for infertility in those patients with PCOD in whom medical treatment fail.

### Patients and methods

This study includes 50 patients female, age between (22-35) years old. Diagnosis of PCOD based on ultrasound findings of PCOD, elevated levels of androgenic hormones and oligo or anovulation (Rotterdam criteria). Clinical features included infertility of 1–8 years duration, abnormalities in menstruation (oligo/amenorrhea), increase in body weight (BMI 29–36Kg/m<sup>2</sup>), pictures of acne and hirsutism indicating high levels of androgens. The assay of hormonal levels showing

low level serum FSH and an elevation in LH hormone level with LH/FSH ratio >2. All investigation were done for those patients include thyroid function test, ovarian hormone assay, ultrasound examination in order to exclude other secondary causes for infertility than the PCOD. In addition seminal fluid analysis were done for there husbands to exclude male causes .

All patients were on medical treatment for period between (6months to one year), treatment include clomiphene citrate dose of 100mg /day starting from day 2-day five of the cycle. The normal values in this study for biochemical assay show as follow: and after doing the laparoscopic ovarian drilling. There are significant changes in the levels of FSH, LH, the LH/ FSH ratio and testosterone.

glucose 80-115 mg/dl; FSH - 3-12.4 mUI/ml; LH - 2.3-12 mUI/ml; total testosterone - 0.1-1.2 ng/ml; free testosterone - 0.6-6.8 pg/ml.

The procedure was done in our laparoscopic department under general anesthesia, three port using for camera and two working ports. The procedures include punctures of ovarian capsules using electrocuttary hook for perform 5-8 holes in each ovary with a contact time between 3-5 seconds. All patients were discharged the hospital on second day postoperatively and follow up period was one year for regular ovulation and pregnancy.

### Results

Fifty patients were studied here .In 40 patient (80%), they had regular menstrual cycles. Follow up period was 12 months. Thirty of patient (60%) had pregnancy; the mean time of the first pregnancy was 3.5 months. From those thirty pregnancies 4 ended in abortion (mean period was 2.5 month) and one case diagnose as ectopic pregnancy. No significant change was noted regarding the weight and body mass index after the procedure. The changes in hormone assay and a clinical picture was reordered before

Abnormalities of menstruation in the form of oligo or amenorrhea which is most frequent symptoms showing improvement in about 40 cases (80%).as shown in table 1.

**Table 1** the hormonal changes, menstruation and pregnancy results of LOD

Parameter	Before drilling	After drilling
Serum FSH	5.5 mUI/ml	6.2 mUI/ml
Serum LH	5.9 mUI/ml	4.4 mUI/ml
LH/FSH	1.1	0.7
Free testosterone	4.2 pg/ml	3.5 pg/ml
Total testosterone	0.9 ng/ml	0.5 ng/ml
Glucose	87 mg/dl	88 mg/dl
Regular cycle	40%	80%
Pregnancy rate	-	60%

## Discussion

There is great change in the definition of polycystic ovary syndrome that evolved along decades but it always refers to a multi-system reproductive metabolic disorder. In patients with PCOD, the ovaries have a certain specific shape and texture that can be detected by ultrasonography even this appearance may be found in women without clear clinical picture. Metabolic disorders that may associated with the disease include resistance to insulin, obesity (with a high incidence in the United States) and dyslipidemia<sup>4, 30</sup> Several studies show that there is family tendency in PCOD mainly in first-degree relatives.<sup>5</sup>

The menstrual abnormality in PCOD is mainly characterized by irregularity with infrequency and some times absent. The complete absence of the menses may reach 20% in some women while 5-10% of cases may show normal ovulation.<sup>9</sup> Women with PCOS classically show increase in ovarian size with multiple small antral follicles on periphery with increase stromal thickness in the center. The exact mechanism that cause this specific morphological change is still vague, the possible explanation that the normal cycle of follicles development may progress until the midantral stage, then the growth will cease and after that the main numbers of follicles end with atresia.<sup>10</sup>

The incidence of miscarriage show increase frequency in women with PCOD, the exact explanation is still unclear. In some series the percentage of recurrent abortion in women with PCOD may reach 55%.<sup>11</sup>

Some studies show high incidence of endometrial carcinoma in PCOD patients this may be related to long period of anovulation and chronic effect of unopposed estrogen.<sup>16, 29</sup>

The relation between levels of androgen hormone and gonadotropin with obesity now is understudy mainly in adolescents. McCartney and colleagues in 2001 had a

cross sectional study of obese girls at puberty, the study had showed a significant elevation in the level of testosterone hormone in comparison with none obese girls also there is decrease in the level of LH hormone. Also there increase in insulin level in obese compared to normal controls.<sup>20</sup>

The effect of hyperinsulinemia and resistance to insulin as a major cause for PCOD is still not well documented. There may be evidence that high insulin levels may cause alteration in the normal metabolic and reproductive physiology of this syndrome. Some studies had shown that hyperinsulinemia lead to stimulate androgen production, by effect of LH hormone, from ovarian normal theca cells.<sup>21</sup>

The first notice for the effect of LOD was reported in 1984 when using electrocuttary on the capsule of ovary during laparoscopic surgery which result in induce ovulation and pregnancy. The resulting ovulation after LOD has variable duration, in some studies show that spontaneous ovulation after LOD may persist for multiple years.<sup>15</sup> The penetration of ovarian capsule was done by using either the electrocuttary or laser which associated with less complication post operatively.<sup>18</sup> Nowadays the introduction of harmonic device also improve result and decrease post operative complication in LOD.

Farquhar et al. study discusses the difference between LOD and medical treatment with gonadotropin therapy in patient diagnose with PCOD and infertility. Study shows no significant difference between surgery and medical therapy except that LOD show lower rate of multiple pregnancy.<sup>19</sup>

Our opinion, we assume that LOD has the benefit on medical therapy from the economic view and in those patients in whom the drug compliance is weak and

can't withstand long term treatment in addition to the side effect of drug from the pharmacological view.

LOD has a role in stimulate ovulation when we decide that clomiphene citrate therapy show failure of ovulation rate may reach 75-80% and pregnancy rate may

### Conclusion

As a second line treatment for infertility treatment in patients with PCOD, LOD has good and successful results that lead to increase using specially for patients with failure of medical treatment and poor compliance. It's beneficial as less pelvic adhesion and minimal ovarian trauma making it with fewer side effects. The results postoperatively in regarding hormone assay and conception rate are favarouable.

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