

Outcome of laparoscopic Ovarian drilling in anovulatory infertility associated with polycystic ovarian syndrome

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Abstract

Background: Polycystic ovarian syndrome (PCOS) is one of world wide endocrine problem ,affecting women during their reproductive life . 75%of women with polycystic ovarian syndrome (PCOS) complain from infertility due to Anovulatory dysfunction , together with menstrual abnormality and signs &symptoms of hyper andorganism.. One of the second line of treatment is Laparoscopic ovarian drilling (LOD) that used to induce ovulation in women with PCOS .

Objective: To assess the effectiveness of LOD surgery in management of PCOS related to an ovulation , menstrual regularity and failure of conception.

Patients and Methods: This prospective study included 47female had previously tried multiple drugs for stimulation of ovulation for conception, and undergo surgery by laparoscope ovarian drilling for period between 1st of May 2011 to 15 th of May 2016, At private hospital with follow –up for 1 year .

Results: Surgical ovarian drilling by laparoscopy was successfully done without any surgical or anesthetic problems , and follow-up the patient for 1 year . There were significant decrease ($P<0.05$) in LH, prolactine and Testosterone hormones levels with significant increase in the hormonal level of Progesterone following the LOD procedure compared to before the drilling. (70.2%) of the patient start again to had ordinary regular menstrual cycle and(61.70%) establish to ovulate spontaneously while only (48.93%) has been conceived.

Conclusion: Laparoscopic ovarian drilling appear as an efficacious and safe second line treatment for PCOS women with Clomphine acetate failure , anovulatory dysfunction and may achieve immediate correction of the patient s endocrinology with increase ovulation and pregnancy rates.

Key words: PCOS (polycystic ovary syndrome), LOD(Laparoscopic ovarian drilling),LH(luutilizing hormone),FSH(follicle stimulating hormone) ,BM I(body mass index).

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Introduction

Polycystic ovarian syndrom (PCOS) is the most common prevalent endocrine disorder to effect women during

reproductive year [1].There is significant heterogeneity of presentation of PCOS include menstrual disturbance and feature

of hyperandrogenism (hirsutism, acne, alopecia), with chronic anovulation, obesity and psychological issue [2]. It is the predominant cause of anovulatory infertility with an estimated prevalence rate of 17-20% [3]. While the pathology-physiology of polycystic ovarian syndrome (PCOS) was explained early in the 20th century by Stein and Leventhal [4], any treatment for fertility associated with this syndrome was not mentioned until 1930. The etiology of the disease of polycystic ovary syndrome is a controversial one; it is a major cause of infertility and the issues related to anovulatory infertility, the induction of ovulation and hyperandrogenemia are widely acknowledged. They are currently a variety of treatment options are shown including lifestyle modification, drug therapy and surgery [5].

Wedge resection of ovary was the first technique reported the success of surgical procedure for anovulatory PCOS treatment [6]. However, it was derelict due to its association with possibility of post-ovarian resection adhesions [7,8]. This type of surgery has been replaced by medical ovulation induction with clomiphene and gonadotrophins. But, these medications are associated with an amplified risk of ovarian hyperstimulation syndrome (OHSS) and multiple pregnancies [9-10]. Furthermore, it is costly, consuming more time and requiring regular careful hormonal and ultrasound monitoring.

The development of operative Laparoscopy in the late 1960s led to a revival of the surgical treatment of PCOS carried out laparoscopically [11]. The operation can be done on an "day hospitals" with very little surgical complication and post-operative adhesion as soon as when compared to the surgical laparotomy procedure. Laparoscopic drilling surgery is a minimal invasive procedure in which the ovaries are treated with tiny puncture

using laser or electro-cautery [12,13]. The etiology of action of LOD is not fully recognized and therefore some PCOS patients do not get benefit from this treatment. It may act by destroying partial of ovarian tissue producing androgen- or that ovarian diathermy acts by rising the sensitivity of the ovaries to endogenous follicle stimulating hormone (FSH) results in ovarian follicular development and ovulation [14]. In recent years a number of studies reported and predicting the success and effectiveness of LOD treatment for infertile women. Our study was done to assess the effectiveness of LOD surgery in management of PCOS related to anovulation, menstrual regularity and failure of conception and possible predictor factors of the success of LOD.

Patients and Methods

This prospective study involving forty seven female infertile women, diagnosed with polycystic ovarian syndrome was dependent on Rotterdam manifestation criteria which include presence of only two of features of the following manifestation: i) oligo-ovulation/anovulation; ii) hyperandrogenism (clinical/biochemical); and iii) ultrasound confirmation of polycystic ovaries [14]. Who had been tried clomiphene citrate with or without gonadotrophins (more than >3 cycles but cannot provoke ovulation or pregnancy). During the period from 1st May 2011 to 15th May 2016.

Inclusion criteria :

1-The patients age was from 20- 35 years old (mean 24.15+SD 3.3) kg/m², average BMI was between (20-35)kg/m² with mean (27.81 +SD3.5).

2-Infertility: primary or secondary of 1-9 years duration with mean (3.47+_ 2.76) .

Then clinical and pelvic examination was done with hormonal profile for all females included in this study to diagnose the PCO

women. These hormones include FSH,LH, and prolactine ,thyroid levels and Testosterone were carried on 3rd day of the menstrual cycle and progesterone at(D21). Clinical manifestation features and female profile of each women recorded by questioner , including their age , weight gain (BMI), type and length of infertility and clinical manifestation of hyperandrogenism as (acne and hirsutism) .

Exclusion Criteria

1-The following patients were excluded :

Women with associated infertility factors such as bilateral tubal block and endometriosis .

2-Severe male factor (sperm density<10million / ml, motility <30 %,morphology < 10%).

The surgical ovarian drilling technique was performed under general anaesthesia in Trendelenburg position, preformed of (3)port of trocars : one in the subumbilical area and other two in each iliac fossa.

Then introduce grasp forceps to lift the ovary by grasping the utero-ovarian ligament and a hook diathermy needle used in drilling of ovarian. The diathermy needle ,its long was 7-8 mm and 0.5 mm in diameter, the mono polar current being set to 30 W and the time of each puncture was of~1-3 s to induced 3 to 8punctures each ovary according to the dimension of each ovary . at the end of procedure washing of the pelvis

by normal saline solution of 200 ml.

After the operation , tag along and contact regularly all patients for up to 12 months.

Statistical Analysis

Statistical analysis was done by SPSS (statistical package of social science). proportion were evaluated by chi-square method ,while other continuous parametric data expressed as mean ,standard deviation and percentage were applicable . P value of <0.05 was statistically considered as a significant.

Results

Table (1) show:

Most of these patient had menstrual cycle abnormality either Oligomenorrhea (61.7%)or amenorrhea (31.9%) while only Three patient had no menstrual irregularity.

Forty two (89.36%) patient had ultrasonic manifestation and criteria of PCOS while only (10.2%) of patient their ovaries were normal appearance on ultrasounography.

Other Manifestation features include clinical hyperandrogenism,(hirsutism ,acne)were present in 36(76.5%) and 13 (27.65 %)respectively.

Thirty eight (80.8%) patients had tried previously drugs as clomiphene citrate in different doses but failed to get pregnant while other (19.14%) used gonadotrophines for induced ovulatory cycle.

Table (1): The characteristic features and profiles of 47 female with PCOS manifestation.

Characteristic	NO 47	Percentage %
Menstrual cycle pattern		
Regular	3	6.3
Oligomenorrhea	29	61.7
Amenorrhea	15	31.9
Hirsutism	36	76.5
Acne	13	27.65
Infertility primary	42	87.8
secondary	5	10
Ultrasound feature of PCOS	42	89.36
Previous ovulation induction by		
Clomid	38	80.8
Clomid + gonadotropine	9	19.14

Table (2): Hormonal profile of 47 women with PCOS before and after Laparoscopic ovarian drilling (LOD).

Hormonal profile	Before drilling	After drilling	Normal range	P - Value
FSH	5.452 +0.160	4.80 +0.125	3.5 -12.3 IU/ml	0.567
LH	9.577+0.265	6.87 +0.185	2-8 IU/ml	0.030
Prolactine	15.746 +1.359	11.153+0.952	5-32 ng/ml	0.018
Testosterone	0.920 +0.041	0.741 +0.029	0.1 – 0.9 ng/ml	0.002
Progesterone	1.659+0.609	13.597+0.632	1.5-20.0 ng/ml	0.041

In table (2) Regarding hormonal changes there was a non significant decrease in the hormonal level of FSH ($P > 0.05$) before and after laparoscopic ovarian drilling (LOD) procedure among PCOS women. However both values in normal limits. While there were significant decrease ($P < 0.05$) in LH,

prolactine and Testosterone hormones levels following the LOD procedure.

There was a significant increase in the hormonal level of Progesterone following the LOD procedure compared to before the drilling at luteal phase(day 21).

Table (3): Outcome of laparoscopic Ovarian drilling regarding Reproductive health.

Reproductive health after LOD	NO.	Percentage%
Menstrual cycle pattern		
Regular	33	70.2
Irregular	14	29.7
Ovulation		
Spontaneous	29	61.70
With help CC	12	25.53
With help HMG	6	12.76
Pregnancy		
Ongoing - delivery	21	44.68
Miscarriage	2	4.25
Ectopic	nil	
No pregnancy	24	51.1

The table (3) shows: clinical results of laparoscopic ovarian drilling in categories of cycle regularity, ovulation and pregnancy.

Thirtythree patients (70.2%) restart regular menstrual cycle whereas 14 (29.7%) patients stay complain from menstrual irregularity, spontaneous ovulation occurred

in61.70% patients, while 25.53% ,12.76% did so after supplemental CC and gonadotrophin use respectively.

Total pregnancies occurred after LOD were 23 (48.93%), out of these 2 ended in miscarriage.

Table (4): Factors that predict successful treatment of laparoscopic ovarian drilling.

Characteristic of patient	Conceived within 12 month (n=23)	Not conceived with in 12 month(n=24)	P
Mean Age	23.35(2.98)	27.12(3.48)	0.05
Mean of body mass index	26.11(2.99)	28.66(3.80)	NS
infertility period in years	2.42(2.64)	4.75 (2.89)	0.004
Before -treatment			
LH(IU\L)	13.2(7.52)	8.67(3.83)	0.03
FSH(IU\L)	2.45(1.3)	1.93(0.67)	NS
Infertility primary secondary	22 1	20 4	
USG of PCOS typical of pcos A typical ofpco	21 2	21 3	

Table (4) this table demonstrate the effectiveness of multiple factors on the treatment Success of ovarian drilling . Age of patient emerged a significant factor, while the Body mass index had no clinical significant difference in both groups. Regarding period of infertility, the shorter

duration, the better successful outcome. level of LH more than10 IU\L before operation also shows a effectual significance as compared to non pregnant group . while other factors infertility(primary or secondary) and ultrasonic Features of

polycystic ovaries did not show any clinical significant .

Discussion

In the present study ,laparoscopic ovarian drilling (LOD) has been used to induce ovulation and corrects the endocrine abnormalities associated with PCOS syndrome. It has been found direct endocrine responses to LOD with significantly lowered serum concentrations of LH and T in women who undergo LOD were compared to before drilling with transient decline of gonadotrophins level (LH and FSH). Which agree to those founded by Campo et al [15] ,Naether OGL et al[16], Sagle M et al [17] that,demonstrating the effects LOD in decrease the LH.:FSH ratio and the serum concentration of LH and androgen.

However the decrease in prolactine hormone reported in this work was controversial to the study by GreenblattE[18] who recorded an hyperprolactinemia decreased serum testosterone concentrations following LOD and remain low for up to 6 years. this study cannot confirm these long –term endocrine changes formed by ovarian drilling because of the short –term period of the study of follow up of patient which was approximately for one year .

Among 47 PCOS women ,70.2% resumed regular menstruation,61.7% started to ovulate spontaneously with pregnancy rate 48.93% after LOD in this study . While Gjonnaess[19] and , Li et al [20] reported their studies a higher ovulation rates around -80 -90% and a pregnancy rate of 70% after laparoscopic ovarian electrocoagulation in patients with PCOS. dissimilarity in response may be recognized to the use of other form of energy modalities such as CO2 laser and Argon in adding to the diathermy or different periods of follow up .

In this study, assessment the effect of a variety of clinical factors and biochemical level with ultrasonographic criteria of

polycystic ovarian syndrome that may expect that clinical outcome of laparoscopy in 47 women with PCOS .result of our study present as 3 main factors to have important role on effectiveness of laparoscopy i.e age of women ,period of infertility and LH level before operation.

Period of infertility(less than 4 years) had an important impact effect that may predict successfulness' of laparoscopy ($p<.004$), which is similar with a study by Amar et al.[21]A likely explanation for this , may be the appearance of other co-existence fertility factors as length of infertility become longer . also the age of infertile women emerge as a considerable significant factor($p< 0.05$).the younger age group of female less than 25 years had more successful result when compare to other group who their age >25 years old .

Women who respond to ovarian drilling with serum concentration of LH more than10 IU/L pre-operation, achieve higher pregnancy rates ($p<0.05$)than those whose LH less than 10U/L which similar to Gadir *et al* [22] that found better responder in women with elevated LH . After laparoscopic drilling ,serum concentrations of both LH and testosterone reduce .This increases the probability of conception and danger of abortion [23-24]. On additional ,the precise mechanism or action of laparoscopic ovarian drilling to induce ovulation remains unclear ,unilateral diathermy leads to two-sided ovarian action suggestive of that laparoscopic ovarian drilling achieve its result by correcting the disorder of ovarian pituitary feedback(26).

Balen et al theorize that ovarian damage leads to liberate of restricted cascade of growth factors such as IGFI that interacts with FSH and leads to follicular enlargement and ovulation. adding to this ovarian damage can led to alteration in intra ovarian surroundings from androgen to estrogen excess by destroying the androgen producing

tissue and this support follicular development and ovulation [25].

The impact of elevated BMI or obesity on women who respond to ovarian drilling is disputable. both decreased ovulation and pregnancy rate as compared to non-obese women [26-27]. Gjonnaess[19] shows that obese women who undergo surgical ovarian drilling by laparoscopy for infertility can achieve significantly lesser ovulation rates(70%) as compared with slimmer women. While Abdel Gadir et al[22] show that body weight was similar between women who ovulated than not. In our study, patients who responded to LOD were overweight with mean BMI of (26.9)Kg/m² but there was upward trend in achieving pregnancy as compared to women with higher BMI but clinical significance was not approved which similar to Gjonnaess. So Loss of weight helps in a change in hormonal milieu as well as making surgery free of anesthesia risk.

Conclusion: Laparoscopic ovarian drilling is an effective procedure for induction ovulation in women with PCOS, when Clomiphene fails, with either persistently LH, needs laparoscopic assessment of pelvis. LOD is out of risks of multiple pregnancy and hyperstimulation of ovary, causes less ovarian trauma and does not carry side effect of medical therapy.

References

[1] Rotterdam ESHRE\ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. *Hum Reprod*. 2004;19:41–7.

[2] Cussons AJ, Watts GF, Burke V, Shaw JE, Zimmet PZ, Stuckey BG. Cardiometabolic risk in polycystic ovary syndrome: a comparison of different approaches to defining the metabolic syndrome. *Hum Reprod*. 2008;23:2352–8.

[3] March WA, Moore VM, Willson KJ, Phillips DI, Norman RJ, Davies MJ. The prevalence of polycystic ovary syndrome in a community sample assessed under contrasting diagnostic criteria. *Hum Reprod*. 2010;25:544–51.

[4] Asuncion M, Calve RM, San Millan JL *et al*. A prospective study of the prevalence of pcos in unselected causation women from Spain. *Endocrinol Me tab*. 2000;85:2434-4.

[5] Rajashekar L, Krishna D., Patel M polycystic ovaries and infertility. Our experience. *J Hum Reproduction*. 2008;1:65-72.

[6] Adashi EY, Rock JA, Guzick D *et al*. Fertility following bilateral ovarian wedge resection: a critical analysis of 90 consecutive cases of the polycystic ovary syndrome. *Fertiity steril*. 1981;36:320-5.

[7] Buttram VC Jr, Vacquero C. postovarian wedge resection adhesive disease. *Fertil steril*. 1975;26:874-2.

[8] Itra S, Nayak PK, Agrawal S. Laparoscopic ovarian drilling: an alternative but not the ultimate in the management of polycystic ovary syndrome. *J Nat sci Biol Med*. 2015;6(1):40-8.

[9] A Balen, R Homburg, S Franks. Defining polycystic ovary syndrome. *Bmj*. 2009;338:2968.

[10] Group TREAsPcw. Revised 2003 consensus on diagnostic criteria and long term health risks related to polycystic ovary syndrome (PCOS) *Human Reoroduction*. 2004;19:41.

[11] Kovacs G, Buckler H, Bangah M, Outch K, Burger H, Healy D, *et al*. Treatment of anovulation due to polycystic ovarian syndrome by laparoscopic ovarian electrocautery. *Br J Obstet Gynaecol* 1991;98:30-5.

[12] Bayram N, van wely M, Kaaijk EM *etal*. Using an electro cautery strategy or re combinant folic stimulating hormone to

- induce ovulation in PCOS. *BMJ*. 2004;328:192-2.
- [13] Mitra S, Nayak PK, Agarwal S. Laparoscopic ovarian drilling: An alternative but not the ultimate in the management of polycystic ovary syndrome. *J Nat Sci Biol Med* 2015;6:408.
- [14] Farquhar C, Lilford RJ, Marjoribanks J, et al. Laparoscopic "drilling" by diathermy or laser for ovulation induction in an ovulation PCOS. *Cochrane Data base syst. Hum Reproduction*. 2005;20.
- [15] Campo S, Felli A, Lamanna MA, et al. Endocrine changes and clinical outcome after laparoscopic ovarian resection in women with polycystic ovaries. *Hum Reprod*. 1993;8:359-63.
- [16] Naether OGL, Fisher R, Weise HC, et al. Laparoscopic electrocoagulation of the ovarian surface in infertile patients with polycystic ovarian disease. *Fertil Steril*. 1993;60:88-94.
- [17] Sagle M, Bishop K, Ridly N, et al. Recurrent early miscarriage and ovaries. *BMJ*, 1988;297:1027-28.
- [18] Greenblatt E, and Casper, R.F. Endocrine changes after laparoscopic ovarian cautery in polycystic ovary syndrome. *Am. J. Obstet. Gynecol.* 1987;156:279-285.
- [19] Gjonnaess H. Polycystic ovarian syndrome treated by ovarian electrocautery through the laparoscope. *Fertil Steril*. 2005;41:20-5.
- [20] Li TC, Saravelos H, Chow MS, et al. Factors affecting the outcome of laparoscopic ovarian drilling for polycystic ovarian syndrome in women with anovulatory infertility. *Br J Obstet Gynaecol*. 1998;105:338-44.
- [21] Amar SA, Gopalan V, Li TC, WL, Cook ID. Long term follow up of patients with Polycystic ovarian syndrome after laparoscopic ovarian drilling. *Clinical outcome. Hum Reprod*. 2002;17:1046-1051.
- [22] Abdel Gadir A, Khatim MS, Alnaser HMI, Mowafi RS, Shaw RW. Ovarian electrocautery; responders versus non-responders. *Gynecol Endocrinol* 1993; 7: 4348.
- [23] Imani B, Eijemans M, Fauser BC. Predictors of chances to conceive in ovulatory patients during clomiphene citrate induction of ovulation of induction in normogonadotrophic oligomenorrheic infertility. *J Clin Endocrinol Metabol*. 1999; 84: 1617-1622.
- [24] Palomba S, Orio F Jr, Falbo A, Russo T, Caterina G, Manguso F, et al. Metformin administration and Laparoscopic Ovarian drilling improve ovarian response to clomiphene citrate (CC) in oligo-anovulatory CC-resistant women with polycystic ovary syndrome. *Clin Endocrinol* 2005;63:631-5.
- [25] Amer SA, Li TC, Ledger WI. Ovulation induction using laparoscopic ovarian drilling in women with polycystic ovarian syndrome: Predictors of success. *Hum Reprod*. 2004; 3: 1-6. 28-Gjonnaess H. Ovarian electrocautery in the treatment of women with polycystic ovary syndrome (PCOS). Factors affecting the results. *Acta Obstet Gynecol Scand*. 1994; 73: 407-412.
- [26] Kriplani A, Manchanda R, Agarwal N, et al. Laparoscopic ovarian drilling in clomiphene citrate-resistant women with polycystic ovary syndrome. *J Am Assoc Gynecol Laparosc* 2001;8:511-8.
- [27] Kaya H, Sezik M, Ozkaya O. Evaluation of new surgical approach for the treatment of clomiphene citrate resistant infertility in polycystic ovary syndrome: laparoscopic ovarian multi-needle intervention. *J Minim Invasive Gynecol* 2005;12:355-8.