ORIGINAL ARTICLE

LAPAROSCOPIC OVARIAN DRILLING FOR POLYCYSTIC OVARIAN SYNDROME: TREATMENT OUTCOME

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Background: Anovulatory infertility due to polycystic ovarian syndrome (PCOS) remains the commonest cause among women of reproductive age group. Although clomiphene citrate (CC) remains the first choice treatment in addition to other medical therapies, laparoscopic ovarian drilling (LOD) is rapidly gaining acceptance as a second line management in patients who failed to respond to CC. This study was done to evaluate the efficacy of LOD in management of PCOS related infertility. **Methods:** This was a descriptive study conducted at CMH Peshawar, CMH Kharian, and PAF Hospital Mushaf, from 2004 to 2011. It included 69 patients who underwent LOD for anovulatory infertility after being diagnosed as PCOS. Patients were diagnosed on the basis of their clinical, hormonal and ultrasonic findings. Age of the patients, features suggestive of hyperandrogenism, body mass index (BMI), duration of infertility, and LH/FSH ratio were noted. Patients were followed post-operatively for one year. **Results:** Overall ovulation rate was 82.61% after LOD. Thirty-one out of 69 patients ovulated spontaneously within first 6 weeks after LOD while 26 patients ovulated on getting treatment with CC in addition to LOD. Thirty-three (47.82%) patients conceived in their first year after surgery. About 54% of patients reported improvement in their symptoms related to hyperandrogenism. **Conclusion:** LOD is an established and safe method as a second line treatment for PCOS related infertility.

Keywords: Polycystic Ovarian Syndrome, Laparoscopic ovarian drilling

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the commonest cause of anovulatory infertility in about 75% of women of reproductive age group.[1] The syndrome first defined by Stein and Leiventhal in 1935 consisted of irregular anovulatory bleeding, obesity, hyperandrogenism, abnormal ovarian morphology and atypical gonadotrophin secretions.[2,3] clomiphene citrate (CC) remains the first choice of treatment in management of anovulatory amenorrhea but achievement of pregnancy occurs in about 35–40% of cases.[4] Failure to respond to CC and other drug therapies resulted in more invasive procedures such as wedge resection of ovaries, multiple ovarian biopsies and others.[5] Although successful in many cases, these invasive procedures resulted in pelvic adhesions that augmented infertility further and increased morbidity to the patients.[6] With the advent of microsurgical techniques these adverse effects were reduced to minimal. Electrocautery punctures of ovarian capsule using laparoscopic instruments resulted in similar results with less pelvic adhesions and operative trauma.[7] The purpose of this study was to illuminate the efficacy and effectiveness of laparoscopic ovarian drilling (LOD) in treating anovulatory infertility associated with PCOS.

MATERIAL AND METHODS

Initially data from 134 patients with anovulatory infertility and menstrual irregularities due to PCOS was examined. Twenty patients were lost to follow-up, while 12 patients had other endocrine abnormalities in addition to PCOS. Fifteen patients had mechanical factors contributing towards their infertility such as uni- or bilateral tubal blockage and pelvic adhesions. Another excluding criteria was co-existing male infertility for 18 patients. Therefore, 69 patients were included in this study. These 69 patients were treated over a time period from 2004 to 2011 in various military hospitals. All these women had anovulatory infertility of 1–9 years of duration and had unsuccessful treatment with diagnosis of PCOS on the basis of clinical history, hormonal assay and transvaginal ultrasonographic findings. Clinical features included infertility of 1–9 year duration, menstrual problems (oligo/amenorrhea), weight gain (BMI 30–35 $Kg/m^{2)}$, features suggested of hyperandrogenism (hirsutism and acne). Hormonal assay revealed low serum FSH and a high LH level with LH/FSH ratio >2. Serum samples were taken randomly Ultrasound scanning: Patients who underwent trans-vaginal ultrasound before surgery possessed abnormal morphological features of ovaries characterised by hyperechogenic enlarged central stroma with more than 9 follicles of 5–9 mm diameter situated mainly on the periphery. Ovaries were located in relation to iliac vessels and volume of each ovary was calculated by measuring longitudinal, anterio-posterior and transverse diameter and a mean volume of both ovaries in each patient was recorded. LOD; Three port laparoscopy was performed. A specially designed hook probe was used to make 4–8 punctures in ovarian capsule depending upon the size and thickness of each ovary. A mono-polar current of 35 W was applied with a contact time of 2–4 seconds. Procedure ended with a saline wash of pelvis in order to cool the ovaries. Postoperatively patients were discharged the same day and were followed regularly for ovulation and conception till one year. If menses did not start for initial 6 weeks blood

samples were collected for FSH and LH and treatment with CC was started six wks post LOD. If menstruation/ovulation was achieved with CC, then patients were followed for 12 months for conception.

SPSS-11 was used for data recording and analysis. Patients' characteristics including age, BMI, duration of infertility, symptoms related to hyperandrogenism (acne/hirsutism), menstrual irregularities, LH/FSH ratio and ovarian volume were recorded. Effects of LOD were analysed in each of category. Student's *t*-test was used for comparison of analysis between groups. Pearson χ^2 test for linear trends was used to assess trends across categories and between categories of each factor, and $p<0.05$ was taken as significant.

RESULTS

Sixty-nine patients underwent LOD for PCOS related anovulatory infertility and 31/69 (44.92%) resumed menses and ovulated spontaneously within 6 weeks following LOD, while 21/69 (37.68%) ovulated after receiving treatment with CC (150 mg daily for 5 days). Thus overall ovulation rate was 82.60% after LOD. Forty-five out of 57 patients maintained their regular cycles during their first year after LOD, while 12 developed mild to moderate menstrual irregularities; 33/69 (47.82%) patient conceived in the first year following surgery. Five patients among these 47.82% conceived in their first menstrual cycle. Out of 33 pregnancies 7 ended in miscarriage and one was ectopic pregnancy. Sixteen out of 29 patients who claimed their acne improvement in their symptoms after LOD while one said that it got worse. Hirsutism also improved in 8 out of 15 patients after surgery. Our study failed to identify any factor that influenced the outcome of LOD significantly. Table-2 illustrates the ovulation and pregnancy rates in different categories of Age, BMI, acne and hirsutism, duration of infertility, LH/FSH ratio and ovarian volume.

Table-1: Patients' profile

Parameter	Range	Mean	SD
Age (years) n=69	20–42	29	4.5
BMI kg/m2 n=60	25–35	31	3.8
Duration of infertility (Yr) (n=65)	1–9	3.5	1.1
Serum LH (n=61)	10.2–28	18	2.4
Serum FSH (n=61)	2–8	6.1	1.8
LH/FSH (n=61)	1.8–7.7	3.6	4.4
Ovarian volume (n=50)	11–17	14	2
Acne			
Yes		29	
No		40	
Hirsutism			
Yes		15	
No		54	
Menstrual history			
Regular		5	
Oligomenorrhoea/amenorrhea		64	

Table-2: Results of LOD in each category of patients

Parameter	Category	n	Ovulation	Pregnancy
Age	<30	37	31	19
	>30	32	26	14
BMI Kg/m^2	<30	20	16	9
Cut-off point 35	>30	40	34	17
Acne	Yes	29	23	13
	No	40	34	20
Hirsutism	Yes	15	12	6
	No	54	45	27
Duration of infertility	1–3 years	36	30	16
	4–9 years	29	25	14
LH/FSH ratio	1.8–3.5	28	22	14
	3.5–7.7	33	28	16
Ovarian volume	<14	22	17	12
	>14	28	21	14

DISCUSSION

The range of women in reproductive age group have PCOS as a major cause of infertility is 5–10%[8], whereas, PCOS accounts for approximately 75% of women with anovulatory infertility.[9] Treatment with CC remains first line of management to induce ovulation which is administered in accordance to NICE guidelines.[10] Ovulation rate after 6 cycles of CC treatment is about 70–80% with a pregnancy rate of 40%.[11,12] CC resistant cases are usually given second line treatments. Metformin, an insulin sensitising oral anti-hyperhyperglycaemic agent is being increasingly used as second line drug to induce ovulation and pregnancy in CC resistant cases especially in obese patients. (BMI 25–30 Kg/m^2). Although results may be encouraging with added advantage of reduction in miscarriages and a decreased likelihood of developing gestational diabetes[13], but it does not show any significant advantage over CC with respect to ovulation, pregnancy or live birth rate[14]. Other similar drugs like rosiglitazone and pioglitazone have little short-term risk, but their foetal safety has not been established. Other treatment options include ovulation induction with gonadotrophins having risk of ovarian hyper-stimulation syndrome and multiple pregnancies. To prevent a low dose step-up regime is being used. A careful serial ultrasound monitoring is indicated and if there are more than 7 follicles >8 mm on day 8, cycle may have to be cancelled.[15] Up to 18% of cycles may have to be abandoned and a multiple pregnancy rate of 6% has been reported.[16] Obesity is seen in 35–60% of women with PCOS and is implicated for lack of response to CC, gonadotropins and LOD. Weight loss improves endocrine profile and increases the chance of ovulation and pregnancy. A mere loss of 5% of the initial weight is considered beneficial in inducing normal menses and ovulation.[17] Surgical ovarian induction with LOD is as effective as induction of ovulation with gonadotropins but it is not associated with a risk of multiple pregnancies. The aim of treatment with LOD is to

induce regular unifollicullar ovulation, while minimising the risks of ovarian hyperstimulation and multiple pregnancies. LOD has therefore been widely used to induce ovulation induction in PCOS women after failure with CC. It is associated with an ovulation rate of 70–80% and a conception rate of 50–60%.[18] Response may be gratifying though a few anovulatory PCOS women fail to respond to LOD. This may be due to prolonged duration of infertility, a high BMI, and marked hyperandrogenism, therefore, resulting in an inherent resistance of ovary to surgery.[19] Our study failed to establish any affect of these factors on our own results, i.e., ovulation rate of 82.60% and conception rate of 47.82%. Even other factors such as age, ovarian volume and LH/FSH ratio failed to establish any association with the rate of ovulation and pregnancy. LOD is generally chosen for patients with young age, CC resistance, raised LH levels, and exaggerated response to gonadotropins and non compliance with excessive monitoring. It is believed that that ovarian diathermy works by increasing the sensitivity of ovaries to endogenous FSH and a minimal amount of thermal injury is required. We applied 4–8 drilling points depending upon the volume and thickness of ovarian capsule. It is reported that unilateral drilling of ovary with cauterisation may be equally effective as bilateral drilling in inducing ovulation and conception with potential advantage of less trauma and less pelvic adhesions.[20] Keeping in view of these potential advantages an alternative procedure of laparoscopic ovarian multi-needle intervention (LOMINI) has been reported with a cumulative pregnancy rate of 35.3%.[21]

CONCLUSION

Laparoscopic Ovarian Drilling (LOD) is an effective second line treatment for PCOS related infertility in patients who failed to respond to CC. It causes less ovarian trauma and less pelvic adhesions and does not carry the side-effect of hormonal therapy.

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