

Role of Laparoscopic Ovarian Drilling as a First Line Management in Infertility with Polycystic Ovarian Disease

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Abstract

Polycystic ovarian disease (PCOD) is the most common endocrine disorder in women of reproductive age. The pathogenesis is not completely clear still today. Problems in inducing ovulation in PCOD is well recognized. A retrospective study of last 3 years in patients attending the OPD in the Department of Obstetrics and Gynecology, JNMC, Sawangi, Wardha, who were diagnosed as cases of PCOD with complaints of infertility and irregular menstrual cycle underwent laparoscopic ovarian drilling. It was concluded that the procedure had higher ovulation and successful pregnancy rate. It is cost-effective, minimally invasive procedure with lesser hospital stay with less postoperative complications, being ideal for rural setup.

Keywords: PCOD, infertility, ovarian drilling.

INTRODUCTION

Polycystic ovarian disease (PCOD) is the most common endocrine disorder in women of reproductive age.¹ Clinical presentations are those of hyperandrogenemia like hirsutism, acne, together with anovulation, infertility and oligomenorrhea.^{1,2} Ultrasound features are enlarged ovaries > 5 cc with more than 10 cysts 2 to 8 mm in diameter scattered either around or through an echodense thickened central stroma.^{3,4} Infertility due to chronic ovulation is the most common reason for women seeking counseling or treatment in rural area. The pathogenesis is not completely clear still today. However, the syndrome is characterized by an increased frequency of LH pulse over FSH favoring the androgen production by ovarian theca cells and the increase of estradiol conversion in granulosa cells. Insulin also plays a key role in the pathogenesis of PCOS acting synergistically with LH on theca cells, and reducing the sex hormone binding globulin (SHBG) and thus increasing the biologically active androgen levels. In addition, several paracrine and autocrine factors mediate the effect of LH and insulin.¹ Many treatment protocols, surgical and medical have been recommended to control polycystic ovary syndrome. Life style modification to reduce body mass index (BMI), oral metformin and antiandrogenic drugs are considered as basic modality of management. Anovulation can be treated medically in some cases with antiestrogen, but a proportion of patients fail to respond, and of those who ovulate, the pregnancy often

occurs later and the miscarriage rate is high. Gonadotropin therapy may be more successful, but it is expensive, and there is a significant risk of hyperstimulation and multiple pregnancy hence require critical monitoring. In 1935, Stein Leventhal proposed wedge resection of the ovaries as a treatment option for clomiphene resistant polycystic ovarian syndrome. This met with remarkable success regarding resumption of ovulation, but was abandoned, because of postoperative peri-ovarian adhesions. A revived surgical approach to patients with PCOS and infertility is laparoscopic ovarian drilling (LOD), introduced by Gjonnaess in 1984. Introduction of laparoscopic ovarian drilling together with the rapidly expanding field of operative laparoscopy, surgical management has received renewed interest. In recent years, a number of studies reported the success and utility of this form of treatment that resulted in good ovulatory and pregnancy rates.

MATERIALS AND METHODS

Main objective of study was to evaluate the effectiveness of laparoscopic ovarian drilling in polycystic ovarian syndrome in terms of pregnancy rate. Secondary outcome measures were other clinical parameters like menstrual pattern and ovulation rates. In a retrospective study conducted in the Department of Obstetrics and Gynecology at Jawaharlal Nehru Medical College-Acharya Binova Bhave Rural Hospital, Sawangi, Wardha. 50 cases of polycystic ovarian disease underwent into laparoscopic

ovarian drilling, between July 2007 to July 2009, whose follow-up records were available selected as study group. Their medical records were reviewed for a detailed history of infertility and menstrual irregularities for at least 2 years. Other parameters were recorded as age, duration and type of infertility, obesity, acne, hirsutism, details of menstrual history (amenorrhea, oligomenorrhea, irregular cycle). Clinical and biochemical evidence of hyper androgenemia was noted. Pre- and post-procedure FSH, LH, DHEA, Insulin and T₃, T₄, TSH was tried in every woman but due to cost restrain in was not obtained universally hence not included in the parameters of outcome. Presence of characteristics of polycystic ovarian syndrome on ultrasound examination; which showed: Ovarian stromal hypertrophy and multiple small⁶⁻⁸ follicle arrange in the periphery and enlarged ovarian volume, calculated by using the formula 0.523 × length × width × thickness of each ovary. All patients underwent laparoscopic drilling of 4-5 punctures in each ovary of 5 mm depth using monopolar electrocautery in early follicular phase of cycle (6-9th day of LMP). Tubal patency was also checked simultaneously by methylene blue chromopertubation test. Patients with patent tubes only were taken for study. Women were watched for spontaneous ovulation, menstrual pattern and conception. Ovulation induction was planned after 3 months only, by clomiphene citrate or letrozole and cases were followed for further 6 to 9 months.

RESULTS

Amongst the total 50 women majority of them were in between 26 to 33 years. Average duration of infertility was 3 to 5 years. Most of the women were oligohypomenorrhic (Table 1).

On the contrary of most common association of PCOD with obesity, majority of our women had BMI of 24 to 30. Although, association with sedentary life style and excessive dietary fat intake was present. Acne was commonest to present although 20% did not exhibit any features of hyperandrogenemia (Table 2).

Table 1: Distribution of the study population according to their demographic characteristic (n = 50)

Parameters	No	frequency
Age (in years)		
> 30	10	20%
26-30	24	48%
19-25	16	32%
Duration of infertility (in years)		
1-2	14	28%
3-5	28	56%
5-7	8	16%
> 7	4	8%
Menstrual pattern		
Oligomenorrhea	16	32%
Oligohypomenorrhea	20	40%
Normal menstrual cycle	12	24%
Menorrhagia/polymenorrhagia	2	4%

Table 2: Showing factors influencing PCOD

Parameters	No	Frequency
Body mass index		
1. > 30	16	32%
2. 24-30	30	60%
3. < 24	04	8%
Lifestyle		
1. Sedentary life style	32	64%
2. Moderate worker	16	32%
3. Heavy worker	02	4%
Dietary habits		
1. More of fat intake	32	64%
2. Less fat intake	18	36%
Acne and hirsutism		
1. Acne	22	44%
2. Hirsutism	20	40%
3. Both	16	32%
4. None	10	20%

Table 3: Showing the outcome of the ovarian drilling

Parameters	Frequency
Menstrual cycle pattern after 3 months	
1. Regular	78%
2. Irregular	22%
Outcome of ovulation	
1. Successful ovulation	36 (72%)
2. Mean duration	2-5 months
3. Spontaneous	21
4. With induction agent	15
Outcome of pregnancy	
1. Total number of pregnancy	24 (48%)
2. Mean duration	3-9 months
3. Spontaneous	17 (34%)
4. With induction agent	7 (14%)
5. Delivered	11 (22%)
6. Ongoing	9 (18%)
7. Miscarriage	3 (6%)
8. Ectopic	0

Lifestyle modification was advised to all: 78% women had normal menstrual cycle after 3 months. Successful cumulative ovulation rate of 72% was observed by follicular study, with a mean duration of 2 to 5 months, successful pregnancy rate of 48%, a mean duration of 3 to 9 months (Table 3).

DISCUSSION

Polycystic ovarian disease is a heterogeneous group of conditions. It ranges from individuals with normal body weight, regular menstrual cycles with ultrasonic findings of polycystic ovaries to those of the full clinical picture of oligomenorrhea, obesity, hirsutism and hyperandrogenemia.¹ In 1930, before the good understanding of the hypothalamic pituitary ovarian axis, before the radioimmunoassay concept, and before the presence of drugs for ovulation induction, Stein and Leventhal described the classic syndrome which bears their names. Over the next 35 years, surgical treatment in the form of wedge resection was the accepted treatment of polycystic ovary

syndrome¹ In the first reported series, ovarian cauterization by electrocautery resulted in ovulation in 90%, and conception in 70% of the women treated. A significant number of subsequent studies have produced similarly encouraging results, despite the variation in technique and degree of damage caused to the ovary. The main adverse effect is the risk of periovarian adhesion formation.³ Laparoscopic ovarian drilling replaced ovarian wedge resection as surgical treatment for women with polycystic ovarian syndrome.⁵ It is free of the risks of multiple pregnancies, ovarian hyperstimulation and does not require intensive ultrasound monitoring.⁶ Further more, ovarian diathermy appears to be as effective as routine gonadotropin therapy in the treatment of women with polycystic ovarian syndrome Gjønaess with his multielectrocauterization in PCOD achieved an ovulation rate of 92% and pregnancy rate of 69%. And the abortion rate was 15%. He proposed electrocauterization as the primary treatment for women with PCOD undergoing laparoscopy for any reason irrespective of their fertility status.² Amer and Iachelin followed patients PCOS treated with LOD for a period of 3 years. They applied diathermy to each ovary for 4 sec at a time in four places. 86% ovulated within an average time period of 23 days. 66% women became pregnant.⁷ Other study achieved a spontaneous ovulation rate of 70.1%, cumulative ovulation rate of 98.3%, and pregnancy rate of 84.5%.⁸ Pregnancy rate of 61% observed in a mean period of 135 days in a study conducted in Denmark.⁹ A similar study showed a spontaneous ovulation rate of 70.1%, cumulative ovulation rate of 98.3%, and pregnancy rate of 84.5%.¹⁰ In few studies, it was observed that LOD responders who had lower pretreatment LH levels or a lower LH/FSH ratio were more likely to continue to benefit from the treatment for a longer period compared with those who had higher pretreatment LH or LH/FSH ratio who were more likely to experience a recurrence of their anovulatory status after several months of treatment⁴ but due to affordability factor it was not taken in to the study. Treating women as a primary mean or with clomiphene-resistant polycystic ovarian syndrome by laparoscopic ovarian diathermy results in reduced direct and indirect costs. The reduction in multiple pregnancies makes the alternative of surgery particularly attractive.⁵ Surgical therapy with laparoscopic ovarian 'drilling' (LOD) may avoid or reduce the need for gonadotrophins or may facilitate their usefulness. The procedure can be done with less trauma and fewer postoperative adhesions than with traditional surgical approaches.⁶ A strategy with diagnostic laparoscopy and LOD as the first line of treatment of infertility in women with PCOS will shorten the time to pregnancy for many women, reduce the need for medical ovulation induction and enable diagnosis of those women with anatomic infertility, who can achieve pregnancy only by *in vitro* fertilization treatment.⁹ In addition, laparoscopic ovarian drilling is useful therapy for anovulatory women with polycystic ovarian syndrome who failed to respond to clomiphene citrate and who either persistently hypersecrete LH or who live too far away from the hospital to be able to attend for the intensive monitoring

required for gonadotropin therapy.¹¹ Duration of infertility > 3 years, BMI 35 kg/m², FAI ≥ 15 and/or testosterone 4.5 nmol/l are relatively poor responder to laparoscopic ovarian drilling hence alternative methods of treatment for this group of patients such as weight reduction, metformin, gonadotrophin therapy or IVF are to be taken into consideration.⁴ As an alternative to standard laparoscopic procedures, transvaginal ovarian capsule drilling has been shown to be successful in several pilot studies. The transvaginal approach has the advantage of being incision free as it uses a needle-puncture technique, and it "offers a direct access to the tubes, ovaries and fossa ovarica."¹² but some large scale studies needed to prove it.

CONCLUSION

The value of laparoscopic ovarian drilling as a primary treatment for subfertile patients with anovulation (failure to ovulate) and polycystic ovarian syndrome (PCOS) is undetermined. There is insufficient evidence to determine a difference in ovulation or pregnancy rates when compared to gonadotrophin therapy as a secondary treatment for clomiphene resistant women. Multiple pregnancy rates are reduced in those women who conceive following laparoscopic drilling. The Cochrane analysis highlighted the main advantage of ovarian drilling—A very high prevalence of monofollicular ovulation and therefore a significant reduction in multiple pregnancy rates compared with gonadotrophin therapy. Further possible advantages of LOD are a reported reduction in miscarriage rates, that it is an often successful "one-off" procedure which may avoid the use of expensive medical therapy and the exclusion of ovarian hyperstimulation syndrome. If ovulation is not forthcoming within 2-3 months following LOD, then ovulation induction can often be more successfully employed afterwards than preceding the operation.¹³ The diagnosis of PCOD needs ultrasound in addition to laboratory assays. The treatment cycle should be carefully monitored by hormonal assays and ultrasonic folliculometry to prove the occurrence or failure of ovulation and in turn failure of the treatment protocol. Though many studies have shown the comparative values of pre- and postoperative LH and FSH values in the successful outcome, it should have been taken in this study, but due to lack of financial support of our study group, we had to exclude this criteria. The role of behavioral modification like regular exercise and change in eating habits should be advised. The procedure of ovarian drilling is simple with less trauma and fewer postoperative adhesions and long lasting hormonal changes that take place afterwards improve the general health of the patient and thus reduce the risk of developing diseases such as diabetes mellitus, endometrial carcinoma, ovarian cancer, myocardial infarction and hypertension, all of which are associated with PCOD.^{14,15} In conclusion, laparoscopic ovarian drilling is effective in the induction of ovulation and increasing the pregnancy rate in cases of PCOD as a primary management, particularly in rural areas, where repeated hormonal assay is not affordable and

gonadotrophin therapy is not feasible due to high cost and lack of monitoring facilities.

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