

# Outcome of Ovarian Drilling in Women with Polycystic Ovary Syndrome

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## ABSTRACT

**Objective:** To determine the effectiveness and safety of laparoscopic ovarian drilling (LOD) in inducing ovulation in women with polycystic ovary syndrome (PCOS) who failed to conceive after medical methods of ovulation induction.

**Materials and Methods:** A retrospective study of all women who underwent LOD as a treatment for anovulatory infertility between January 2010 and December 2011 was conducted. Women diagnosed to have PCOS by the Rotterdam criteria were considered for the study. Those who had PCOS but were associated with male factor infertility, deep infiltrating endometriosis and submucous fibroids were excluded.

**Results:** A total of 43 women underwent LOD during the study period. Majority were aged 26 to 30 years and two-thirds were overweight or obese. Most (72%) of them had primary infertility.

Other factors which could have contributed to infertility such as superficial endometriosis, septate uterus and unilateral tubal block were observed in 30.2% of the women, which were dealt with concomitantly. When we excluded the 14% who were lost to follow up, 23 of 43 (53.5%) women achieved pregnancy and almost 70% of them did so within the first 6 months. None of our study population had ovarian hyperstimulation or multiple pregnancy.

**Conclusion:** LOD thus not only helps in regulating ovulation and enhancing conception rates but also provides an opportunity to assess the pelvis for other potential causes of subfertility which could be treated at the same time. We therefore believe that diagnostic hysteroscopy and laparoscopy should be offered quite high-up in the hierarchy of infertility investigations and treatment.

**Keywords:** Anovulation, Infertility, Laparoscopic ovarian drilling, Polycystic ovarian syndrome

## INTRODUCTION

Polycystic ovary syndrome (PCOS) is a very common endocrine disorder accounting for 90% of anovulatory infertility [1]. Oligo-ovulation and anovulation in this group of women is a major cause of infertility needing treatment for ovulation induction or assisted reproductive techniques. Insulin resistance and hyperinsulinaemia are central to the pathophysiology of PCOS, but these features are clearly not essential to the development of the syndrome, especially in lean women. Nevertheless, even if insulin resistance or hyperinsulinaemia is not the cause, it does amplify hyperandrogenism in women who gain weight. The mechanism of action of laparoscopic ovarian drilling (LOD) is not fully understood. It may act by destroying ovarian androgen-producing tissue and reducing the peripheral conversion of androgens to estrogens. However, others believe that ovarian diathermy works by increasing the sensitivity of the ovaries to endogenous follicle stimulating hormone (FSH), and that only a minimal amount of thermal injury is required [2]. A fall in the serum levels of androgens and luteinising hormone (LH) and an increase in FSH levels have been demonstrated after ovarian drilling [3-5].

We carried out this study to determine the effectiveness and safety of LOD in inducing ovulation in women with PCOS who failed to conceive after medical methods of ovulation induction.

## MATERIALS AND METHODS

This is a retrospective study wherein we included women who had LOD of polycystic ovaries as a treatment for anovulatory infertility. Medical records of women who underwent LOD over a two year period from January 2010 to December 2011 were retrieved and reviewed. All women in the study had ovulation induction with clomiphene citrate ± gonadotropins for varying periods prior to having LOD. Women who were diagnosed to have PCOS by the

Rotterdam criteria prior to laparoscopy were considered for the study. Rotterdam criteria defines PCOS in women with presence of two of the following three criteria: oligo-ovulation or anovulation; hyperandrogenism (clinical or biochemical or both); and polycystic ovaries, with the exclusion of other causes [6]. Polycystic ovary was defined as an ovary with 12 or more immature follicles measuring 2-9 mm in diameter. We excluded all women who had PCOS but associated with male factor infertility, deep infiltrating endometriosis, previous laparotomy and submucous fibroids.

Body mass index (BMI) was calculated as weight in kg / height in m<sup>2</sup> and the women were categorised as lean (BMI ≤19.9), normal weight (BMI 20.0-25.0), overweight (BMI 25.1-29.9), or obese (BMI ≥30.0). All women in the study had ovulation induction for varying periods (≥ 3 cycles) prior to having LOD. LOD was performed using monopolar diathermy at 40 watts making four punctures in both ovaries for 4 seconds each. They were followed-up postoperatively for a period of 18 months for pregnancy. The fallopian tubes were assessed for patency using methylene blue dye. Any evidence of superficial endometriosis was also noted and diathermy performed when present.

| BMI       | Not conceived n (%) | Conceived n (%) | Lost to follow up n (%) | Total n (%) |
|-----------|---------------------|-----------------|-------------------------|-------------|
| ≤19.9     | 0 (0.0)             | 2 (4.7)         | 0 (0.0)                 | 2 (4.7)     |
| 20-25     | 4 (9.3)             | 6 (14.0)        | 1 (2.3)                 | 11 (25.6)   |
| 25.1-29.9 | 4 (9.3)             | 9 (20.9)        | 4 (9.3)                 | 17 (39.5)   |
| ≥30       | 6 (14.0)            | 6 (14.0)        | 1 (2.3)                 | 13 (30.2)   |
| Total     | 14 (32.6)           | 23 (53.5)       | 6 (14.0)                | 43          |

[Table/Fig-1]: Relationship of BMI to conception

| Time to conception | Numbers conceived (%) |
|--------------------|-----------------------|
| ≤ 6 months         | 16 (69.6)             |
| > 6 to ≤ 12 months | 3 (13.0)              |
| > 12 months        | 4 (17.4)              |

[Table/Fig-2]: Time to conception

| Contributing factors      | Not conceived n (%) | Conceived n (%) | Lost to follow up n (%) | Total |
|---------------------------|---------------------|-----------------|-------------------------|-------|
| Superficial endometriosis | 3 (42.9)            | 4 (57.1)        | 0 (0.0)                 | 7     |
| Septate uterus            | 1 (25.0)            | 1 (25.0)        | 2 (50.0)                | 4     |
| Tubal block               | 0 (0.0)             | 2 (50.0)        | 2 (50.0)                | 4     |

[Table/Fig-3]: Other factors contributing to infertility

Diagnostic hysteroscopy was performed on all these women. In those who had septate uterus, resection was done to ensure uniform cavity. Hysteroscopic tubal cannulation was attempted where proximal tubal block was demonstrated by methylene blue dye test and adhesiolysis/neosalpingostomy in those with distal block.

## STATISTICAL ANALYSIS

The data was analysed using SPSS statistical program version 19.

## RESULTS

A total of 43 women underwent LOD during the study period. Majority, i.e. 27 (62.8%) women were in the age group of 26-30 years while 2 (4.7%) of them were over 35 years. Thirty (69.8%) women were either overweight or obese while only 2(4.7%) women had a BMI under 20.

Information was available for 86.0% of women while 14.0% were lost to follow-up. Majority (72.0%) of women in the study group had primary infertility while 28.0% had conceived in the past. However, of those who had secondary infertility, 66.7% had one miscarriage while 16.7% had two miscarriages. There was no significant difference in conception rates between different BMI groups [Table/Fig-1].

A total of 23 (53.5%) women conceived. Of these, 16 achieved pregnancy within six months, 3 in the subsequent six months and 4 women took over 12 months to conceive [Table/Fig-2]. Nine (39.1%) women got pregnant in natural cycle while 14 (60.9%) needed assistance in the form of ovulation induction, intrauterine insemination or in-vitro fertilization.

Apart from PCOS there were other factors, which potentially could have contributed towards infertility. These were noted in 30.2% of women of which superficial endometriosis was present in 7(16.3%), septate uterus in 4 (9.3%) and unilateral tubal block in 4 (9.3%) women [Table/Fig-3]. Of this group, success rate was highest amongst those who had diathermy to superficial endometriosis.

## DISCUSSION

LOD has been recommended as one of the treatments for ovulation induction in women with PCOS [5-7]. Our study further endorses the fact that LOD can significantly increase the rate of ovulation and conception in those with anovulatory infertility due to PCOS.

According to Cochrane review in 2012, there was no evidence of a significant difference in rates of clinical pregnancy, live birth or miscarriage in women with clomiphene-resistant PCOS undergoing LOD compared to other medical treatments and the reduction in multiple pregnancy rates in women undergoing LOD made this option attractive [8]. Surgical therapy with LOD may reduce the

need for gonadotropins or facilitate their usefulness. It is also useful in anovulatory women with PCOS who are unable to attend the hospital for intensive monitoring in the form of ultrasonic follicular scans required for gonadotropin therapy [8]. Consistent with findings from other studies [9-11] none of our study population had ovarian hyperstimulation, which could be a significant benefit, compared to clomiphene or gonadotropin ovulation induction.

Obesity is recognized to be associated with PCOS but is not a diagnostic criterion. Only 40-50% of women with the syndrome are overweight [1]. Nearly a third of women in our study population had normal BMI, which lends support to the theory that probably obesity is less likely to be a cause of PCOS. Seventy percent of our study population had a BMI of over 25. Women with BMI ≥ 35 and duration of infertility of over three years appear to be poor responders to LOD [12].

Anovulatory infertility in PCOS has traditionally been managed with clomiphene citrate and then gonadotropins or laparoscopic ovarian surgery in women who are resistant to clomiphene [7]. The ovulation rate after LOD varies between 70-80%, and the conception rate between 37-48% [9]. In a large randomised controlled trial from Netherlands [13] comparing LOD to ovulation induction with recombinant FSH, women treated with diathermy took longer to conceive and 54% needed additional medical treatment to induce ovulation.

One of the drawbacks of our study is the small number of women in the study group. Although conception rate was as high as 53.5% in our study, it may not be possible to attribute the results solely to LOD because of the presence and treatment of other confounding factors such as endometriosis, septate uterus and tubal block. As far as duration to conception is concerned, it appears that the benefit from LOD is at its peak for the first six months following the procedure.

Mullerian duct anomalies may be associated with polycystic ovaries [14-16]. In our study four (9.3%) women with PCOS were noted to have septate uterus. The other associated factors were superficial endometriosis and unilateral tubal block, which were dealt with concomitantly. LOD thus not only helps in regulating ovulation and enhancing conception rates but also provides an opportunity to assess the pelvis for other potential causes of subfertility which could be treated at the same time. We therefore believe that diagnostic hysteroscopy and laparoscopy should be offered high up in the hierarchy of infertility investigations and treatment.

## CONCLUSION

We conclude that laparoscopic ovarian diathermy increases the rate of ovulation and pregnancy in women with polycystic ovaries. This approach should be offered to the couple as second line therapy for those who fail to respond to medical methods of ovulation induction. Associated conditions such as superficial endometriosis, septate uterus and tubal block should be treated at the same time to increase the ovulation and pregnancy rate in this group of women.

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**FINANCIAL OR OTHER COMPETING INTERESTS:** None.

Date of Submission: **Oct 27, 2013**  
Date of Peer Review: **Dec 17, 2013**  
Date of Acceptance: **Apr 18, 2014**  
Date of Publishing: **Feb 01, 2015**