
Efficacy of Laparoscopic Ovulation Induction in Polycystic Ovary Syndrome

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Abstract

This prospective study was aimed to evaluate the efficacy of laparoscopic ovarian electrocoagulation in women with PCOS. Twenty-three PCOS women who had refractory to clomiphene citrate attending the Reproductive Endocrinology Unit, Ramathibodi Hospital between March 1995 and June 1998 were enrolled in the study. In all patients, electrocoagulation on the ovarian surface of both ovaries was performed through laparoscope under general anesthesia. Two patients were lost to follow-up for unknown reasons. The remaining 21 women had a mean age of 30.3 ± 3.9 years (range 21-39) and mean duration of infertility of 4.1 ± 2.8 years (range 1-11). There was no intra-operative and post-operative complication. After surgery, ovulation was documented in 16 out of 18 (88.9%) patients. Fifteen (71.4%) patients became pregnant. Fourteen pregnancies (93.3%) occurred within 9 months after surgery. Twelve women (80%) became pregnant in spontaneous cycles without any treatment. The outcomes of pregnancies were 10 live births, 3 ongoing pregnancies and 2 abortions. This study reveals the high efficacy of ovarian electrocoagulation in infertile women with PCOS. High pregnancy and low abortion rates are convincing. This surgical technique should be the treatment of choice for women with CC-resistant PCOS.

Key word : Polycystic Ovary Syndrome, PCOS, Laparoscopic Ovarian Electrocoagulation, Ovulation/Pregnancy Rate

Polycystic ovary syndrome (PCOS) is a common cause of anovulatory infertility. In these patients, clomiphene citrate (CC) was used as the

first line drug for ovulation induction. The ovulation rate of 75 per cent and pregnancy rate of 30-40 per cent were achieved⁽¹⁾. For women who do not

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respond to CC, gonadotropins (Gn) has been used successfully with the ovulation rate of 75-94 per cent and the conception rate of 33-40 per cent⁽²⁻⁴⁾. During the past decade, laparoscopic ovarian electrocoagulation has been introduced for surgical induction of ovulation in PCOS patients⁽⁵⁾. Because of high efficacy, this surgical technique has been widely accepted as an alternative treatment for CC-resistant patients. This method has several advantages over Gn treatment including no increase risk of multiple gestational rate, elimination of the risk of ovarian hyperstimulation syndrome (OHSS), no need for intensive monitoring, the occurrence of many ovulatory cycles with one treatment and lower cost⁽⁶⁾. The aim of this study was to evaluate the efficacy of laparoscopic induction of ovulation in women with CC-resistant PCOS.

MATERIAL AND METHOD

Patients

From March 7, 1995 to June 31, 1998, 23 infertile women with PCOS were enrolled in the study. The diagnostic criteria of PCOS were oligomenorrhea and/or amenorrhea and polycystic ovary appearance by ultrasonography as defined by Adams et al⁽⁷⁾ and Fox et al⁽⁸⁾. Some women had evidence of clinical hyperandrogenism (acne, seborrhea, and hirsutism). Twenty one patients failed to ovulate with CC in doses up to 150 mg per day for 5 days at least 3 cycles. Another two did not conceive after 6 ovulatory cycles with CC.

Intervention

Laparoscopic ovarian electrocoagulation was performed under general anesthesia with endotracheal intubation using a three-puncture technique. Laparoscope was introduced into the peritoneal cavity through a subumbilical incision. Following the assessment of pelvic structures, tubal patency and the presence of bilateral polycystic ovaries, a pair of 5 mm atraumatic grasping forceps was introduced into one side of the iliac fossa to stabilize the ovary by holding the utero-ovarian ligament. A sharp-tipped monopolar electrocoagulatory probe was then passed through a third port into another side of the iliac fossa. The ovary was held away from the bowel and placed onto the anterior surface of the uterus. The electrocoagulatory probe was held against the ovarian surface at the point of follicle with gentle pressure. Unipolar current (Medical Birtcher, Irvin, California, U.S.A.) was applied until

subcapsular cysts were drained and vaporized of follicular fluid. In order to prevent further damage to the inner stroma, the probe tip was inserted not more than 5 mm deep. Depending upon the size and number of subcapsular cysts, about 10-15 sites per ovary were punctured. All patients were admitted for observation, and discharged home the next morning.

Post-operative management

One week after surgery, all patients returned to the clinic for post-operative checkup. The patients were asked to record menstruation and to attend the clinic every 3 months. Patients who had a regular cycle after surgery were allowed to conceive without any treatment for one year. For those who remained anovulatory, induction of ovulation with 50 mg to 150 mg of CC was given. If this regimen was insufficient, human menopausal gonadotropins (hMG) was added. Follicular development of both spontaneous and stimulated cycles were monitored by ultrasound at the time of follow-up. The patients who lived in distant towns and regular follow-up was inconvenient, were contacted by phone unless oligomenorrhea persisted.

RESULTS

There was no intra- and post-operative complication in this series. Two patients were lost to follow-up for unknown reasons after the first week post-operative attendance. Data of the remaining 21 patients who completed the study was analyzed.

Table 1 shows the patient characteristics. Mean age was 30.3 ± 3.9 years (range 21-39). All but two had primary infertility with a mean duration of infertility of 4.1 ± 2.8 years (range 1-11). Ten (47.6%) patients had clinical manifestations of hyperandrogenism.

Fourteen women living in or around Bangkok attended the clinic regularly. The other seven patients lived in distant towns. Of these, 5 patients who had a regular cycle were contacted by phone.

After surgery, the first menses occurred at days 22 to 52 with the mean of 30.5. Thirteen (61.9%) patients resumed normal menstruation and 6 (28.6%) patients had oligomenorrhea.

Apart from four women who became pregnant within 8 weeks, the follicular development and ovulation were documented by ultrasound in 14

Table 1. Patients' characteristics (n=21).

| | Mean \pm SD | Range |
|--------------------------------|----------------|----------|
| Age (year) | 30.3 \pm 3.9 | 21-39 |
| BMI (kg/m ²) | 23.5 \pm 3.5 | 18.1-32 |
| Duration of infertility (year) | 4.1 \pm 2.8 | 1-11 |
| LH (mIU/ml) | 20.1 \pm 7.8 | 7.4-35.2 |
| FSH (mIU/ml) | 13.7 \pm 5.9 | 4.2-22.6 |
| LH/FSH | 1.9 \pm 1.4 | 0.4-4.8 |
| Prolactin (ng/ml) | 14.0 \pm 4.2 | 8.5-22.3 |
| Testosterone (ng/ml) | 0.5 \pm 0.4 | 0.01-1.5 |

Table 2. Ovulation rate.

| | n | % |
|----------------|----|------|
| Total patients | 18 | 100 |
| Ovulation | 16 | 88.9 |
| Spontaneous | 11 | |
| CC induced* | 5 | |

* 6 anovulatory patients received CC

patients. Six patients who still had anovulation after surgery were treated with CC. One woman with a regular cycle later became anovulatory and was also treated with CC. Five of seven women who received CC ovulated. Three patients had regular cycles but ovulation was not documented. Thus, the ovulation rate after operation was 88.9 per cent (16/18), Table 2.

After ovarian electrocoagulation, 15 (71.4%) patients became pregnant. The conceptions occurred between 1 to 14 months with the mean of 4.8 months after surgery and 14 out of 15 (93.3%) occurred within 9 months. Twelve (80%) women became pregnant in spontaneous cycles. The outcomes of pregnancies were 10 live births, 3 ongoing pregnancies and 2 abortions (13.3%). No multiple pregnancy occurred in this series.

DISCUSSION

In this study, the definition of PCOS was women with oligomenorrhea and/or amenorrhea, polycystic ovaries, with or without clinical hyperandrogenism. The criteria for diagnosis of PCOS remain controversial. The inclusion criteria in this series were the same as Naether's study⁽⁹⁾. Unlike some reports, in which hyperandrogenism, either

clinical or hormonal, and increased luteinizing hormone (LH) level and LH/follicle stimulating hormone (FSH) ratio more than 1.5-2 were prerequisite criteria in diagnosis of PCOS⁽¹⁰⁻¹²⁾. However, according to Balen *et al*⁽¹³⁾, PCOS is a spectrum of both clinical and endocrine disorder that each manifestation or abnormality can not be present at the same time and may develop later.

This study confirmed the efficacy of ovarian electrocoagulation for women with CC-resistant PCOS. After surgery, normal menstruation and spontaneous ovulation rate are highly likely. For those who remained anovulatory, CC could be repeated with satisfactory success. The ovulation rate of 88.9 per cent in this series is comparable with previous reports^(9,11,14). High pregnancy rate was achieved. Interestingly, most pregnancies occurred spontaneously within 9 months after surgery. This result is similar to the other reports^(9,11,14).

Not only was there a high pregnancy rate but good outcomes were also achieved. All pregnancies were singleton. The low abortion rate appeared to be comparable to normal⁽¹⁵⁾.

The main mechanism of restoration of ovulation and conception in women with PCOS treated with laparoscopic electrocoagulation is the decrease in intraovarian androgen, serum androgen and LH. Many studies have shown the reduction of serum androgen and LH levels after surgery^(10,11,16,17). It is believed that the spillage of follicular fluid and destruction of androgen producing ovarian stroma lead to the decrease of androgen level and subsequently decreases peripheral conversion to estrogen⁽¹⁸⁾. LH level is also decreased, possibly secondary to the diminution of positive feedback signal of estrogen. It has been shown that the reduction of LH level improves the quality of oocyte and embryo. The results were a higher pregnancy rate with a lower abortion rate⁽¹⁹⁾.

The conventional treatment for CC resistant PCOS patient is the use of Gn. This medical treatment, although resulting in a high ovulation rate, pregnancy occurs in only 30-40 per cent of cases⁽²⁻⁴⁾. Gn therapy is very costly and often leads to serious complications such as OHSS and multiple pregnancies. Many studies have confirmed the efficacy of laparoscopic ovarian electrocoagulation since the previous decade. The surgical method not only eliminates the complications of Gn therapy, but also has other potential advantages including the occurrence of multiple ovulatory cycles with a

single treatment, no need for intensive monitoring, lowering the abortion rate and lower cost⁽⁶⁾. In addition, these advantageous effects may last for many years⁽²⁰⁾. Although the potential adhesion formation still exists after surgery⁽²¹⁻²³⁾, most patients initiate spontaneous ovulatory cycles and many have successfully conceived without any treatment⁽²¹⁾.

In Thailand, beside the efficacy of treatment, other factors should be considered such as

cost and availability of treatment. Laparoscopic ovarian electrocoagulation could be performed in all hospitals equipped with a basic laparoscopic set. The cost of surgery is usually less than one single cycle of Gn therapy. The patient also has many chances of pregnancy without the need for intensive monitoring. Therefore, laparoscopic ovarian electrocoagulation appears to be more cost-effective than Gn therapy and should be considered as the treatment of choice for women with CC-resistant PCOS.

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ประสิทธิผลของการจี้รังไข่ด้วยไฟฟ้าในการรักษาภาวะมีบุตรยากที่มีสาเหตุจากกลุ่มอาการรังไข่มีซิสต์หลายอัน (Polycystic Ovary Syndrome)

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การศึกษานี้เป็นการศึกษาแบบไปข้างหน้า ถึงประสิทธิผลของการจี้รังไข่ด้วยไฟฟ้าในสตรี จำนวน 23 ราย ที่มีบุตรยากจากกลุ่มอาการโพลีซิสติก โอวารี่ ที่ไม่ตอบสนองต่อยา โคลมิเฟน ซิเตรท ตั้งแต่เดือนมีนาคม พ.ศ.2538 ถึงเดือนมีนาคม 2541 ผู้ป่วยสองราย ขาดการติดตามการรักษาโดยไม่ทราบสาเหตุ สตรี 21 รายที่เหลือมีอายุเฉลี่ย 30.3 ± 3.9 ปี และระยะเวลาของการมีบุตรยากเฉลี่ย 4.1 ± 2.8 ปี ภายหลังการผ่าตัดพบว่ามีอัตราการตกไข่ร้อยละ 88.9 และตั้งครรภ์ 15 ราย (ร้อยละ 71.4) การตั้งครรภ์ส่วนใหญ่ (ร้อยละ 93.3) เกิดขึ้นภายใน 9 เดือน และ 12 ราย (ร้อยละ 80) เป็นการตั้งครรภ์ที่เกิดจากการตกไข่เองตามธรรมชาติ ผลการตั้งครรภ์ของผู้ป่วย 15 ราย คือ คลอดครบกำหนด 10 ราย กำลังตั้งครรภ์ 3 ราย และแท้ง 2 ราย ไม่พบภาวะแทรกซ้อนระหว่างและหลังการผ่าตัด การศึกษานี้แสดงให้เห็นประสิทธิผลที่ดีมากของการจี้รังไข่ในสตรีที่มีบุตรยาก จากสาเหตุกลุ่มอาการโพลีซิสติก โอวารี่ ฉะนั้นการจี้รังไข่ด้วยไฟฟ้าควรเป็นวิธีการรักษาสตรีที่มีกลุ่มอาการโพลีซิสติก โอวารี่ที่ไม่ตอบสนองต่อยาโคลมิเฟน ซิเตรท

คำสำคัญ : กลุ่มอาการรังไข่มีซิสต์หลายอัน, การจี้รังไข่ด้วยไฟฟ้า, อัตราการตกไข่และการตั้งครรภ์

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