European Journal of Obstetrics & Gynecology and Reproductive Biology 162 (2012) 50–54

Contents lists available at SciVerse ScienceDirect

European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.elsevier.com/locate/ejogrb

Repeat transvaginal ultrasound-guided ovarian interstitial laser treatment improved the anovulatory status in women with polycystic ovarian syndrome☆

Wenjie Zhu [a,*], Mengxun Chen [b], Zhihong Fu [a], Xuemei Li [a], Chunrong Qin [a], Xuelian Tang [a], Xiumin Chen [a]

[a] Department of Reproductive Health, Shen-Zhen City Maternity and Child Healthcare Hospital, Shen-Zhen 518048, China
[b] Southern Medical University, Guang-Zhou 510515, China

ARTICLE INFO

Article history:
Received 11 October 2011
Received in revised form 29 December 2011
Accepted 12 February 2012

Keywords:
Polycystic ovary syndrome
Anovulation
Infertility
Repeat
Transvaginal ovarian interstitial laser treatment

ABSTRACT

Objective: To assess the effectiveness of repeated transvaginal ultrasound-guided ovarian interstitial laser treatment in the management of anovulatory patients with polycystic ovary syndrome (PCOS).
Study design: A retrospective study was performed in our department on 27 anovulatory PCOS women who failed to respond to the first ultrasound-guided transvaginal ovarian interstitial laser treatment. Each woman received a repeat procedure and postoperative rates of ovulation and pregnancy were monitored.
Results: Of 27 patients, 18 (66.67%) ovulated spontaneously following the repeated ultrasound-guided transvaginal ovarian interstitial laser treatment Ten women became pregnant within six postoperative months and a cumulative pregnancy rate of 37.04% was achieved. There were no significant operative complications.
Conclusion: Repeated ultrasound-guided transvaginal ovarian interstitial laser treatment is an effective and safe management in anovulatory PCOS patients who fail to respond or have a transient response to the first transvaginal ovarian interstitial laser treatment.

1. Introduction

In recent years we have reported the effectiveness of the transvaginal ultrasound-guided ovarian interstitial laser treatment in anovulatory women with clomiphene citrate (CC)-resistant polycystic ovary syndrome (PCOS) [1,2]. With an ovulation rate of more than 80% and a pregnancy rate of 30% during six postoperative months, this new method of ovulation induction in infertile PCOS women made us feel confident in treating this refractory disease. However, just as the technique of laparoscopic ovarian diathermy or drilling (LOD) is applied in the management of anovulatory women with CC-resistant PCOS, in which a satisfactory treatment result of a 70–80% postoperative ovulation rate and a 30–40% pregnancy rate [3–8] are obtained, there are still about 20–30% of infertile PCOS women who are not responsive to this therapy. Some of them ovulated for few months and then became anovulatory again.

Although a satisfactory treatment result is usually associated with the appropriate number of punctures made, the power setting and duration of each puncture may influence treatment outcome. We considered that an optimal outcome of ovarian interstitial laser treatment depended much more on the appropriate number of intra-ovarian laser coagulation points. Our previous study showed that the rates of ovulation and pregnancy were significantly lower in PCOS women undergoing ovarian interstitial laser treatment with 1–2 points per ovary than those with 3–5 points (1 cm of diameter per point) [2]. It was possible that intra-ovarian laser coagulation points during the first laser treatment were not enough to induce follicular growth or ovulation. In other words, non-response might be explained by the lower laser doses (number of ovarian interstitial coagulation points).

Repeated LOD treatment in PCOS women with optimal outcome has also been reported [9]. Gjoemmaes et al. [10] reported the benefical effects of electrocautery through the laparoscope in anovulatory PCOS women and gave due attention to potential adhesion, ovarian reserve, and perioperative risk, which influenced the results of previous resection treatments. These resections paralleled the interstitial laser treatment where 3–5 coagulation points, each with 1 cm of ovarian stroma cooked at least 1 cm below the ovarian capsule.

To investigate the effectiveness and risk of supplemented laser dose of the transvaginal ultrasound-guided ovarian interstitial laser treatment in the non-responders, we did repeat laser therapy

☆ This work was supported by a grant for scientific research from the Shen-Zhen Bureau of Science and Technology (No. 200602070). ClinicalTrials.gov ID NCT00643708.
* Corresponding author at: No. 3012, Fu-Qiang Road, Shen-Zhen City 518048, Guang-Dong Province, China. Tel.: +86 013500053700/0755 82889999 6707; fax: +86 0755 83570589.
E-mail address: zhuwenjie542004@yahoo.com.cn (W. Zhu).

0301-2115/$ – see front matter © 2012 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.ejogrb.2012.02.008

from January 2006 to March 2011 while we were undertaking the study of transvaginal ultrasound-guided ovarian interstitial laser treatment. In this study, we analyzed retrospectively the outcomes of repeated laser therapy in those refractory infertile PCOS women.

2. Materials and methods

2.1. Subjects

Between January 2006 and March 2011, a total of 107 women with CC-resistant PCOS underwent transvaginal ultrasound-guided ovarian interstitial laser treatment in our center. Thirty-six of them failed to respond to this new treatment method or ovulated initially for a few months and then became anovulatory again. To try to improve ovulation, each of them was recommended one or two repeat applications of ovarian laser therapy. All non-responders were informed that this procedure is a new technique, and that the optimal laser dose has not been confirmed, although previously some patients had been treated using this technique for the same purpose with a good outcome. Finally, nine eligible subjects opted not to participate in the repeat procedure when counseled regarding the possible risks. The remaining twenty-seven patients accepted and were enrolled for the repeated transvaginal ultrasound-guided ovarian interstitial laser treatment. Every patient gave informed written consent and our institutional Ethics Committee approved the study.

All women presented with oligo-/amenorrhea and anovulation for at least 2 years and were seeking to become pregnant. All subjects had polycystic ovaries on transvaginal ultrasound scan (TVS) (Aloka-1000, UST-985, 5 MHz transvaginal probe, Aloka Co. Ltd, Tokyo, Japan), and the diagnosis of PCOS was made using the Rotterdam criteria [11]. Serum concentrations of follicle-stimulating hormone (FSH), luteinizing hormone (LH) and testosterone (T) were assessed at the third day of progesterone-induced bleeding (natural progesterone injection; Guangzhou Minxin Pharmaceutical Company, Guang-Zhou, China). All patients received incremental clomiphene citrate (CC) doses (50, 100, and 150 mg), to which they failed to ovulate. A normal hysterosalpingogram or laparoscopy had to have been recorded in the past 3 years prior to the first ovarian interstitial laser treatment. Exclusion criteria included any contraindications to surgery, previous treatment with LOD and presence of tubal or male factors for infertility. In the previous procedure, all women underwent 3–5 coagulation points of transvaginal ovarian laser treatment in single ovary. Nineteen out of 27 women were anovulatory and eight women had one ovulation during the initial 1–3 months following the first laser treatment and then became anovulatory again. The characteristics of 27 anovulatory PCOS women are stated in Table 1.

Table 1
The characteristics of 27 anovulatory PCOS women. Mean ± SD or *n* (%).

Age (years)	28.67 ± 2.69
Body mass index (kg/m^2)	23.14 ± 2.52
Duration of infertility (years)	3.47 ± 2.10
Serum LH (IU/l)	13.27 ± 7.49
Serum FSH (IU/l)	6.31 ± 1.70
Serum testosterone (nmol/l)	2.89 ± 0.49
Ovarian diameter (mm)	28.37 ± (3.31)
Number of follicle(unilateral)	22.36 ± 6.01
Menstrual cycle pattern	
Regular, *n* (%)	0 (0)
Oligomenorrhea, *n* (%)	5 (19)
Amenorrhea, *n* (%)	22 (81)
Infertility	
Primary, *n* (%)	24 (89)
Secondary, *n* (%)	3 (11)

2.2. Protocol

The procedure of transvaginal ultrasound-guided ovarian interstitial laser treatment has previously been reported [1]. In brief, an intramuscular injection of 50–100 mg of pethidine (Pethidine Hydrochloride Injection, Shenyang First Pharmaceutical, NEPG, Shen-Yang, China) was administered to each patient about 30 min before the operation. After emptying their bladder, the women were placed in lithotomy position. They were then prepared using an aseptic vulva and vaginal douche.

2.2.1. Location and puncture

The transvaginal probe was inserted into the vagina and moved from side to side to find the largest or the best ovarian plane. The operator then punctured the predetermined intra-ovarian point with a 17-gauge, 35-cm-long needle (K-OPS-1035-Cook IVF; Brisbane, Australia). After aspiration of the fluid (blood or follicular fluid) present inside the long needle, an assistant cut the soft tube connected to the long needle, and a fiberoptic cable of 400 μm in diameter was inserted into the long needle up to the marked point. The operator drew the long needle back about 10 mm until the bare fiber was out of the tip of long needle. These points were always at least 10 mm deep from the surface of the ovary and 5 mm from each other. Usually, one to three laser coagulation points could be accomplished on the widest ovarian plane. If not, the next largest ovarian plane was chosen until enough laser coagulation points had been made in the unilateral ovary.

2.2.2. Laser coagulation

The electrical laser (XH-YAG-100 Laser; Wuhan Xinghua Photoelectricty Co. Ltd, Wu-Han, China) was activated persistently for 2–5 min with a power of 3–5 W and current of 8–10 A, until a 10-mm light spot appeared on the ovarian plane. The fiberoptic cable was then carefully withdrawn from the long needle with care taken not to pull the needle out of the ovary while withdrawing it toward the surface. The next point was then located and punctured and the procedure repeated as stated above. This procedure continued until 3–5 points on the unilateral ovary were completed. The needle was then withdrawn. The same procedure was repeated on the contralateral ovary. The women stayed in bed for 2–3 h after the surgery, after which they were re-examined with TVS in order to rule out intra-abdominal haemorrhage prior to discharge. The procedure lasted approximately 35–40 min. The treatment was conducted on the third day after progesterone-induced bleeding. If they did not respond, patients could be selected for a second repeat, which in all cases was done about one month after the first laser treatment.

2.3. Postoperative monitoring

Postoperative monitoring of repeat transvaginal ovarian interstitial laser treatment included the measurement of serum hormone concentrations of LH, FSH, testosterone, prolactin (PRL), estradiol (E_2) and progesterone, follicle development and ovulation, pregnancy and miscarriage, and adverse effects.

2.4. Statistical analysis

The means ± SD of the baseline and postoperative values were calculated for the serum LH, FSH, testosterone, PRL, progesterone, E_2 levels and the ovarian diameters or number of follicles. Student's *t*-test or matched *t*-test were used. The rates were calculated based on the cases of postoperative spontaneous ovulation and pregnancy. The Statistics Package for Social Science (SPSS 13.0; SPSS Inc., USA) was used for statistical analysis. Statistical significance was set at $P < 0.05$ (two tailed).