

Influence of Acupuncture on Idiopathic Male Infertility in Assisted Reproductive Technology

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Summary The clinical effects of acupuncture on idiopathic male infertility in sperm parameter and on therapeutic results in assisted reproductive technology were investigated. 22 patients failed in intracytoplasmic sperm injection (ICSI) with idiopathic male infertility were treated with acupuncture twice weekly for 8 weeks, followed by ICSI treatment again. The sperm concentration, motility, morphology, fertilization rates and embryo quality were observed. Quick sperm motility after acupuncture ($18.3\% \pm 9.6\%$) was significantly improved as compared with that before treatment ($11.0\% \pm 7.5\%$, $P < 0.01$). The normal sperm ratio was increased after acupuncture ($21.1\% \pm 10.4\%$ vs $16.2\% \pm 8.2\%$, $P < 0.05$). The fertilization rates after acupuncture (65.2%) were obviously higher than that before treatment (40.2%, $P < 0.01$). There was no significant difference in sperm concentration and general sperm motility between before and after acupuncture. The embryo quality after acupuncture was improved, but the difference between them was not significant ($P > 0.05$). Acupuncture can improve sperm quality and fertilization rates in assisted reproductive technology.

Key words: acupuncture; intracytoplasmic sperm injection; fertilization rates; embryo quality

From Oct. 1999 to Aug. 2000, 22 cases of idiopathic male infertility treated by acupuncture had been observed before and after intracytoplasmic sperm injection (ICSI). The purpose of this study was to investigate the changes in semen markers, fertilization rate and embryo quality before and after acupuncture.

1 MATERIAL AND METHODS

1.1 Clinical Data

From Oct. 1999 to Aug. 2000, 22 cases of idiopathic male infertility at Reproductive Medical Center in Ulm, Germany were treated. Entrance standard: Idiopathic male infertility including seminal concentration less than 20×10^6 /ml, or quickly motile sperm less than 20%, or normal morphological sperm less than 30%, or above three conditions. Ages of the men were between 26—58 years (average 35 years). All men had unsuccessful assisted reproduction therapy at least more than 2 times (the least 2 times, the most 11 times). This treatment was approved by the Ethics Committee of the University of Ulm, Germany and consented completely by the patients. Female infertility were excluded.

1.2 Seminal Examination and Pretreatment

Three to four days after sexual abstinence the semen was obtained by way of masturbation at oocyte retrieval day. Some semen was used for seminal examination in 20 min after ejaculate ac-

ording to WHO standard, and the remaining was used for ICSI treatment.

1.3 Treatment

Each patient in this study received acupuncture treatment, 2 times a week, lasting 2 months. Sterile disposable stainless steel needles (0.25 mm \times 25 mm) were inserted into acupuncture point locations. Needle reaction (soreness, numbness or distention in and around the point = *Deqi* sensation) was regarded as achievement by insertion at the beginning. After 10 min the needles were rotated in order to maintain *Deqi* sensation. The needles were kept staying in position for 25 min and then removed. The depth of needle insertion was about 10 to 20 mm, depending on the different regions of the body. Acupoints selected were as follows: *Baihui*, *Neiguan*, *Cice*, *Xuehai*, *Neiting*, *Shenshu*, *Sanyinjiao*, *Xuanzhong*, *Gongshun*, *Fengnong*, *Qihai* and *Guanyuan*. All the patients were given ICSI treatment in 3 months after acupuncture.

1.4 Ovarian Stimulation, Oocyte Retrieval, *in vitro* Culture and Embryo Transfer

Pituitary of the women in all studied cases was down-regulated with nafarelin acetate (SynarelTM, Heumann Pharma, Nuremberg, Germany) in a short protocol starting on the first cycle day and continuing until the day of human chorionic gonadotropin (hCG) injection. Ovarian stimulation was performed with 2—6 ampoules hMG (MenogonTM, Ferring, Kiel, Germany) or rFSH beginning on cycle day 3. The dosage was individually adjusted and, in case of previous treatment cycles, determined in accordance with previous re-

response. On day 8 of stimulation, follicular development was measured by transvaginal ultrasonography the largest diameter in two planes. The daily dosage was adjusted according to the follicular growth. HCG (Pregnesin™, 5 000 IU, Serono, Unterschleißheim, Germany) was administered when at least one follicle reached a maximum size of 20 mm or two follicle were 16 mm in diameter. Transvaginal ultrasound-guided needle aspiration of follicular fluid was carried out 36 to 38 h after hCG administration. Immediately after follicle puncture the oocytes were retrieved, treated and cultured *in vitro*.

1.5 Seminal Preparation and Culture, Intracytoplasmic Sperm Injection, Embryo Culture and Transfer

The semen were processed by trace Percoll gradient centrifugation after seminal liquefaction and stored for later use. After ICSI procedure, further culture were performed according to conventional method. Less than three embryos were transferred into the uterine cavity on day 2 or 3 after oocyte retrieval. Luteal phase support was given by transvaginal progesterone administration (Utrogest™, Kade, Berlin, Germany, 200 mg 3 times per day). Progesterone administration was initiated on the day after oocyte retrieval and continued until serum β -hCG measurement, namely 14–16 days post transfer, in case of pregnancy, until gestation week 8.

1.6 Determination of Fertilization

15–18 h after the conventional ICSI procedure, the oocytes were observed for spermatization

and growth. If two clear different pronuclei in nucleolus existed, namely in 2PN phase, the oocytes were estimated to be fertilized, or else fertilization to have failed.

1.7 Estimation of Embryos Quality

Forty–eight h after the conventional ICSI procedure, embryos were evaluated according to their appearance as types 1, 2, 3, or 4^[1].

1.8 Diagnosis of Pregnancy

Clinical pregnancy was defined by the presence of a fetal sac at ultrasound examination 6 weeks after embryo transfer.

1.9 Statistical Analysis

A statistical analysis was performed respectively using the *t*-test, *Chi*-test and Wilcoxon-Vorzeichen-Rangsummen Test according to data type. $P \leq 0.05$ or ≤ 0.01 was considered to be the limit of statistical significance.

2 RESULTS

Table 1 displayed the changes in sperm concentration, general sperm motility, quick sperm motility and normal sperm ratio before and after acupuncture. Table 2 revealed the ratio of the oocytes accepting ICSI.

Table 3 indicated the embryo quality after acupuncture. 4 out of 22 cases were clinical pregnancy defined by ultrasound examination with the clinical pregnancy rate being 18.2%. Although this pregnancy rate was not high, it is not bad for patients who had been treated by unsuccessful IVF or ICSI more than 10 times.

Table 1 Comparison of seminal routine parameters ($\bar{x} \pm s$, $n=22$)

Time	Sperm concentration (10^6 /ml)	General sperm motility G1+G2 (%)	Quick sperm motility G1 (%)	Normal sperm ratio (%)
Before acupuncture	21.9 \pm 20.6	26.8 \pm 10.9	11.0 \pm 7.5	16.2 \pm 8.2
After acupuncture	22.4 \pm 19.0	33.7 \pm 12.8	18.3 \pm 9.6*	21.1 \pm 10.4*

* $P < 0.05$ as compared with those before treatment

Table 2 The features of the oocytes and fertilization rate before and after acupuncture

Time	Insemination oocytes/total oocytes (%)	2PN phase oocytes/Insemination oocytes (%)
Before acupuncture	174/220 (79.1)	70/174 (41.4)
After acupuncture	157/209 (75.1)	104/157 (66.2)*

* $P < 0.01$ as compare with that before acupuncture

Table 3 Embryo quality before and after acupuncture ($n=22$)

Time	Median	Minimum	Maximum
Before acupuncture	1	1	3
After acupuncture	1	1	3

$P=0.21$ as compared with that before acupuncture

3 DISCUSSION

Male infertility is comparatively difficult to

treat in clinical treatment with assisted reproductive technology. Although ICSI provides good chance for male infertility patients with less sperm, successful fertilization is still low for the

patients with bad sperm quality in ICSI. So many stimulation cycles must be canceled^[2]. This will bring couple physical and mental distress and increase financial burden. Moreover, sperm quality influences embryo quality and clinical pregnancy rate that is end point of the assisted reproductive technology^[3]. Therefore, it is very important to improve sperm quality before ICSI. It is a pity that medicament that had been thought to be efficient in the beginning were inefficient when compared with controls^[4]. Traditional experiential treatment, such as acupuncture, have been drawing attention of researchers. Acupuncture is an effective and less side-effect treatment^[5,6]. In our study, *Shengsu*, *Guanyuan*, *Qihai*, and *Baihui* were used to supply Qi, increase kidney function and strengthen Yang; *Xuehai*, *Sanyinjia* and *Gongshun* increase blood and enhance Yin; *Neiguan*, *Cice*, *Neiting*, *Shuanzhong* and *Fengnong* harmonize Yin and Yang. Total effect is to regulate Jingluo function, to increase Qi and Xue, to strengthen kidney function, and finally to improve reproductive function.

The results in this study with traditional acupuncture integrated with assisted reproductive technology displayed, 24 h after the conventional ICSI procedure, the ratio of the oocytes in 2PN phase, namely fertilization rate, after acupuncture (66.2%) was obviously higher than that before treatment (40.2%, $P < 0.01$). Although the embryo quality after acupuncture had no significant difference, it showed improvement tendency, which may be correlated with the limited number of cases.

Although sperm concentration and general sperm motility were insignificantly increased after

acupuncture, quick sperm motility and normal sperm ratio were improved significantly. Acupuncture may achieve therapeutic purpose by general or local regulation of physiological function^[6].

Our result indicates that acupuncture can improve sperm quality and increase successful chances for male infertility patients with bad sperm quality in assisted reproductive technology. In order to prove acupuncture effect and exclude the psychogenic influence, a lot of cases and placebo needle should be used in further study.

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(Received Feb. 25, 2002)