Electro-acupuncture as a peroperative analgesic method and its effects on implantation rate and neuropeptide Y concentrations in follicular fluid

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BACKGROUND: In a previous study on the effect of electro-acupuncture (EA) in combination with a paracervical block (PCB) as an analgesic method during oocyte aspiration in IVF treatment, EA appeared to increase the pregnancy rate. This study was designed to test the hypothesis that EA as an analgesic during oocyte aspiration would result in: (i) a better IVF pregnancy rate than with alfentanil; (ii) peroperative analgesia that was as good as that produced by alfentanil; (iii) less postoperative abdominal pain, nausea and stress; and (iv) a reduction in the use of additional analgesics. Neuropeptide Y (NPY) concentrations in follicular fluid (FF) were analysed when possible.

METHODS AND RESULTS: In this prospective, randomized, multicentre clinical trial, 286 women undergoing oocyte aspiration were randomly allocated to the EA group (EA plus a PCB) or to the alfentanil group (alfentanil plus a PCB). No significant differences were found between the EA and alfentanil groups in any of the IVF variables. NPY concentrations in FF were significantly higher in the EA group compared with the alfentanil group. No correlation between pregnancy rate and NPY concentrations was found in either analgesic group. Both EA plus a PCB and alfentanil plus a PCB induced adequate peroperative analgesia during oocyte aspiration evaluated using the visual analogue scale. After 2 h, the EA group reported significantly less abdominal pain, other pain, nausea and stress than the alfentanil group. In addition, the EA group received significantly lower amounts of additional alfentanil than the alfentanil group. CONCLUSION: EA does not improve pregnancy rate in the present clinical situation. The observation that NPY concentrations in FF were higher in the EA group may be important for human ovarian steroidogenesis. The analgesic effects produced by EA are as good as those produced by conventional analgesics, and the use of opiate analgesics with EA is lower than when conventional analgesics alone are used.

Key words: alfentanil/analgesia/electro-acupuncture/neuropeptide Y/oocyte aspiration

Introduction

Transvaginal ultrasound-guided oocyte aspiration has simplified the process of IVF and embryo transfer. The oocyte aspiration procedure is usually short, lasting for about 20–30 min, and is generally the most painful component of the IVF treatment. The pain perceived during oocyte aspiration varies to a large extent from one individual to another, and is often likened to the intense pain perceived during menstruation. The analgesic method used must have a rapid onset, provide optimal pain relief, and allow for rapid recovery; in addition, the method must have no harmful effects on oocytes.

Conventional analgesic methods during oocyte aspiration commonly consist of a local analgesic administered as a paracervical block (PCB) (Ng et al., 1999) in combination with intravenous (i.v.) opiates administered during the aspiration procedure itself. In addition, a sedative premedication is sometimes administered. These conventional analgesic methods are not uncommonly associated with side-effects such as tiredness, nausea and confusion. Furthermore, many of these agents have been detected in follicular fluid (FF), but evidence from human studies which indicates any negative effect on pregnancy rates is sparse (Wikland et al., 1990; Soussis et al., 1995). However, one of these groups (Soussis et al., 1995) recommended that the time taken to collect the oocytes should be kept to a minimum in order to avoid any harmful effects of the drugs reaching the FF. Neuropeptide Y (NPY) is a peptide which exerts different effects in the central and peripheral nervous systems. NPY has, for example, been shown to have a
modulatory role on the hypothalamic–pituitary–ovarian axis (Barreca et al., 1998). NPY reaches the ovary via the plexus ovarian nerve, and high concentrations have been found in FF. NPY has been hypothesized to play a physiological role in the regulation of ovarian functions, follicular growth and ovulation (McNeill and Burden 1987; Jørgensen et al., 1989; 1990).

Acupuncture is a pain-relieving method that activates endogenous pain-inhibiting systems such as the spinal/segmental gate mechanism and the endogenous opioid systems (Andersson and Lundeborg, 1995). It should be stressed that any acupuncture effect rests on physiological and/or psychological mechanisms (Stener-Victorin et al., 2002). Despite both experimental and clinical evidence of the effects claimed for electro-acupuncture (EA), its role in conventional medicine has been questioned (Renckens, 2002). The effect of EA as a pain-relieving method during surgical procedures has been evaluated in different situations, one of which is in connection with oocyte aspiration during IVF treatment. In this procedure, EA was reported to be as effective as conventional analgesics without any observed negative side-effects (Stener-Victorin et al., 1999). Another interesting observation in the same study, which evaluated the effect of EA as an analgesic during oocyte aspiration, was the significantly higher pregnancy rate in the group of women who underwent EA compared with a group that used conventional analgesics (45.9 versus 28.3%). Even though these observations were interesting, the number of studied patients was small, and hence the power of the findings too low for the results to be considered reliable. A study with a larger number of patients was thus needed to clarify this point.

In a recent study (Paulus et al., 2002), acupuncture during embryo transfer in IVF cycles resulted in significantly higher pregnancy rates compared with the group that did not undergo acupuncture (42.4 versus 26.3%). The results in that study cannot be directly compared with those of a previous investigation (Stener-Victorin et al., 1999) as the study design and acupuncture protocol were different.

The present study was designed to test the hypotheses that EA in combination with PCB as analgesics during oocyte aspiration would result in: (i) a better IVF pregnancy rate than alfentanil in combination with PCB; (ii) peroperative analgesia that was as good as that produced by alfentanil in combination with PCB; (iii) less postoperative abdominal pain, nausea and stress; and (iv) a reduction in the use of additional analgesics. In addition, an investigation was made as to whether NPY concentrations in the FF differed between the two analgesic groups, and whether there was any correlation between pregnancy rate and NPY concentration.

**Materials and methods**

**Study design**

The present study was a prospective, randomized, controlled multicentre trial comparing EA and PCB (EA group) with alfentanil and PCB (alfentanil group). The study was performed at five IVF centres in Sweden (the IVF Unit at Sahlgrenska University Hospital in Göteborg; the Fertility Centre Scandinavia in Göteborg; the IVF Centre in Falun; the IVF Unit at Karolinska Hospital in Stockholm; and IVF-Oresund in Malmo) between 1999 and 2001. Each woman gave her written informed consent before entering the study, which was approved by the Ethics Committees of Göteborg, Lund/Malmö, Stockholm and Uppsala Universities in Sweden.

**Participants**

Women who were aged ≤38 years, with a body mass index (BMI) ≤28 kg/m², who had four or more follicles of an expected size ≥18 mm at the time of hCG injection, and who had undergone no more than three IVF treatments previously, were accepted for the study. Each woman contributed data from one cycle only. The women were informed about the study ~3 days before oocyte aspiration, which was performed using transvaginal ultrasound guidance (Wikland et al., 1987).

**Randomization and progress through trial**

Participants were randomly allocated within blocks to the EA or alfentanil groups (Figure 1). A total of 286 women was recruited, all of whom were willing to use EA if randomized to that group. Each centre randomized its patients using sealed, unlabelled envelopes, each of which contained a unique study number. The envelopes were distributed into groups of 20 (10 from the EA group and 10 from the alfentanil group) in order to avoid extended treatment periods of EA-only or alfentanil-only.

Those women randomized to the EA group [n = 141; mean age 32.9 years (range 22–38)] were given EA and a PCB of lidocaine hydrochloride (Xylocain; Astra, Södertälje, Sweden) during oocyte aspiration. Those women randomized to the alfentanil group [n = 145; mean age 32.9 years (range 25–38)] were given alfentanil (Rapifen®; Janssen-Cilag, Solotentuna, Sweden) and a PCB during oocyte aspiration. The participants understood that they could discontinue the study at any time. Five subjects in the EA group were excluded: one woman because of a fall in blood pressure; one because of nausea;
one because she voluntarily withdrew; and two women because of administrative failure. Seven subjects in the alfentanil group were excluded: one woman because of age; one because of administrative failure; and five women because they voluntarily withdrew from the study. Data from a total of 274 women were analysed (EA group, n = 136; alfentanil group, n = 138).

Treatment protocols
Electro-acupuncture
Well-trained and experienced nurses, two at each IVF unit, administered the acupuncture. Before the start of the study, all nurses were instructed and coordinated in the technique. The acupuncture stimulation began at least 30 min before oocyte aspiration; this was found to be the optimum time needed for a thorough onset of analgesia and relaxation prior to operation. The acupuncture stimulation was terminated directly after oocyte aspiration. Acupuncture points were selected in somatic segments according to the innervation of the ovaries and uterus; the type of stimulation was the same in all women (Figure 2). The stainless steel needles (Hegu: Hegu AB, Landsbro, Sweden; size 0.32 × 30 or 50 mm) were inserted intramuscularly to a depth of 15–35 mm. Points ST36 and GV20 were stimulated manually. The needles were rotated by hand every 10th minute to evoke the needle sensation, which reflects activation of muscle-nerve afferents (of A-delta and possibly C fibres) (Haker and Lundeberg, 1990). The remaining needles (inserted in points ST29, TE5 and LI4) were stimulated electrically. These were attached to an electrical stimulator (CEFAR ACU II; Cefar, Lund, Sweden) that emitted continuous square-wave pulses of alternating polarity with a ‘high frequency’ of 80 Hz with a pulse duration of 180 μs to the points in the stomach, and a low burst frequency of 2 Hz (each pulse has a duration of 180 μs, a burst length of 0.1 s and a burst frequency of 80 Hz) to the points in the hand. The stimulation intensity for both the high and low frequencies was optimized for each woman. The high-frequency stimulation induced non-painful paraesthesia and was intended to influence the pain inhibitory systems involving the gate control mechanism at the spinal/segmental level. The low-frequency stimulation was sufficient to cause non-painful local muscle contractions in an attempt to activate the central descending pain inhibitory systems, including central β-endorphinergic systems.

Alfentanil
The alfentanil group received 0.5 mg alfentanil and 0.25 mg atropine (Atropin NM Pharma; NM Pharma AB, Stockholm, Sweden) intravenously directly before a PCB was placed and oocyte aspiration began.

PCB and heating pad
Both groups received a PCB comprising 10 ml lidocaine (5 mg/ml). Lidocaine was injected into the right and left lateral regions of the upper fornix; that is, where the aspiration needle was intended to penetrate the vaginal wall. In addition, both groups were given an electric heating pad to place on the abdomen during oocyte aspiration. No premedication was administered in any group. If EA or the initial dose of alfentanil did not result in sufficient pain relief, additional alfentanil (0.25 or 0.5 mg) was administered.

Outcome measures
IVF variables
The IVF outcome variables that were recorded and analysed included the number of oocytes retrieved, fertilization rate, number of embryo transfer procedures undergone, number of embryos transferred, number of pregnancies, number of gestational sacs, and number of miscarriages between the 16th week of pregnancy and the 16th week of gestation. The following figures were calculated: pregnancy rate (number of pregnancies per embryo transfer), implantation rate (number of gestational sacs per number of transferred oocytes) and on-going pregnancies (number of pregnancies per embryo transfer after the 16th week of gestation).

Radioimmunoassay (RIA)
Clear FF was collected, when possible, from the largest follicle of the second ovary for testing for NPY-like immunoreactivity (NPY-LI). The FF was stored at −80°C until taken for analysis. Samples were extracted using a reverse-phase C18 cartridge (Sep Pak, Waters) and analysed with a competitive RIA. NPY-LI was analysed using antiserum N1, which cross-reacts 1.0% with avian pancreatic polypeptide, but not with other peptides. Intra- and inter-assay coefficients of variation were 7 and 14% respectively. The detection limit of NPY-LI with this RIA was 1.5 ng/ml.

Rating of subjective experience
Nine visual analogue scales (VAS) (McCormack et al., 1988) were used to evaluate pain and subjective experience before, during and after oocyte aspiration. Each VAS consisted of a 100 mm line oriented vertically on a paper with nine different dimensions. The nine variables had the following endpoints: abdominal pain ± no pain and unbearable pain; pain directly related to oocyte aspiration ± no pain and unbearable pain; pain during placement of PCB ± no pain and unbearable pain; other pain ± no pain and unbearable pain; time of discomfort ± never and all the time; adequacy of analgesia ± enough and would have needed much more; stress ± not at all stressed and very stressed; calm ± very calm and not at all calm; nausea ± no nausea and unbearable nausea. The measurements were assessed approximately 30 min before, directly after, and 2 h after oocyte aspiration.

Additional analgesic
Amounts of additional analgesic were recorded, and differences between the groups were calculated.

Statistical analyses
Based on the results of a previous study (Stener-Victorin et al., 1999), a power calculation indicated that 150 patients in each group would be necessary to detect a 10% increase in pregnancy rate with a power of
at least 80% at a 5% level of significance. The study was ended pre-term based on the results of an interim analysis. The interim analysis revealed no difference in pregnancy rate between the two study groups. In addition, hypothetical calculations of different outcomes were also made, and when all possibilities were taken into account it was found that there would be no differences in pregnancy rate between the two study groups. All data were analysed using the software package Statistica 4.1 for Macintosh. The χ2-test was used to compare differences between the groups concerning need for additional analgesic and IVF variables; pregnancy per embryo transfer, implantation rate, miscarriage before the 16th week of gestation, and take-home baby rate. Student’s t-test for unpaired data was used to compare differences in NPY concentrations in the FF. The significance of the correlation between NPY concentrations and pregnancy was tested with Spearman’s rank order correlation test. The Mann–Whitney U-test was used to compare differences between the groups concerning VAS ratings, the number of oocytes retrieved, and the fertilization rate (Altman, 1996). A P-value <0.05 was considered statistically significant. The median and range or mean and SEM were calculated when possible.

Results

IVF variables

Clinical characteristics—the cause of infertility and the number of IVF treatments—did not differ between the two groups (Table I).

Table I. Clinical characteristics of the participants: the cause of infertility and the number of previous IVF attempts in the group receiving electro-acupuncture (EA) and a paracervical block (PCB) and the group receiving alfentanil (ALF) and a PCB

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>EA (n = 136)</th>
<th>ALF (n = 138)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause of infertility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>66 (41.8)</td>
<td>55 (38.4)</td>
</tr>
<tr>
<td>Tubal disease</td>
<td>22 (13.9)</td>
<td>23 (16.1)</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>25 (15.8)</td>
<td>18 (12.6)</td>
</tr>
<tr>
<td>PCOS</td>
<td>9 (5.7)</td>
<td>5 (3.5)</td>
</tr>
<tr>
<td>Unexplained</td>
<td>29 (18.3)</td>
<td>39 (27.2)</td>
</tr>
<tr>
<td>Other causes</td>
<td>7 (4.5)</td>
<td>3 (2.1)</td>
</tr>
<tr>
<td>Two causes</td>
<td>22 (13.9)</td>
<td>5 (3.6)</td>
</tr>
<tr>
<td>Total</td>
<td>158 (100)</td>
<td>143 (100)</td>
</tr>
</tbody>
</table>

| No. of IVF treatments           |              |               |
| 1 attempt                      | 67 (49.3)    | 76 (55.1)     |
| 2 attempts                     | 40 (29.4)    | 35 (25.4)     |
| 3 attempts                     | 25 (18.4)    | 21 (15.2)     |
| 4 attempts                     | 4 (2.9)      | 6 (4.3)       |

Values in parentheses are percentages. PCOS = polycystic ovary syndrome.

Table II. IVF variables in the group receiving electro-acupuncture (EA) and a paracervical block (PCB) and the group receiving alfentanil (ALF) and a PCB

<table>
<thead>
<tr>
<th>IVF variable</th>
<th>EA (n = 136)</th>
<th>ALF (n = 138)</th>
<th>Significance, EA versus ALF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSI cycles (n)</td>
<td>67</td>
<td>56</td>
<td>NS</td>
</tr>
<tr>
<td>Standard IVF cycles (n)</td>
<td>61</td>
<td>68</td>
<td>NS</td>
</tr>
<tr>
<td>50/50</td>
<td>8</td>
<td>12</td>
<td>NS</td>
</tr>
<tr>
<td>TESA</td>
<td>0</td>
<td>1</td>
<td>NS</td>
</tr>
<tr>
<td>PESA</td>
<td>0</td>
<td>1</td>
<td>NS</td>
</tr>
<tr>
<td>Embryo transfers (n)</td>
<td>119</td>
<td>125</td>
<td>NS</td>
</tr>
<tr>
<td>Pregnancies (n)</td>
<td>43</td>
<td>49</td>
<td>NS</td>
</tr>
<tr>
<td>Pregnancy rate (%)</td>
<td>36.1</td>
<td>39.2</td>
<td>NS</td>
</tr>
<tr>
<td>Embryos transferred (n)</td>
<td>231</td>
<td>238</td>
<td>NS</td>
</tr>
<tr>
<td>Gestational sacs (n)</td>
<td>50</td>
<td>55</td>
<td>NS</td>
</tr>
<tr>
<td>Implantation rate (%)</td>
<td>21.6</td>
<td>23.1</td>
<td>NS</td>
</tr>
<tr>
<td>Miscarriages (n)</td>
<td>6</td>
<td>6</td>
<td>NS</td>
</tr>
<tr>
<td>On-going pregnancy (%)</td>
<td>31.1</td>
<td>34.4</td>
<td>NS</td>
</tr>
</tbody>
</table>

*The χ2-test was used to compare differences between the groups. 50/50 = 50% ICSI/50% standard IVF cycle; NS = not significant; PESA = epididymal sperm aspiration; TESA = testicular sperm extraction.

Furthermore, there were no significant differences found in pregnancy rates when comparing the EA group of women who had not needed additional analgesic with the alfentanil group.

Concentrations of NPY in the follicular fluid

FF was collected in 44 of 136 women in the EA group, and in 47 of 138 women in the alfentanil group who underwent oocyte aspiration. NPY concentrations in the FF were significantly higher in the EA group compared with the alfentanil group (P < 0.001) (Table III). Although the women in each group who became pregnant had somewhat lower FF NPY concentrations than the group average, the FF NPY concentrations of pregnant women still differed significantly between groups (Table III). No correlations were found between FF NPY concentrations and pregnancy.

Concentrations of NPY in the follicular fluid

FF was collected in 44 of 136 women in the EA group, and in 47 of 138 women in the alfentanil group who underwent oocyte aspiration. NPY concentrations in the FF were significantly higher in the EA group compared with the alfentanil group (P < 0.001) (Table III). Although the women in each group who became pregnant had somewhat lower FF NPY concentrations than the group average, the FF NPY concentrations of pregnant women still differed significantly between groups (Table III). No correlations were found between FF NPY concentrations and pregnancy.

VAS ratings of subjective experience

There were no significant differences between the groups in any of the VAS ratings made before and directly after oocyte aspiration (Table IV). At 2 h after oocyte aspiration, the EA group experienced significantly less abdominal pain (P < 0.01), other pain (P < 0.05), nausea (P < 0.01) and stress (P < 0.01) and were more calm (P < 0.05) compared with the alfentanil group (Table IV). The frequency of VAS ratings in variables...
where significant differences between the EA and alfentanil group were detected are shown in Table V.

None of the VAS ratings of the women who were undergoing their first IVF cycle differed significantly from those of the women who were undergoing their second, third or fourth IVF cycle, as compared within each group.

**Discussion**

Infertile women attempt many things in the hopes of overcoming their infertility, and acupuncture is no exception. It is unclear, however, as to the scientific evidence which is available to support the use of acupuncture in this situation. Although previously reported observations were of interest (Paulus et al., 2002), the statistical analysis used in that study could be criticised as no power calculation was presented. Hence, the result might have misleading significance and so should be interpreted with care. A large number of patients is required in order to be able to determine whether there is a true difference in pregnancy rate between groups. However, the results of the study by Paulus and colleagues are in line with an observation in a previous study from the present authors’ group.
Table VI. Number (percentage) of patients who received additional anaesthetic in the group receiving electro-acupuncture (EA) and a paracervical block (PCB) and in the group receiving alfentanil (ALF) and a PCB.

<table>
<thead>
<tr>
<th>Anaesthetic</th>
<th>EA (n=136)</th>
<th>ALF (n=138)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALF 0.25 mg</td>
<td>13 (9.4)</td>
<td>2 (1.5)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>ALF 0.5 mg</td>
<td>34 (26.4)</td>
<td>17 (12.5)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>ALF 0.75 mg</td>
<td>5 (3.6)</td>
<td>0 (0)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>ALF 1.5 mg</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>NS</td>
</tr>
<tr>
<td>Total</td>
<td>53 (38.6)</td>
<td>19 (14)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Values in parentheses are percentages.

*The χ²-test was used to compare differences between the two groups in terms of additional anaesthetics given. NS = not significant.

where the number of patients was also too small for any conclusions to be drawn about pregnancy rate. It is important to bear in mind that the study protocols differ, and it is not possible to make any direct comparison between the present study and that of Paulus and co-workers. In particular, in the present study protocols differ, and it is not possible to make any direct comparison between the present study and previous findings where the consumption of analgesics was reduced by 50% when EA was used in combination with conventional analgesics (Wang et al., 1997a). A reduction in the use of pharmacological medication during oocyte aspiration may be desirable, as alfentanil has been found in the FF (Soussis et al., 1995). The disadvantage of the EA procedure used in the present study was that the time taken to induce analgesia was more time-consuming than when conventional analgesics only were used. It would be of interest to investigate whether analgesia could be induced by EA in a <30 min procedure performed prior to oocyte aspiration.

Many couples undergoing IVF suffer great stress and anxiety and may need to undergo repeated attempts before treatment is successful. It is therefore important that patients are not left with unpleasant memories of the oocyte aspiration procedure. An interesting observation in the present study was that the EA group had less postoperative abdominal pain, nausea and stress compared with the alfentanil group. Stress may affect the implantation rate (Csemiczky et al., 2000), and for that reason this finding may be of great value.

Although in the past scepticism has been voiced over the effects claimed for acupuncture, in recent years the effect of acupuncture on different conditions (pain and diseases) has been studied from a Western scientific perspective, and the results have demonstrated that acupuncture has both physiological and psychological impacts (Andersson and Lundeberg, 1995). Needle insertion into the skin and deeper tissues, in addition to subsequent stimulation of the needles, results in a particular pattern of afferent activity in peripheral nerves, mainly the A-delta and possibly also the C fibres. Acupuncture stimulation has been demonstrated to activate inhibitory systems in the spinal cord, which results in segmental inhibition of the sympathetic outflow (Sato et al., 1997) and pain pathways, as predicted by the gate control theory (Melzack and Wall, 1965). EA releases endogenous opioids and oxytocin, which seem to be essential in the induction of functional changes in different organ systems (Andersson and Lundeberg, 1995). In this respect, particular interest has been dedicated to β-endorphin—an endogenous opioid with a high affinity for the μ receptor (Bashbaum and Fields, 1984). Indeed, evidence suggests that this hypothalamic β-endorphin system plays a central role in mediating the pain-relieving effect of acupuncture (Wang et al., 1990a,b). Furthermore, it has been shown that intense stimulation results in the activation of supraspinal pain inhibitory centres, and this mechanism is denoted diffuse noxious inhibitory controls (DNIC) or counter-irritation (Bing et al., 1990).

In conclusion, in the present clinical situation EA does not improve pregnancy rates. In the present study, NPY concentrations in FF were higher in the EA group, which may be two repeated trials, been found to be as good as alfentanil in inducing adequate peroperative analgesia during oocyte aspiration. The finding that EA induces adequate analgesia during minor surgery is not new, and has been substantiated in different clinical areas (Kho et al., 1991; Wang et al., 1997b). In addition, the results of the present study show that women given EA require significantly less quantities of additional opiates than those given alfentanil group. This is in line with previous findings where the consumption of analgesics was reduced by 50% when EA was used in combination with conventional analgesics (Wang et al., 1997a). A reduction in the use of pharmacological medication during oocyte aspiration may be desirable, as alfentanil has been found in the FF (Soussis et al., 1995). The disadvantage of the EA procedure used in the present study was that the time taken to induce analgesia was more time-consuming than when conventional analgesics only were used. It would be of interest to investigate whether analgesia could be induced by EA in a <30 min procedure performed prior to oocyte aspiration.
important for human ovarian steroidogenesis. In addition, the findings of the present study support the view that EA might be a valuable alternative to conventional analgesics during oocyte aspiration in assisted reproduction. For those women who are willing to try EA, it may be a better analgesic method as the pain relief achieved peroperatively is as effective as that induced by conventional analgesics. The women experience less abdominal pain, less nausea and less stress at 2 h after oocyte aspiration, and also use less opiate analgesics than when conventional analgesics alone are used.

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