Epidural Anesthesia in an *in Vitro* Fertilization and Embryo Transfer Program

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Objectives: To investigate the potential advantages of epidural anesthesia in an *in vitro* fertilization and embryo transfer program.

Study Design: Between January 1991 and December 1992, 148 infertile patients underwent transvaginal ultrasound guided oocyte retrieval. A total of 44 patients (group A) had 50 retrievals under epidural anesthesia, and 104 patients (group B, control group) 112 retrievals under intravenous sedation (propofol) with mask-assisted ventilation (nitrous oxide).

Results: In group A satisfactory anesthesia was achieved in 49 of the 50 cases (98%); one patient required additional intravenous administration of propofol owing to extreme anxiety. No complications were observed. Adversely, in group B nausea was observed in 16 cases (14%) and nausea and vomiting in 7 cases (6%). In group A the fertilization, cleavage and pregnancy rates were 67.2%, 92% and 20% respectively, while in group B the rates were 69.3%, 93% and 19.6% respectively; the differences are not statistically significant.

Conclusions: Epidural anesthesia is an effective method for transvaginal oocyte retrieval but does not improve the treatment outcome as compared to an intravenous sedation with mask-assisted ventilation using propofol and nitrous oxide.

KEY WORDS: anesthesia; IVF-ET; epidural anesthesia; transvaginal oocyte retrieval.

INTRODUCTION

The development of assisted reproductive technologies (ART) has prompted over the last 15 years a high number of investigations. The majority of scientific reports have concentrated on endocrine, clinical and embryological aspects of these techniques. In contrast, anesthesia has been the subject of few studies in ART and the effects of anesthetic agents on the reproductive outcome are yet unclear.

Laparoscopic oocyte retrieval for IVF-ET or GIFT usually requires general anesthesia or intravenous sedation and consequently exposes the gametes to the potentially adverse effects of the anesthetic agents. It has been reported that the prolonged exposure to these agents affects cleavage and fertilization rate (1,2) and probably the luteal phase (3). Moreover, laparoscopic procedures utilize carbon dioxide (CO$_2$) pneumoperitoneum and the gametes are exposed also to the effects of this gas (4), which further confuses causal studies in ART.

The introduction in clinical practice of transvaginal oocyte retrieval has eliminated the use of CO$_2$; however, this technique also usually requires some form of anesthesia. Theoretically regional anesthesia offers obvious advantages over general anesthesia or intravenous sedation with mask-assisted ventilation.

In this report we have made a control study in the use of epidural anesthesia for transvaginal ultrasound guided oocyte retrieval.
MATERIALS AND METHODS

Patients

Between January 1991 and December 1992, 148 infertile patients underwent transvaginal ultrasound guided oocyte retrieval for IVF-ET procedures. A total of 44 patients (group A) had 50 retrievals under epidural anesthesia, and 104 patients (group B, the control group) underwent 112 retrievals under intravenous sedation with mask-assisted ventilation. In group A the mean age was 33 years (range: 20–41). The mean duration of infertility was 7.1 years (range: 1–19). The causes of sterility included ovarian (8 cases), tubal (13 cases), unknown (6 cases) and male factor (17 cases).

In group B the mean age was 32 years (range: 21–40). The mean duration of infertility was 6.8 years (range: 1–20). The causes of sterility included ovarian (16 cases), tubal (34 cases), unknown (13 cases) and male factor (41 cases).

Ovarian Stimulation and Oocyte Retrieval

The protocols for ovarian stimulation included the administration of a single i.m. injection of D-Trp-6 LH-RH (Decapeptyl, Ipsen, Italy) or leuprolermin (Enantone, Takeda Italia Farmaceutici, Italy) and the administration of hMG (FSH 75 IU plus LH 75 IU per ampule, Pergonal 500, Serono, Italy). The dose of gonadotropins was 3 or 4 ampules from day 1 to day 4 and from day 5 the dose was adjusted according to the oestradiol levels and ultrasound monitoring. A total of 10,000 IU of hCG (Profasi HP 5000, Serono, Italy, 2 ampules) were administered when at least two follicles exceeded 17 mm in diameter and estradiol levels were greater than 800 pg/ml. The luteal phase was supported by the administration of 100 mg of progesterone (Gestone 100, AMSA, Italy) every 2 days.

Oocytes were retrieved 34 h after hCG administration by transvaginal ultrasound guided puncture, using a 6.5-MHz electronic transducer (AU 450, Ansaldo Biomedica, Italy) and double-lumen needles (Casmed, U.K.).

Epidural Anesthesia

The patients were admitted to the clinic on the day of retrieval. In the operating theater the women were placed in a sitting position and the epidural anesthesia was performed by two experienced anesthesiologists (A. D'A. and G. D'A.) according to the following protocol:

Infusion of balanced salt solution
Administration of atropine, 0.5 mg i.m.
Local anesthesia with 3 cc of mepivacaine 1% (Carbocaina, Pierrel, Italy)
Puncture at the L2–L3 level by a gauge 18, 3.5-inch needle (Spinocan, Becton Dickinson, USA)
Administration of 20 cc of bupivacaine (Marcaina, Pierrel, Italy).
Continuous monitoring of body temperature, blood pressure, cardiac activity and peripheral oxygen (O_2) saturation.

Intravenous Sedation with Mask-Assisted Ventilation
Preanesthesia: atropine, 0.5 mg i.m.
Induction: propofol (Diprivan, ICI, Italy) by bolus i.v., 3 mg/kg
Maintenance: (i) propofol by i.v. infusion and (ii) NO_2 plus O_2 by mask. The patients breathed spontaneously. These agents were administered according to the data obtained from monitoring.

Follow-Up

The patients were followed for at least 2 weeks by clinical observations. A pregnancy test was performed 13 days after retrieval, and the pregnancies were confirmed at the fifth week with ultrasound examination.

Statistical Analyses

Statistical comparisons were performed by chi-square analysis or Student's t test as appropriate.

RESULTS

Anesthesia Results

The mean duration of the sonographic and surgical procedures during retrieval was 28 min (range: 14–40) in group A and 30 min (range: 12–42) in group B (P > 0.05). These procedures included (1) sonographic examination of the pelvis; (2) localization of the ovaries; (3) puncture and washing of each follicle, until oocyte recovery (maximum three washings); (4) aspiration of the free fluid in the pouch of Douglas, if necessary. No complications were observed in any of the cases. In group A satisfactory anesthesia was obtained in 49 of the 50 retrievals (98%). One patient required additional ad-