Conscious sedation and analgesia for oocyte retrieval during IVF procedures: a Cochrane review

Irene Kwan¹, Siladitya Bhattacharya², Fiona Knox³ and Alex McNeil⁴

¹National Collaborating Centre for Women’s and Children’s Health, London, ²Department of Obstetrics and Gynaecology, ³Service for Obstetric Anaesthesia, Aberdeen Maternity Hospital, Aberdeen, UK and ⁴BMJ Knowledge, BMA House, London, UK

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BACKGROUND: Various methods of sedation and analgesia have been used for pain relief during oocyte recovery during IVF. OBJECTIVE: To compare conscious sedation and analgesia with alternative methods for pain relief and pregnancy outcomes. METHODS: We searched the Specialised Register of the Menstrual Disorders and Subfertility Group, the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL, the National Research Register and Current Controlled Trials up to February 2004. RESULTS: Twelve trials were included. Owing to considerable heterogeneity, regarding types and dosages of sedation or analgesia used, and tools used to assess pain, a meta-analysis was attempted only in trials where appropriate data were available. Clinical pregnancy rates per woman in individual trials were comparable. Data on pain showed conflicting results. CONCLUSION: No single method or delivery system appeared superior for pregnancy rates and pain relief. Future studies need to be consistent in the choice of tools used to measure pain and the timing of such evaluations.

Key words: conscious sedation/IVF/oocyte retrieval/pain relief/systematic review

Introduction

Recovery of oocytes from the ovary is a fundamental step of IVF treatment. Although less invasive than the laparoscopic approach (Tanbo et al., 1988), transvaginal oocyte retrieval may be the most painful procedure performed during IVF treatment (Ng et al., 2001).

Types of pain relief used for transvaginal oocyte retrieval include conscious sedation and local, epidural, spinal and general anaesthesia. The primary goal is to provide safe and effective analgesia facilitating optimum surgical conditions and speedy post-operative recovery. There is also concern about potential effects of any drugs used on reproductive outcome (Palot et al., 1988; Wikland et al., 1990; Coetsier et al., 1992; Soussis et al., 1995; Christiaens et al., 1999). Toxic effects of analgesic/sedative agents on oocyte maturation and fertilization have been reported in animal studies (Depypere et al., 1991; Asalili et al., 1997; Janssenswillen et al., 1997; Tatone et al., 1998).

The concept of conscious sedation is widely accepted for the short-term management of pain in internal medicine, paediatrics and dentistry (Trout et al., 1998). It has been defined as ‘a technique in which the use of a drug or drugs produces a state of depression of the central nervous system enabling treatment to be carried out, but during which verbal contact with the patient is maintained throughout the period of sedation. The drugs and techniques used should carry a margin of safety wide enough to render loss of consciousness unlikely’ (Skelly, 1996). Analgesia has been defined as ‘a state of reduced pain perception’. This implies consciousness (White, 1987). Some analgesics, mainly opiates, have the capacity to depress the central nervous system and impair respiration, circulation or both (AOMRC, 2001).

It has been suggested that the pain associated with oocyte retrieval is intermittent rather than continuous (Zelcer et al., 1992). An ideal technique of pain relief is one which has the flexibility to respond to the changing requirements of women undergoing oocyte recovery. Patient-controlled analgesia (PCA) may facilitate an individualized approach and, by allowing women a degree of control over their drug administration, lead to higher levels of patient satisfaction (Dell and Cloote, 1998). Conscious sedation allows patient co-operation to be maintained and the procedure to be conveniently performed in the outpatient setting, without an anaesthetist. This remains the most commonly used method of providing analgesia and anaesthesia during transvaginal oocyte retrieval (Trout et al., 1998) and is used in 84% of IVF clinics in the UK (Elkington et al., 2003) and 95% of IVF centres in the USA (Ditkoff et al., 1997). By comparison, 16% of UK clinics and about 50% of
This systematic review aims to assess the effectiveness of conscious sedation versus alternative methods of analgesia in women undergoing transvaginal oocyte retrieval in terms of pregnancy outcomes, pain relief and patient satisfaction.

### Materials and methods

#### Searching

We searched the Menstrual Disorders and Subfertility Group’s Specialised Register of controlled trials, The Cochrane Central Register of Controlled Trials (CENTRAL) on the latest issue of *The Cochrane Library*, MEDLINE (1966–2004), EMBASE (1980–2004), CINAHL (1982–2004), the National Research Register and Web-based trial databases such as Current Controlled Trials. There was no language restriction. Additionally, all references in the identified trials and background papers were checked and authors contacted to identify relevant published and unpublished data. Details of the search strategy have been described previously (Kwan et al., 2005) and are available from the authors on request.

#### Selection

The primary outcomes were live birth rate and ongoing pregnancy rate per woman and intra- and post-operative pain scores. Secondary outcomes included side effects of analgesia, post-operative complications and patient satisfaction. Two reviewers (I.K. and A.M.) independently examined the electronic search results for reports of possibly relevant trials, and these reports were retrieved in full. Both reviewers applied selection criteria independently to the trial reports, resolving disagreements by discussion with two other reviewers (S.B. and F.K.).

#### Validity assessment and data extraction

Data were extracted independently by I.K. and A.M. on the type of participants, intervention, outcome measure and methods of randomization, including the use of intention-to-treat analysis, valid prospective power calculations, numbers lost to follow-up and blinding of outcome assessment. Because there is evidence that the quality of allocation concealment particularly affects the results of studies, we rated quality of allocation concealment according to the criteria proposed by Schulz et al. (1995) as ‘adequate’, ‘unclear’ or ‘inadequate’. Where the method used to conceal allocation was not clearly reported, the authors were contacted for clarification. Disagreement was resolved by consensus among the authors.

#### Data analysis

Only data reported in the trials were included in our primary analysis. Interventions were classified and analysed under broad categories of pain relief, e.g. types of conscious sedation and analgesia methods and administration protocols. Where appropriate data were available, they were pooled to calculate odds ratios (OR) and weighted mean differences (WMD), using the Review Manager 4.2 software (Cochrane Collaboration). For the remaining trials, a descriptive summary of the outcomes of each trial was presented.

#### Results

Our search strategy identified 390 potentially eligible reports, of which 27 were appropriate for review. After full text review, 15 were excluded because conscious sedation was not one of the comparators. Twelve papers which met our inclusion criteria (Ramsewak et al., 1990; Zelcer et al., 1992; Cook et al., 1993; Bhattacharya et al., 1997; Ben-Shlomo et al., 1999; Stener-Victorin et al., 1999; Thompson et al., 2000; Ng et al., 2001; Lok et al., 2002; Ocal et al., 2002; Stener-Victorin et al., 2003; Humaidan and Stener-Victorin, 2004) involved 1349 women who underwent oocyte retrieval (Figure 1). There were two main categories of trials: (1) those which compared the effect of conscious sedation with alternative methods (Table I) and (2) those which compared the effect of PCA with physician-administered sedation/analgesia (Table II). Interventions used for pain relief showed a wide variation among trials in terms of pharmacological preparations and their doses.

The methodological quality of the trials was variable. The method of randomization was not always explicit, and intention-to-treat analyses and sample size calculation were not routinely performed (Table I). Sample sizes in individual trials were small, ranging from 30 to 286 women. Sample size calculation was not reported in six trials (Ramsewak et al., 1990; Zelcer et al., 1992; Cook et al., 1993; Ben-Shlomo et al., 1999; Stener-Victorin et al., 1999; Ocal et al., 2002). None of the trials reported blinding of outcome assessment.

#### Pregnancy rates

Live birth was only reported in a single trial (Stener-Victorin et al., 1999), whereas seven trials reported clinical or ongoing pregnancy rates (Ben-Shlomo et al., 1999; Stener-Victorin et al., 1999, 2003; Ng et al., 2001; Lok et al., 2002; Thompson et al., 2000; Humaidan and Stener-Victorin, 2004). Overall, alternative methods of conscious sedation/analgesia did not result in marked differences in pregnancy rates. Three trials compared i.v. alfentanil (opiate analgesic) [plus paracervical block (PCB)]
### Table 1. Summary of randomized trials comparing conscious sedation with other methods

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<td><strong>Conscious sedation versus placebo</strong></td>
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<td>Ramsewak et al. (1990)</td>
<td>RCT (ampoules randomized by pharmacist, covered with masking tape and kept in separate box in medicine cupboard. Code for ampoule contents kept in sealed envelope by embryologist.)</td>
<td>30 women undergoing follicular aspiration for single follicles</td>
<td>Sedation with i.v. fentanyl (n = 12) versus placebo with normal saline (n = 12)</td>
<td>Intraoperative pain (VAS)</td>
<td>During needle insertion: 39 ± 8 versus 56 ± 9</td>
<td>Adequate</td>
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<td>No sample size calculation</td>
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<td>No intention to treat (six patients excluded)</td>
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<td><strong>Conscious sedation/analgesia versus general anaesthesia</strong></td>
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<td>Ben-Shlomo et al. (1999)</td>
<td>RCT (allocation by random numbers, sealed in consecutive envelopes)</td>
<td>50 women scheduled for oocyte retrieval</td>
<td>Sedation with i.v. midazolam and ketamine (n = 25) versus general anaesthesia with i.v. fentanyl and propofol (n = 25)</td>
<td>(1) Clinical pregnancy rate (2) Intraoperative pain (Likert scale) (3) Post-operative pain (VAS) (4) Patient’s satisfaction (5) Post-operative vomiting</td>
<td>(1) 20% versus 20% (OR = 1.00; 95% CI = 0.25–3.94) (2) 1.32 ± 0.83 versus 0.12 ± 0.32 (WMD = 1.20; 95% CI = 0.85–1.55) (3) 0.2 ± 0.5 versus 2.1 ± 0.7 (WMD = –1.90; 95% CI = 2.24–1.56) (4) 96% versus 100% (OR = 0.14; 95% CI = 0.00–6.82) (5) 16% versus 4% (OR = 2.10; 95% CI = 0.39–11.37)</td>
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<td>No intention to treat (one patient excluded)</td>
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<td><strong>Conscious sedation/analgesia with PCB versus electroacupuncture with PCB</strong></td>
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<td>Stener-Victorin et al. (1999)</td>
<td>RCT (allocation by opening sealed unlabelled envelopes, each containing a unique study number)</td>
<td>150 women undergoing oocyte aspiration</td>
<td>Control: analgesia with i.v. alfentanil plus PCB (n = 75)</td>
<td>(1) Live birth rates (2) Clinical pregnancy rate (3) Intraoperative pain (VAS) (4) Post-operative pain (VAS) (5) Post-operative nausea (VAS)</td>
<td>(1) 26% versus 33% (OR = 0.69; 95% CI = 0.34–1.40) (2) 26% versus 33% (OR = 0.58; 95% CI = 0.29–1.16) (3) 26.4 ± 22.0 versus 30.1 ± 19.4 (WMD = –3.50; 95% CI = –7.46 to 1.06) (4) 43.60 ± 28.50 versus 48.60 ± 23.10 (5) 5.7 ± 12.8 versus 6.7 ± 16.2</td>
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<td>No intention to treat (one patient excluded)</td>
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<td>Stener-Victorin et al. (2003)</td>
<td>RCT (allocation by opening sealed unlabelled envelopes, each containing a unique study number)</td>
<td>286 women undergoing oocyte aspiration</td>
<td>Control: analgesia with i.v. alfentanil plus PCB (n = 145)</td>
<td>(1) Ongoing pregnancy rates (2) Clinical pregnancy rate (3) Intraoperative pain (VAS) (4) Post-operative pain (VAS) (5) Post-operative nausea (VAS) median</td>
<td>(1) 31% versus 27% (OR = 1.21; 95% CI = 0.72–2.03) (2) 36% versus 32% (OR = 1.19; 95% CI = 0.72–1.96) (3) 26.4 ± 18.30 versus 29.7 ± 17.70 (WMD = –3.20; 95% CI = –7.46 to 1.06) (4) 44.8 ± 23.80 versus 45.90 ± 23.60 (WMD = –0.10; 95% CI = –6.71 to 4.51) (5) 2.0 (range 0–86) versus 1.0 (range 0–68)</td>
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<td>No intention to treat (12 patients dropped out)</td>
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with electroacupuncture (plus PCB) (Stener-Victorin et al., 1999, 2003; Humaidan and Stener-Victorin, 2004), and no significant difference in clinical pregnancy rates was reported between the two groups (26% versus 37%, 36% versus 32% and 50% versus 46%, respectively). Combining clinical pregnancy data from these three trials resulted in a combined OR of 1.01 [95% confidence interval (CI) = 0.73–1.40]. There was no significant difference between i.v. alfentanil and electroacupuncture in terms of ongoing pregnancy rate and live birth rate per woman (Stener-Victorin et al., 1999, 2003) (31% versus 27% and 26% versus 33%; combined OR = 0.99, 95% CI = 0.65–1.51).

### Pain

Pain was the primary or exclusive outcome in all the included trials. However, the timing and mode of assessment varied among the included trials. Intraoperative pain was measured in 11 trials (Ramsewak et al., 1990; Zelcer et al., 1992; Bhattacharya et al., 1997; Ben-Shlomo et al., 1999; Stener-Victorin et al., 1999, 2003; Thompson et al., 2000; Ng et al., 2001; Lok et al., 2002; Ocal et al., 2002; Humaidan and Stener-Victorin, 2004) and post-operative pain in five trials (Ben-Shlomo et al., 1999; Stener-Victorin et al., 1999, 2003; Lok et al., 2002; Humaidan and Stener-Victorin, 2004). Pain was measured by visual analogue scale (VAS), a 100 mm linear analogue scale; WMD, weighted mean difference. PCB involves injecting local anaesthetic near the cervix. Epidural analgesia involves injecting local anaesthetic into the epidural space close to the spinal cord in order to numb the lower part of the body. Electroacupuncture is a pain-relieving method that activates endogenous pain-inhibiting systems such as the spinal/segmental gate mechanism and the endogenous opioid systems. Any acupuncture effect rests on physiological and/or psychological mechanisms. Alfentanil/fentanyl, opiate analgesia; ketamine, sedative and analgesic; midazolam, sedative and anxiolytic; pethidine, opiate analgesic; piroxicam, non-steroidal analgesic; propofol, sedative and anxiolytic.
<table>
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<tr>
<th>Study</th>
<th>Design and Randomization Method</th>
<th>No. of Participants</th>
<th>Intervention</th>
<th>Control</th>
<th>No. of Participants</th>
<th>Intervention</th>
<th>Key Results</th>
<th>Adequacy</th>
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<tr>
<td>Bhattacharya et al.  (1997)</td>
<td>RCT (allocation by computer-generated random numbers in consecutively numbered opaque sealed envelopes)</td>
<td>81 women undergoing vaginal oocyte recovery</td>
<td>Control: patient-controlled analgesia with i.v. fentanyl using a patient-controlled analgesia machine (n = 39)</td>
<td>Intervention: intermittent physician-administered i.v. fentanyl (n = 42)</td>
<td>(1) Intraoperative pain score using VAS</td>
<td>(1) 38.5 ± 19.8 versus 46.1 ± 21.3 (WMD = –7.6; 95% CI = –16.6 to 1.35)</td>
<td>Adequate</td>
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<td>Lok et al. (2002)</td>
<td>RCT (allocation using computer-generated random numbers concealed in opaque envelopes)</td>
<td>110 women undergoing IVF</td>
<td>Control: patient-controlled sedation/analgesia with i.v. propofol and alfentanil using a pump (n = 51)</td>
<td>(1) Intraoperative pain score using VAS</td>
<td>(1) 38.5 ± 19.8 versus 46.1 ± 21.3 (WMD = –7.6; 95% CI = –16.6 to 1.35)</td>
<td>Adequate</td>
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<td>Thompson et al. (2000)</td>
<td>RCT (allocation by computer-generated random numbers contained in numbered sealed opaque envelopes)</td>
<td>112 women undergoing outpatient oocyte recovery</td>
<td>Control: patient-controlled inhalational isodesox via mask (n = 57)</td>
<td>Intervention: physician-administered sedation/analgesia with i.v. pethidine (n = 55)</td>
<td>(1) Intraoperative pain score using VAS</td>
<td>(1) 16% versus 24% (OR = 0.61; 95% CI = 0.24–1.58)</td>
<td>Adequate</td>
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<td>Zelcer et al. (1992)</td>
<td>RCT (method of randomization and allocation concealment not reported)</td>
<td>80 healthy women presenting for outpatient ovum pick-up</td>
<td>Control: patient-controlled analgesia of i.v. alfentanil using a delivery system (n = 40)</td>
<td>(1) Intraoperative pain score using VAS</td>
<td>(1) 29.0 ± 18.00 versus 25.00 ± 15.00 (WMD = 4.00; 95% CI = –3.26 to 11.26)</td>
<td>Unclear</td>
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<td>Cook et al. (1993)</td>
<td>RCT (allocation by opening one of 60 sealed envelopes)</td>
<td>47 women presenting for transvaginal ultrasound-guided oocyte retrieval</td>
<td>Control: patient-controlled sedation with propofol using a pump (n = 22) (alfentanil was also given during the procedure and on request)</td>
<td>Intervention: physician-controlled analgesia of i.v. alfentanil (n = 40)</td>
<td>(1) Intraoperative pain score using VAS</td>
<td>(1) 96% versus 91% (OR = 2.30; 95% CI = 0.23–23.40)</td>
<td>Adequate</td>
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CI, confidence interval; OR, odds ratio; RCT, randomized controlled trial; VAS, visual analogue scale, a 100 mm linear analogue scale; WMD, weighted mean difference. Fentanyl, opiate analgesia; isodesox, analgesic and sedative inhalational agent; midazolam, sedative and anxiolytic; pethidine, opiate analgesic; propofol, sedative and anxiolytic.
analogue scale (VAS) in nine trials (Ramsewak et al., 1990; Zelcer et al., 1992; Bhattacharya et al., 1997; Stener-Victorin et al., 1999, 2003; Thompson et al., 2000; Ng et al., 2001; Lok et al., 2002; Humaidan and Stener-Victorin, 2004) and by Likert scales in two trials (Ben-Shlomo et al., 1999; Ocal et al., 2002).

As Table I summarizes, where women in both groups received PCB, higher pain scores were reported by those who received placebo when compared with those given additional sedation (Ng et al., 2001). Women who received i.m. pethidine (opiate analgesic) were significantly more likely to report no pain than women given i.m. piroxicam (non-steroidal analgesic) alone. The addition of oral piroxicam to pethidine did not confer any additional benefit (Ocal et al., 2002). Response to pain during oocyte retrieval was significantly higher in the group given conscious sedation when compared with the group given general anaesthesia. Abdominal pain, assessed 30 min after the procedure, was significantly lower in the sedation group than in the general anaesthesia group (Ben-Shlomo et al., 1999).

Combining data from three trials which compared conventional analgesia with electroacupuncture in women receiving PCB showed that there was a significant difference in intraoperative pain scores between the two groups (WMD in VAS = –4.95; 95% CI = –7.84 to –2.07) in favour of conventional analgesia. A sensitivity analysis performed after excluding one of the trials (Humaidan and Stener-Victorin, 2004) where the i.v. fentanyl (opiate analgesic) group received premedication did not show a difference in perception of pain between the two groups (WMD in VAS = –3.29; 95% CI = –6.88 to 0.30).

When data on intraoperative pain scores from four trials comparing PCA and physician-controlled sedation/analgesia were combined, a WMD of 5.98 in VAS (95% CI = 1.63–10.33) in favour of physician-controlled sedation/analgesia was obtained. After exclusion of the trial in which PCA was administered via inhalational isodesox (analgesic and sedative inhalational agent) (Thompson et al., 2000), the WMD was 4.68 in VAS (95% CI = –0.09 to 9.45).

**Post-operative complications**

The occurrence of post-operative nausea and vomiting was similar in all groups. Loss of airway was reported in the physician-controlled group in one study (Thompson et al., 1993). In the trial which compared patient-controlled sedation with propofol (sedative and anxiolytic) or midazolam (sedative and anxiolytic), two women suffered syncpe after propofol and one woman became transiently unresponsive after midazolam (Cook et al., 1993).

**Patient satisfaction**

Patient satisfaction reported in these studies was high in all modalities of sedation/analgesia protocols. Owing to the way satisfaction was measured, it was not possible to combine these data.

**Discussion**

**Principal findings**

Alternative modalities of conscious sedation/analgesia during oocyte retrieval did not appear to affect pregnancy rates. In most of these comparisons, the CIs were wide; therefore, the results should be interpreted with caution. High levels of satisfaction were reported in most of the trials included in this review, but women’s experience of pain showed conflicting results. No one particular method or delivery system appeared to be clearly better than the other.

**Strengths**

This study is the first comprehensive systematic review to assess the effect of conscious sedation and analgesia versus all existing modalities of pain management during oocyte retrieval. As a Cochrane systematic review, it will be updated regularly.

A recent systematic review of pain relief in oocyte retrieval (Stener-Victorin, 2005) restricted itself to trials comparing electroacupuncture with other modalities. The findings of this review were similar to ours in this subgroup.

**Weaknesses**

We identified many dissimilar interventions, with little consistency in choice of outcomes. Even where similar drugs were used, the route and doses were often very different. The use of complex interventions in many trials impaired our ability to assess the effects of individual pain relief measures.

Where pain was the chosen outcome, there were marked differences in timing of assessment of pain and instruments used. The heterogeneity of the wide range of interventions, dosing regimen and outcome measures limited our ability to aggregate data meaningfully and generate conclusions.

**Meaning of the results**

**Pain**

The procedure of oocyte recovery is moderately painful, as demonstrated by higher pain scores in women receiving placebo (Ramsewak et al., 1990) and lower scores associated with other interventions. Regardless of the nature of the drug or the dose used, opiates were effective at reducing perception of pain. Where a second drug or intervention such as PCB was added to the opiate, this conferred further benefit, with the exception of piroxicam, a non-steroidal analgesic. The principle of a balanced multimodal approach to analgesia has been shown to be effective at treating pain in other clinical settings such as cancer (WHO pain ladder, http://www.who.int/cancer/palliative/painladder/en/, accessed on 9 November 2005).

In terms of other individual methods of pain relief, PCB appears to reduce pain during oocyte recovery (Ng et al., 1999), as demonstrated in a trial where pain scores were significantly higher in a placebo group (Ng et al., 2001). In a trial evaluating PCB, women who were given additional i.v. fentanyl reported lower intraoperative pain scores. Meta-analysis of the intraoperative pain scores associated with i.v. fentanyl plus PCB versus electroacupuncture plus PCB favoured i.v. fentanyl. However, in this study, the group given fentanyl also received premedication, whereas no premedication was given to the electroacupuncture group (Humaidan and Stener-Victorin, 2004). In many of the studies reviewed, it is
not clear whether the measurement of pain was performed retrospectively. Co-interventions such as premedication might distort the memory of pain. This must be taken into account in interpreting data from trials where pain was measured retrospectively. It was not possible to disentangle the individual anxiolytic, sedative and analgesic effects of sedative–analgesic combinations. Analgesics such as fentanyl and pethidine in high dosage can produce sedation, and i.v. anaesthetics such as propofol and ketamine (sedative and analgesic) have sedative effects at subanaesthetic dosage. Ketamine has analgesic as well as sedative properties.

PCA appeared to be less effective than physician-administered analgesia in terms of pain scores. Although the theoretical advantage of PCA is that it allows patients to administer as much pain relief as they need, this advantage may be limited by (1) the way the pump is set up to deliver a metered dose and (2) in-built lockout time for reasons of safety. A physician may anticipate painful episodes and give a dose larger than a PCA pump would permit.

Reliability of assessment

The combination of midazolam and ketamine was compared with general anaesthesia with propofol and isoflurane (sedative and analgesic vapours) (Ben-Shlomo et al., 1999). No intraoperative pain was remembered in either group. The amnesic effect of midazolam may be an important confounder, as it might obtund the memory of pain; general anaesthesia by definition should not be associated with intraoperative perception of any kind. Women sedated had less post-operative pain, possibly because fentanyl is too short acting to provide adequate post-operative pain relief. Pethidine was reported to be a more effective pain relief agent than piroxicam (Ocal et al., 2002).

Where both the delivery system and drugs used were compared simultaneously, it was impossible to disentangle the effect of the different variables. For example, a regimen of patient-administered propofol with alfentanil was compared with physician-administered pethidine and diazepam (sedative and anxiolytic) (Lok et al., 2002). In another trial, patient-controlled analgesia using inhalational isoflurane was compared with physician-administered fentanyl and midazolam (Thompson et al., 2000).

The substantial discordance between pain scores and satisfaction among these trials limits our ability to draw any firm conclusions. Meta-analysis of the intraoperative pain score between patient- and physician-controlled sedation/analgesia showed significantly lower pain scores in the physician-controlled group. However, this needs to be interpreted with caution, considering the different sedative/analgesic agents and dosages used in these trials.

Another factor that could affect perception of pain is the duration of the oocyte retrieval procedure. Multiple-follicle aspiration would entail a lengthier procedure, which could affect pain scores when compared with single-follicle aspiration. Only two studies reported the number of oocytes retrieved. A single-follicle aspiration during a natural cycle was assessed in one study (Ramsewak et al., 1990), and multiple oocyte retrievals (over 10) were assessed in another trial (Lok et al., 2002).

Meaning of satisfaction

It is unclear whether global satisfaction can be regarded as a meaningful outcome in determining the effectiveness of the nature, dose and delivery system of analgesia used for oocyte recovery. It is possible that the overall success of the operative procedure (in terms of oocytes collected) and anxiety about side effects of drugs may override any distress caused by the pain. Where PCA was available, patients pressed the demand button only when the pain became intolerable (Chumbley et al., 1998). It has also been reported that some patients were reluctant to eliminate pain completely even when encouraged to do so (Hawkins and Price, 1993). The generally high satisfaction levels may also reflect the fact that the overall success of the procedure (i.e. successful retrieval of oocytes) had the potential to counteract the discomfort of the procedure. The subjective nature of pain and satisfaction, and the different measures used to assess them, limits our ability to interpret and aggregate these outcomes satisfactorily.

Complications

In a trial that compared propofol and midazolam in the context of patient-controlled sedation, two women in the propofol group were unable to complete the assessment after the procedure. One was emotionally upset by a difficult oocyte recovery and the other fainted on sitting up. One woman became transiently unresponsive intraoperatively in the midazolam group when given rescue alfentanil by the anaesthetist (Cook et al., 1993). No serious adverse effects or cancellation of oocyte recovery procedure was documented in the rest of the trials reviewed. It is unclear whether no adverse effects actually occurred or whether these effects were simply unreported. Rates of post-operative nausea and vomiting were similar between the comparison groups in all the trials.

General anaesthesia will abolish the issue of pain during oocyte retrieval but is likely to have resource implications. In choosing appropriate regimens for sedation/analgesia for oocyte retrieval, a balance may need to be struck between safety and efficacy. The ideal regimen would reduce pain to a tolerable level in all patients without the risk of adverse respiratory or cardiovascular events. This review demonstrates the variety of approaches to this problem and also underlines the difficulty of identifying one which is clearly superior to the rest.

Conclusion

In addition to conscious sedation and analgesia, many methods of pain relief during oocyte recovery are currently in use. There is insufficient good-quality evidence to determine which of these methods is the most effective. One of the limitations of previous research has been the diversity of techniques and lack of a single universally accepted ‘control’ procedure against which others can be evaluated. Although the outcomes of interest have been analgesic effect and satisfaction, the lack of standardization of measures used to assess these outcomes renders comparison across trials difficult and aggregation of data impossible. In planning future research, greater consensus is needed to determine the appropriate tools to evaluate pain,
and at what appropriate time during the procedure can pain be meaningfully evaluated. In addition, future trials should include intra- and post-operative adverse respiratory and cardiovascular events as outcomes.

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Potential conflicts of interest

None known.

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