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Patient-controlled sedation using propofol in elderly patients in day-case cataract surgery

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Patient-controlled sedation (PCS) with propofol has been used successfully as an adjunct to local anaesthetic procedures. We studied a group of elderly patients (mean age 75.4 yr) undergoing cataract surgery and attempted to increase patient acceptability and comfort of local anaesthesia. Propofol was self-administered in a dose of 0.25 mg kg^{-1} for patients more than 60 yr of age, with a lockout period of 3 min. A total of 14 of 20 patients used PCS; eight of 20 used the PCS only once and another six had three tries or less. Despite this, 18 of 20 patients claimed they found the PCS useful. However, while it is possible to administer PCS successfully to elderly patients undergoing cataract surgery and produce a decrease in the level of anxiety, we found it unacceptable because of head movement in two patients. These patients received only two and three divided doses, to a maximum of 29 and 30 mg, respectively. There were no other adverse events.

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Surgical procedures carried out under local or regional anaesthesia are associated with varying degrees of patient discomfort and apprehension. Patient-controlled sedation (PCS) with propofol has been used successfully during dental,[1] general or orthopaedic surgery under regional block.[2] PCS allows patients to titrate the drug dose on an individual basis,[3] reducing the risk of over- or under-dosage, a potential disadvantage of anaesthetist-administered sedation.

This study was designed to investigate PCS with propofol in day-case cataract surgery, where early recovery and lack of side effects are essential.

Methods and results

After obtaining approval from the Local Ethics Committee and informed patient consent, we planned to study 30 ASA I–III, unpremedicated outpatients undergoing elective cataract surgery under local anaesthesia. However, only 20 patients were studied (see below). Patients with recorded adverse reactions to propofol and those with severe cardiovascular or respiratory disease were excluded.

Instruction on the use of a commercially available patient-controlled analgesia machine (Graseby Medical Ltd, Watford, UK) was given verbally by the anaesthetist on the day of surgery and reinforced by a written description. The pump, charged with propofol 10 mg ml^{-1}, was programmed to deliver on demand a bolus dose of 0.5 mg kg^{-1} for patients less than 60 yr of age and 0.25 mg kg^{-1} for those more than 60 yr, at a rate of 16.7 ml min^{-1}, with a lockout period of 3 min after each delivered dose. A lower dose was felt to be appropriate for the age group usually presenting for cataract surgery.[2]

Before administration of the local anaesthetic and immediately after pump connection to a 22-gauge peripheral i.v. cannula, the patient was encouraged to make the first demand by pressing the hand-held triggering device and to make a demand in the event of any discomfort or anxiety. The electrocardiogram, non-invasive arterial pressure, ventilatory frequency and oxygen saturation were monitored throughout, as was the sedation/anxiety score (adapted from Osborne and colleagues[3]). Monitoring was commenced before administration of any drug, and data were recorded at 5-min intervals.

Specific complications sought were hypoventilation (ventilatory frequency $\leqslant$8 bpm), desaturation (oxygen saturation $\leqslant$90%), hypotension (systolic pressure $\leqslant$100 mm Hg), nausea or vomiting, restlessness or excitement, and over-sedation. If the peribulbar block, administered via a standard technique, appeared inadequate before commencement of surgery, it was repeated. All patients breathed oxygen enriched air (3 litre min^{-1} via nasal prongs).

At the end of surgery, the total amount of propofol administered was noted from the PCS display, as were the number of attempts at self-administration of propofol ('tries'), and the number of successful attempts ('good'). Before discharge from the day surgery unit, patients were asked their opinion of the sedation and its effect.

Table 1 Patient characteristics and surgical details (mean (SD), {range}, number or median [interquartile range]). Procedure duration=length of time PCS available to patient

Age (yr)	75.8 (9.5) {56–91}
Weight (kg)	63.4 (15.6) {40–90}
ASA status (I/II/III)	2/11/7
Sex (M/F)	4/16
Procedure duration (min)	56 (13.2) {40–90}
Length of surgery (min)	26.25 (8.3) {15–45}
Total dose (mg)	40.8 (35.9) {12.5–165}
PCS attempts	4 [3–8] {1–28}
Successful attempts	3.5 [2–6] {1–10}

Data were analysed using ANOVA or chi-square analysis as appropriate. $P \leqslant 0.05$ was accepted as statistically significant.

We studied 20 patients (mean age 75.8 yr) (Table 1). Eight patients used the PCS once (i.e. when prompted to do so before administration of the block) and another six patients had three tries or less. Most patients (18 of 20) claimed they found the PCS useful, whether or not they used more than the initial dose. Most patients (19 of 20) stated they would have a similar sedative again.

The mean dose of propofol used was 40.8 (range 12.5–165) mg (Table 1). The highest level of sedation recorded was in the patient that received the most propofol (165 mg in 75 min). In all patients anxious before the start of the procedure, anxiety levels were reduced during the procedure ($P=0.00003$). No patient developed oxygen saturation $<93\%$, and the lowest recorded ventilatory frequency was 11 bpm. Sedation score was negatively correlated with ventilatory frequency ($P=0.0015$). There were no episodes of hypotension or bradycardia. One patient who received a bolus dose of 0.5 mg kg^{-1} became disinhibited, but demanded no further doses. Another patient complained of pain on injection. The most significant complication noted was head movement in two patients, neither of which resulted in intraocular complications. One patient moved her chin repeatedly; she received two doses of propofol (total 29 mg). Another patient lifted her head, thinking the surgeon had asked her to do so (she stated later that '[she] must have been dreaming'). She received three doses of propofol (total 30 mg).

Comment

Most patients appreciated having control over their sedation, even though the majority (14 of 20) had no more than three tries. Eight patients used the initial dose only. Several remarked they were given confidence knowing they could have used more sedation if they had wanted and therefore did not. This is in keeping with other studies.[4 5] Perhaps surprisingly, no adverse cardiovascular or respiratory events were observed, although all patients in our unit receive supplementary oxygen during surgery.

The study was terminated after 20 of 30 patients were studied because of significant head movement in two patients. This was probably attributable to disorientation during emergence from sedation, as in all patients the local block was effective at the time of surgery. It is of note that both patients had received what most would consider to be a very small dose of propofol (30 mg or less in divided doses).

Although administration of sedation during surgery under local anaesthesia is commonplace in some eye units, some ophthalmologists prefer their patients not to receive sedation because of the risk of disorientation, perhaps resulting in movement of the operative field, and loss of airway patency.[6] Although head movement in our study did not result in complications, the concerns of ophthalmologists appear well founded. In our opinion, in the presence of a good block and patient co-operation, it is probably counterproductive to sedate elderly patients undergoing delicate eye surgery. If patients are unable to co-operate effectively during administration of the local block because of anxiety (incidentally increasing the risk of complications of the block) it is unlikely they will co-operate with the ophthalmologist during surgery. It may be wiser to offer these patients a general anaesthetic at an earlier stage rather than embark on surgery under these circumstances.

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