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Research Article

Outcome of combined peribulbar ropivacaine 0.75% block and general anesthesia for retinal detachment surgery: A randomized controlled study

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KEYWORDS

Peribulbar block;
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Abstract *Background:* Retinal detachment surgery (RDS) is frequently associated with a high incidence of significant perioperative pain and oculocardiac reflex (OCR) intra-operatively. The peribulbar block has gained wide acceptance in ophthalmic anesthetic practice in the recent times. However, there is little current knowledge regarding its efficacy in RDS.
This prospective randomized clinical study evaluated the effect and feasibility of peribulbar block when used in conjunction with general anesthesia on perioperative outcome.
Methods: 98 patients, ASA II-III, were randomly allocated to one of two groups to receive either peribulbar block in conjunction with general anesthesia ($n = 49$) or general anesthesia alone ($n = 49$).
Parameters compared were incidence of OCR, surgical bleeding, duration of surgery, postoperative pain and patient's satisfaction.
Results and discussion: Patients with PB block had a significantly lower incidence of intraoperative OCR ($n = 4$ vs. $n = 13$, $p < 0.05$). It also provided more effective post-operative analgesia with fewer patients requiring rescue analgesia medication ($n = 19$ vs. $n = 27$; $p = 0.105$). Surgical bleeding was more profuse in the general anesthesia group ($n = 5$ vs. $n = 27$, $p < 0.001$), with no cases of bleeding interfering with surgery in the peribulbar group.
Conclusions: PB block combined with GA improved significantly operating conditions and lower incidence of OCR. Patients in the block group also had better postoperative analgesia.

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1. Introduction

Retinal detachment surgery (RDS) is frequently associated with a high incidence of significant perioperative pain [1–6] but it is often underestimated [1]. It's also frequently associated with oculocardiac reflex (OCR), as a result of traction on the extraocular muscles or pressure on the eyeball [2,7,8].

Needle-based ophthalmologic regional anesthesia (RA) was first described by Knapp [9]. Then, in the early 20th century, Atkinson [10] introduced the retrobulbar (RB) block. RB is a practical means to achieve analgesia and profound akinesia of the globe. The peribulbar (PB) block is a more recently introduced needle-based technique that varies from the RB block in terms of the depth and angulation of needle placement within the orbit. The RB blocks are accomplished by directing a needle toward the orbital apex with sufficient depth and angulation such that the cone is penetrated [11]. The PB block is theoretically safer because the needle tip is kept at a greater distance from vital intraorbital structures and brain.

General anesthesia (GA) or RA either with RB or with PB blocks, is the usual method of providing anesthesia for RDS [2]. In comparison with GA, RA reduces the incidence of OCR [3,7] and decreases postoperative pain [3,6].

RA is still widely used in cases of difficult surgery and extended time surgery [12]. However, surgical dissatisfaction caused by insufficient akinesia with the partial blockade and patient discomfort during prolonged surgery are important limitations to the use of RA alone [13–15].

Traditionally, RB block was the local anesthetic method for ocular surgery. Because of the complications of RB block and the safety and effectiveness of PB block [16,17], the latter has gained wide acceptance in ophthalmic anesthetic practice in the recent times [2].

The combination of GA and PB block may reduces these drawbacks [4]. However, there is little current knowledge regarding the efficacy of PB block in RDS [2–4].

The aim of this study (the primary outcome) was to compare the postoperative pain and rescue analgesia requirements in the first two hours after surgery. Secondary outcomes of interest were to evaluate the efficacy and safety of PB block on perioperative outcome after RDS versus GA alone. The incidence of OCR, duration of surgery, surgical bleeding interfering with the surgical field and patient's satisfaction were recorded.

2. Material and methods

After approval of the study from the Institutional Ethics Committee at 06-01-2015 and the written informed consent of each patient, 98 patients (ASA II-III) scheduled for elective RDS, were enrolled in this prospective randomized study. Exclusion criteria included age < 18 years, the usual contraindications for eye RA, clotting abnormalities, impaired mental status and patients who had been taking analgesics, drugs that might affect hemodynamics or any pro bleeding medication. All operations were performed by two experienced surgeons.

Patients were randomly allocated to one of two groups to receive either PB anesthesia in conjunction with GA (PB + GA group, $n = 49$) or GA alone (GA group, $n = 49$). The technique to be used for each patient was revealed by opening a sealed envelope.

All patients had a pre-anesthetic evaluation and were premedicated with oral midazolam 0.2 mg/kg (maximum 15 mg) given 60 min before surgery.

All punctures were performed in the induction room by an anesthesiologist experienced in the technique prior to the induction of GA under ASA standard monitoring. The study solutions were prepared by this physician at the bedside just before the injection.

In the PB-GA group, a single transcutaneous injection was performed using a 25-gauge 25 mm short-bevel needle into the peribulbar space through the inferior eyelid at the junction of the lateral third and the medial two thirds of the inferior orbital edge. After negative aspiration, 3–4 ml of 0.75% ropivacaine was slowly injected. Immediate complications while performing the block, including OCR, were noted. After the block, gentle digital ocular massage was given. Sensory block was assessed according to abolition of the corneal reflex and the eye was dressed until induction of anesthesia.

General anesthesia was induced with remifentanil (0.5–1 mcg/kg/min) and propofol (1.5–2.5 mg/kg) and a laryngeal mask airway (reinforced LMA) was inserted. Anesthesia was maintained with a mixture of O_2/air and sevoflurane. The inspired concentration of sevoflurane was adjusted to maintain comparable depths of anesthesia (BIS values 40–60). Intra-operatively, heart rate (HR), ECG, S_pO_2, non-invasive blood pressure, end-tidal CO_2 (target values: 30–40 mmHg) and Bispectral Index (BIS) were monitored. During surgery, an increase in mean arterial pressure (MAP) or HR more than 20% above the patient's baseline was treated with remifentanil infusion titrated stepwise by 0.05 mcg/kg/min increments. A drop of MAP below 30% of the patient's baseline was managed with adjustments to the rate of infusion of remifentanil or intravenous fluid boluses of 200 ml or ephedrine 5–10 mg boluses.

Postoperative analgesia was started 30 min before the end of surgery by administration of paracetamol 1 g and ketorolac 30 mg. Infusion of remifentanil was stopped as soon as the eye as been dressed (end of anesthesia).

Assessments were performed by the anesthetic responsible for providing general anesthesia and the surgeon.

The OCR was considered to present if the HR decreased by 20% from baseline value or if dysrhythmias or sinus arrest occurred during ocular manipulation [3,10]. If the heart rate did not increase after release of surgical manipulation, atropine 0.5 mg was then administered. Peri-operative bleeding was scored using a 3-point rating scale as follows: 0 = absent; 1 = bleeding does not interfering with surgery; 2 = bleeding interfering with surgery. A 10-point verbal numerical scale (VNS) (0 = no pain at all, 10 = the worst pain imaginable) was used to assess postoperative pain in the first two hours in post-anesthesia care unit (PACU). VNS was used for pain rather than a visual analogue scale (VAS) because of its simplicity and its correlation with VAS for pain and because patients with partial or total blindness might find it difficult to complete VAS [18].

If the patient complained of pain postoperatively (VNS $\geqslant$ 4), intravenous meperidine 10 mg was given as rescue medication. Bolus of meperidine 10 mg was administered until VNS < 4.

The evaluation of pain in the PACU was performed by a nurse blinded as to the treatment group.

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