Peribulbar Block in Pediatric Posterior Segment Ocular Surgery

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Abstract

Objectives: Vitreous and retinal (VR) surgery with or without scleral buckling is associated with significant postoperative pain in adults, and recent studies have addressed the effect of retro or peribulbar block on these parameters. VR surgery in children has received little attention regarding the incidence of pain and the role of regional anesthesia in modifying these parameters. In this study, we compared peribulbar block with conventional opioid analgesia in children undergoing VR surgery.

Methods: In a prospective, randomized, single-blind study, 85 children (age 8 to 14 years) were allocated to receive peribulbar block (n=42) or intravenous fentanyl 2 µg/kg (n=43) after induction of general anesthesia. Parameters compared were: Intraoperative incidence of oculocardiac reflex and requirement for additional analgesic; postoperative pain intensity; time to first analgesic, total number of postoperative analgesic supplements; and parental assessment of the child's postoperative comfort at 24 hours.

Results: The incidence of intraoperative oculocardiac reflex was significantly less in the peribulbar group (p=.0001). Significantly more children receiving peribulbar block were pain free on awakening (p=.0004) and throughout the postoperative period. The number of children requiring opioid was significantly lower with peribulbar block (p=.008).

Conclusions: Peribulbar block appears to be a safe and clinically superior alternative to intravenous fentanyl for pediatric VR surgery.

Key Words: Peribulbar block – Children undergoing VR surgery – Pediatric posterior segment ocular surgery.

Introduction

STRABISMUS surgery has been extensively studied as a model for postoperative pain and nausea and vomiting (PONV) in children [1]. Vitreoretinal (VR) surgery and surgery for retinal detachment (RD) in children has been inadequately studied, although widely performed in children of all age groups. The strict need for immobility has resulted in general anesthesia (GA) traditionally being preferred for VR surgery. The likelihood of significant postoperative pain in these procedures is high, as placement of the scleral buckle entails extensive dissection of the conjunctiva and sclera, repeated traction on extraocular muscles, and ocular manipulation [2,3]. More recently, local anesthetic techniques have been safely and successfully used in adult VR surgery.

We have evaluated the safety and efficacy of peribulbar block in children undergoing a variety of ophthalmic procedures [4]. The present study was performed to quantify pain in children undergoing VR or RD surgery and to assess the effect of peribulbar block on postoperative outcome measures.

Patients and Methods

Eighty-nine children, American Society of Anesthesiology (ASA) I or II, aged 8 to 14 years, scheduled for elective VR surgery or surgery for RD with or without scleral buckling under GA were included in the study. Parents received an explanation of the risks and benefits of peribulbar block. Children were excluded from the study if they had any orbital abnormality, raised intraocular pressure, or if they were blind in the contralateral eye. Other exclusion criteria were known allergy to local anesthetics or nonsteroidal antiinflammatory drugs (NSAIDS), steroid therapy, mentally challenged children, or parental refusal to participate.

During the preanesthetic evaluation, each child was explained the use of a colored, 4-point visual analog scale (VAS), with a 'smiley' face in each colored column. White denoted no pain, with a cheerful Smiley face (VAS=0); yellow denoted mild pain or pricking, the child not distressed, but quiet (VAS=1). Orange denoted moderate pain, the smiley looking unhappy; the child feeling uncomfortable and requesting analgesia (VAS=2). Red denoted maximum possible pain, with a crying
smiley; the child crying or screaming with pain, uncontrollable, or trying to remove the eye dressing (VAS=3). All children were encouraged to relate their pain to smiley’s pain and report their pain postoperatively.

All children were fasted for a minimum of 5 hours and premedicated with oral midazolam 0.15mg/kg 60 to 30 minutes before anesthesia. After routine monitoring, anesthesia was induced with sevoflurane in nitrous oxide-oxygen through a facemask, or intravenous IV propofol, according to the child’s preference. IV access was secured after loss of consciousness in the inhalation induction group, and the trachea intubated with 600 µg/kg rocuronium. Anesthesia was maintained with sevoflurane in 60% nitrous oxide-oxygen.

After induction of anesthesia, the children were randomly allocated to 1 of 2 groups. Children in the study group (peribulbar group, n=44) received medial canthus single peribulbar block with 0.15mL/kg of 0.2% ropivacaine [5-8]. The control group (fentanyl group, n=45) received 2 µg/kg fentanyl.

Hoanin’s oculocompression was performed for 5 minutes. Further intraoperative and postoperative monitoring was performed by investigators who were unaware of the analgesic technique used.

Hemodynamic variables (heart rate, systolic blood pressure, diastolic blood pressure) 5 minutes after administration of analgesic defined baseline. These were monitored continuously.

The number of episodes of oculocardiac reflex (OCR) and requirement of analgesic supplements were also recorded.

At the end of the procedure, residual neuromuscular blockade was reversed with 10 µg/kg glycopyrolat and 50 µg/kg neostigmine, and the trachea extubated after ascertaining adequacy of neuromuscular recovery. Children were transferred to the recovery room, where they were kept for 2 to 3 hours.

Recovery room nurses were trained in the use of a modified Children’s Hospital of Eastern Ontario Pain Score (CHEOPS). They were unaware of the analgesic technique used and assessed the pain status of the child as soon as the child was awake and responded to its name. For pain judged as moderate or severe, meperidine 1mg/kg was administered IV up to 2 hours postoperatively.

After 2 hours in the recovery area, the children were asked to describe their pain on the VAS scale. For a score of 2, oral paracetamol (10mg/kg) was administered and the child transferred to their parent ward when comfortable. For a score of 3, meperidine 1mg/kg IV was administered.

At 6 hours, children were asked to rate their pain on the VAS scale. Paracetamol (10mg/kg) was administered if the child complained of pain during the night.

At 24 hours (before discharge), children were reassessed for pain. Parents were asked to grade their satisfaction of the child’s comfort on a 3 point scale. The scores were graded as 1 (dissatisfied), 2 (noncommittal), and 3 (satisfied).

Results

Demographic data were comparable between groups (Table 1).

Table (1): Demographic data.

<table>
<thead>
<tr>
<th></th>
<th>Peribulbar</th>
<th>Fentanyl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=42</td>
<td>n=43</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>11.9 (2.55)</td>
<td>10.4 (2.53)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>31.6 (8.18)</td>
<td>30.7 (10.2)</td>
</tr>
<tr>
<td>Duration of Surgery (min)</td>
<td>110.8 (28.36)</td>
<td>106.2 (31.09)</td>
</tr>
<tr>
<td>Males:Females</td>
<td>30:12</td>
<td>35:8</td>
</tr>
<tr>
<td>Buckling:nonbuckling</td>
<td>25:17</td>
<td>22:21</td>
</tr>
</tbody>
</table>

Note: No statistical difference between the 2 groups. Values presented as mean (±SD).

Four children (2 from each group) were excluded from the study. In 2 children, surgery was completed within 45 minutes; the other 2 received steroids.

Fewer children (4/42) in the peribulbar group required intraoperative supplemental analgesic compared with the fentanyl group (11/43). OCR was significantly higher in children receiving fentanyl (24/43) as compared with children receiving peribulbar block (3/42). Postoperatively, at all times of assessment, a significantly higher number of children receiving peribulbar block were pain free compared with those who received meperidine (Fig. 1).

Although the number of children having mild pain on awakening (by objective assessment) was significantly higher in the fentanyl group (14/43 V 3/42, p=0.0034) at 2, 6, and 24 hours, the number of children in either group having mild pain was comparable. More children with moderate or severe pain required opioids up to 2 hours postoperatively.
(by objective assessment) in the fentanyl group. Subsequently, significantly more children in the fentanyl group assessed themselves as having moderate pain at 2, 6, and 24 hours and requested analgesia (Fig. 2).

Discussion

This study demonstrated a significant incidence (40%) of pain in children who received only fentanyl for perioperative analgesia after VR surgery. This high incidence has also been reported in previous studies on adults undergoing VR surgery under GA or retrobulbar block [9,10]. The incidence of pain was reduced to 9.52% in the children who received a peribulbar block along with GA. These children not had lower pain scores throughout the 24-hour postoperative course.

Few studies evaluate the use of regional anesthesia in pediatric ophthalmic surgery. Preemptive peribulbar block was evaluated as an adjunct to GA in children undergoing brief ophthalmic procedures (60 to 70 minutes) and demonstrated a significant reduction in postoperative pain scores [11,12]. However, Ates [1] et al., using retrobulbar block in children (5±3 years) undergoing strabismus surgery found no difference in postoperative pain or analgesic requirement. It is possible that the number of children in the retrobulbar group (n=10) was too small to draw conclusions from or that some of the children may have been to young to use the VAS scale.

Concerns may be raised about the safety of peribulbar block. Davis and Mandel [13] reported no complications in 1,600 consecutive blocks. In another series of 16,224 consecutive blocks, the incidence of complications was also found to be very low (orbital hemorrhage, 0.74%; globe perforation, 0.006%; grand mal seizure, 0.006%) [14,15].

In conclusion, peribulbar block appears to be a safe and clinically superior alternative to IV opioid (fentanyl) in pediatric VR and RD surgery. It was easy to administer and did not produce local or systemic complications. It significantly increased postoperative comfort and reduced opioid requirement in the majority of children.

References


