ANESTHESIA FOR VITREORETINAL SURGERY USING A RETROBULBAR CATHETER TECHNIQUE

ANESTESIA EN CIRUGÍA VITREORRETINIANA UTILIZANDO UN CATÉTER RETROBULBAR

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ABSTRACT

Objective: To evaluate peroperative pain management using a flexible spinal anesthesia catheter introduced into the retrobulbar space which allows injections of local anesthetics for vitreoretinal surgery.

Methods: Twenty-five patients who underwent vitreoretinal surgery receiving retrobulbar anesthesia with 3.5 ml ropivacaine 0.75%. After injection, a catheter with spinal needle 22G x 1 1/2 (40 x 0.7 mm) was introduced to the retrobulbar muscle cone. The needle was withdrawn and the catheter was fixed. When the patient started to feel pain (grade 3 or higher), 2 ml ropivacaine 0.75% was administered through the catheter during surgery or 2 ml ropivacaine 0.2% in the postoperative period. The catheter was removed 24-48h later.

Results: During surgery, 1 patient (4%) received a re-injection of 2 ml ropivacaine 0.75% because of pain. Three patients (12%) experienced pain of grade 3 or higher in the postoperative period and needed re-injection of 2 ml ropivacaine 0.2%. Re-injections were an effective method to achieve analgesia. Adverse effects were not noticed.

Conclusions: The retrobulbar catheter technique is a procedure which allows multiple re-injections of

RESUMEN

Objetivos: Evaluar el manejo del dolor peroperatorio en la cirugía vitreorretiniana, utilizando un catéter retrobulbar que permita reinyecciones de anestésicos locales.

Métodos: Fueron incluidos en el estudio 25 pacientes, sometidos a cirugía vitreorretiniana, utilizando un catéter flexible introducido en el espacio intracanal, a través de una aguja espinal 22 G 1/2 de 40x0,7 mm, con la que depositamos previamente 3,5 ml de ropivacaína 0,75% retrobulbares, dejando posteriormente el catéter fijado a piel. Ante la presencia de dolor (grado 3 o superior) se reinyectaron en el postoperatorio 2 ml de ropivacaína 0,2%, y 2 ml al 0,75% si el dolor acontecía intraoperatoriamente. El catéter se mantuvo entre 24 y 48 horas.

Resultados: Un paciente (4%) manifestó moderado dolor intraoperatorio, que cedió tras la administración de 2 ml de ropivacaína 0,75% a través del catéter, y no ocasionó interrupción de la cirugía. Tres pacientes (12%) precisaron una reinyección postoperatoria de 2 ml de ropivacaína 0,2% por dolor. Las reinyecciones aliviaron el dolor de forma inmediata (menos de 3 min). No se precisaron segundas reinyecciones, ni se detectaron complicaciones derivadas de la técnica.
Local/regional anesthesia is used habitually in ophthalmological surgical processes, being cataract surgery the most frequent intervention. Ever since Koller conducted the first cataracts operation by means of instillation of cocaine, anesthesia in ocular surgery has developed through different stages, with general anesthesia being the most used technique for many decades. About 20 years local/regional anesthesia has become an established practice. The characteristics of the surgery and mainly the type of patients, most of them elderly, and with associated diseases, made it advisable to adapt the anesthesia to the type of surgery in order to reduce risks and morbidity.

In this context, vitreoretinal surgery is generally practiced, using local/regional anesthesia by means of a single retroperibulbar injection. The 50% mixture (1,2) of 0.75% bupivacaine (Svedocain® 0.75%, Laboratorios INIBSA, S.A. Lliça de Vall, Barcelona) with 2% lidocaine (Lidocaina braun® Laboratorio Braun Medical S.A. Melsungen, Germany) is of frequent use, using 57 milliliter volumes. This technique provides suitable support for surgery which does not usually exceed 120 min. Even so, in some complex cases the duration is unforeseeable.

Jonas JB Et al (3) described the use of a flexible retrobulbar catheter, proposed as a valid alternative in these cases because it allows us to control the pain in the postop period, as well as to avoid general anesthesia in high risk patients.

By means of the present study we prospectively evaluated a variant of retrobulbar anesthesia in eye surgery.

**Key words:** Vitreoretinal surgery, retrobulbar catheter, ropivacaine, regional anesthesia.

**INTRODUCTION**

Local/regional anesthesia is used habitually in ophthalmological surgical processes, being cataract surgery the most frequent intervention. Ever since Koller conducted the first cataracts operation by means of instillation of cocaine, anesthesia in ocular surgery has developed through different stages, with general anesthesia being the most used technique for many decades. About 20 years local/regional anesthesia has become an established practice. The characteristics of the surgery and mainly the type of patients, most of them elderly, and with associated diseases, made it advisable to adapt the anesthesia to the type of surgery in order to reduce risks and morbidity.

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**SUBJECTS, MATERIAL AND METHODS**

After the approval by the ethical committee of the hospital, 25 ASA IIII patients (10 men and 15 women) were included in the study. The age average was of 68.44 SD 7.83 years (average ± standard deviation); range of 51 to 84 years.

Those patients in whom we anticipated bad collaboration, myopic magnus, having axial length of the globe over 26 mm, inability to remain in prone position at least 2 hours were excluded from the study, as well as those having contraindications for local/regional anesthetic techniques.

After monitorization and conjunctival topical anesthesia with 2% lidocaine, we practiced the retrobulbar approach. We used a Becton Dickinson 22 G 1? spinal needle of 0.7x40 mm since we did not have a commercial equipment for retrobulbar anesthesia with catheter. With the patient placed in prone position and gaze in neutral position, we disinfected the skin with iodized povidona, accessing retrobulbar space by the Labath tract where, after mild aspiration to discard intravascular situation of the 3.5 needle tip we deposited 3.5 milliliter of ropivacaine 0.75% (Naropin® Laboratories Astra Zeneca, Madrid), without hyaluronidase, through the same needle. Subsequently, without withdrawing the needle, we introduced in the retrobulbar space the tip of a radio opaque flexible Pajunk 27Gx90 cm spinal catheter, withdrawing its guide, filling it with 1 milliliter of ropivacaine 0.75% to extract air from within, using a 1 ml syringe because the small section of the catheter does not allow greater pressures. Using an adapter, we then connected the catheter to a 0.2 mm particle micro-

**Conclusiones:** La cateterización del espacio retrobulbar permite la administración fraccionada de anestésicos locales, aportando a la cirugía vitreorrétiniana un adecuado soporte anestésico, así como un control del dolor postoperatorio de forma inmediata, eficaz y segura.

**Palabras clave:** Cirugía vitreorrretiniana, cateter retrobulbar, ropivacaína, anestesia locorregional.
filter. The catheter was fixed to the skin of the patient using adhesive dressings and leaving the protected filter and in an accessible place (shoulder or ribcage), to be able to reinject if necessary (fig 1). Finally we placed Honan’s ball 10 min up to 3035 mmHg.

After the surgery we verified the location of the catheter tip by means of ocular echography in four patients and CAT scan (Computerized Axial Tomography) using contrast in a patient, observing the progressive retrobulbar filling in the different sections (fig 2).

All patients received a peribulbar reinforcement in the ceiling of the orbit (union of the internal third with both external thirds), twenty-two with 1.5 milliliter of ropivacaine 0.75% whereas in the three remaining cases we suspected peribulbar location of the catheter when not obtaining akinesia of the internal straight muscle, the peribulbar reinforcement in the ceiling of the orbit was performed with a 50% mixture of ropivacaine 0.75% and lidocaine 2% with volume of 3 milliliters.

If during the surgical procedure the patient had any irritation or pain we reinjected 2 milliliter of ropivacaine 0.75% through the catheter. Also when finalizing the surgery and with the patients in the Post-Anesthetic Recovery Unit or in the hospitalization plant, we asked them about the comfort of the anesthetic technique and the degree of pain they endured according to the Visual Analogue Scale (VAS) so that when they referred a pain above 3 in the VAS after surgery, we proceeded to reinject 2 milliliter of ropivacaine 0.2% through the catheter.

If 24 hours had passed after the operation and the patient had not experienced pain or it was below 3 in the VAS, the catheter was withdrawn. Otherwise, it remained 48 hours after the surgery.

**RESULTS**

The introduction of the retrobulbar catheter through the spinal needle did not cause irritation or injuries in the retrobulbar space and was well accepted and tolerated by the patients. In addition to its surgical utility, it was also useful in the postoperation period to treat acute pain by means of reinjections.

Four patients needed reinjections (16%), one intraoperatively and three subsequently. The operations lasted 136 min SD 28.20 min (mean ± standard deviation).

The main intraoperative events were:

A patient, of the three that needed preoperating reinforcement in the orbital ceiling with 3 ml due
to a suspected peribulbar location of the catheter by blockage of the internal straight muscle, as suggested by the echographic control, exhibited pain during the operation after 95 min of the blockage, which abated 3 min after the administration of 2 ml of ropivacaine 0.75% through the catheter. This occurrence did not involve an interruption of the surgery.

Two patients (8%) referred annoyances in the opening of the nasal conjunctiva (upper interior quadrant), both had exhibited one complete akinesia (Nicoll=0) after the retrobulbar blockage which was solved by means of topical instillation of lidocaine 2% which did not repeat or hinder difficult the subsequent surgery.

Three patients (12%) needed IV treatment because they exhibited intraoperative arterial hypertension (all of them known hypertense cases). After the surgery and with patients being in the hospital plant:

Only 3 patients needed reinjections through the catheter (12%), one after 270 min. from the completion of the retrobulbar blockage because he exhibited VAS= 4, a second at 305 min, due to VAS=5, and a third at 312 min due to VAS=4. In all, the pain diminished effectively after the reinjection of 2ml of ropivacaine 0.2%, in a time span under 3 min, subsequently exhibiting VAS=01.

A patient commented in the postoperative period a feeling of having a foreign body in the eye, attributable to the friction of the catheter with surrounding tissues because the feeling subsided when it was withdrawn after 24 hours.

There were no cases of nauseous feelings and peroperative vomiting, alterations of ocular motility or infections, although our series is limited (25 patients).

None of the patients needed a second reinjection.

The immediate relief of the pain was positively valued by all the patients intervened by means of this anesthetic technique, specially those who had experienced another type of anesthesia for ocular surgery and treatment of the postoperative pain.

In no case it was necessary to associate systemic analgesic to control the postoperative pain. Indirect effect were not detected (hemodynamic or central) derived from the use of retrobulbar ropivacaine. Neither were there local or systemic infections and the bacteriological analysis of the tip of the 3 catheters that were utilized 48h was negative.

The patients valued the postoperative period as good or excellent.

DISCUSSION

The possibility of catheterizing the retrobulbar space (5) allows for longer operations in patients who might not benefit from general anesthesia due to their physical condition, guaranteeing the effectiveness of the anesthesia with the possibility of peroperative reinjections for treatment of acute pain. This is in sharp contrast to the single injections of local anesthetics in blockages which lose effect with time and the possibility of causing pain and discomfort to the patient even during the operation.

In other occasions surgery is limited time but aggressive, with high requirements in what concerns postoperative analgesic coverage; systemic analgesics are useful, but not always as effective as we would wish for relieving pain, nor its action as immediate as the patient would like, without forgetting that they are not free of undesirable effects in some susceptible patients.

Another possibility in the treatment of the postoperative pain would be reinjecting peri- or retrobulbar local anesthetics, but with potential risks (6) such as muscular, vascular or nervous injury or the perforation of the ocular globe (7) in an anatomy altered after the surgery. In addition these variants are not free of criticism because they imply handling considerable volumes of local anesthetic which cause hardening and undesirable protrusion of the ocular globe.

The retrobulbar catheter can be a useful alternative for reinjections (8,9) of local anesthetics in the case of deciding on this type of anesthesia and postoperative analgesia, that avoids the reintroduction of needles in the orbit and allows treatment of postoperative acute pain with small volumes of local anesthetics (10).

The use of ropivacaine, a long action amide-type local anesthetics with lower toxicity (11) in comparison with racemic bupivacaine, provides a prolonged analgesia of the globe. The doses adapted to surgical and analgesic requirements can be considered low which, together with the already referred lower central (12) and cardiovascular (13) toxicity of this local anesthetic as opposed to others, provides security in handling.

The reason for which we reinforced in all the cases the top of the orbit with 1.5 milliliter of ropivacaine 0.75% was to assure a correct anesthesia in the superior internal quadrant because, even though the retrobulbar a anesthesia «straight in the eye»
was appropriate, we eventually observed that the initial manipulation in this region was painful or at least irritating in spite of a correct blockage.

The retrobulbar anesthetic technique was made with the ocular globe in primary position or slightly downwards outwards (Unsöld position), because in this position the ophthalmic artery and its branches, the superior orbitary vein and the optical nerve are placed further away from the end of the needle than if we directed the eye upwards and inwards at the time of the puncture (Atkinson position).

The TAC exploration provided trustworthy data on the location of the end of the catheter. Even so, due to the small size of the «window» offered by the anatomy of the face (with multiple bone edges), the ocular echography identified the end of the catheter with greater difficulty.

The ocular echography of the patient who needed intraoperative reinjection through the catheter showed an image suggesting a peribulbar location of the end thereof, which is consistent with a faulty blockage of the internal straight muscle observed after the injection (considering the inferior approach), that required an additional blockage in the top of the orbit with 3 milliliter (1.5 milliliter of lidocaine 2% + 1.5 milliliter of ropivacaine 0.75%) before beginning the operation, which was then initiated without irritation until 95 minutes had passed. This fact and the reviewed bibliography (14,15) suggests to us the possibility of practicing vitreoretinal surgery by means of catheterization of the peribulbar space although we would probably need a single or double peribulbar injection to ensure adequate anesthesia for the eye, specially in the superior internal quadrant, but using greater volumes of local anesthetics than in the case of using a retrobulbar catheter. Nevertheless its application and usefulness in a long or painful surgery of the anterior pole, as it is the case of complicated cataracts, iris tumors and cornea transplant surgery, would provide interesting aspects in the anesthetic management of certain type of patients in whom general anesthesia could increase the morbidity/mortality of initially non-aggressive but laborious operations (16).

The absence of retrobulbar commercial equipment (until recent times) has contributed to a large diversity of materials and approaches used throughout history by different professionals for the retrobulbar space. Accordingly, some authors with similar catheters practiced subtenon retrobulbar anesthesia (17) by means of a small dissection of the conjunctiva, Tenon’s capsule and the intermuscular septum obtain access to the retrobulbar space through the internal or inferior nasal quadrant of the orbit, where they deposit 3 milliliter of local anesthetic (18,19). Said authors conclude that it is a simple, effective and safe technique which avoids the introduction of needles inside the orbit, although they use this procedure only during surgery (20) and not in the postoperative period.

There are many variants in local/regional techniques for ocular surgery such as the use of a venous catheter (21) to approach the retrobulbar space which can be fixed and utilized for postoperative reinjections. At the present time we have a specific Polymedic® equipment for the ocular orbit with which we are working.

We can conclude that by means of the catheter we provide immediate and effective pain relief, administering if advisable a last dose of local anesthetic, in our case 2 milliliters of ropivacaine 0.2%, before transferring the patient to the plant. Ropivacaine provides extended analgesia in such a way that after the surgery, 21 of the 25 patients did not require re-injection, and in no case it became necessary to use oral or parenteral analgesic and/or sedative drugs.

We believe that the use of the retrobulbar catheter which enables the administration of local anesthetics in ophthalmic surgery, is an additional instrument for anesthesiologists and ophthalmologists for the anesthetic and analgesic management of patients in whom we want to avoid general anesthesia and which allows an efficient adaptation of the anesthesia to the degree of surgical aggression.

**BIBLIOGRAFÍA**