ELSEVIER

J. of Ambulatory Surgery 11 (2004) 15–18

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Office-based anaesthesia for vitreoretinal surgery

J. Benatar-Haserfaty [a,*], J.Q. Tercero-López [a], A. Coronado-Toural [a], A. Muriel-García [b]

[a] *Clínica de Cirugía Ocular, Calle Almagro 36, 28010 Madrid, Spain*
[b] *Unit of Clinical Biostatistics Hospital Universitario Ramón y Cajal, Madrid, Spain*

Received 6 February 2004; accepted 8 April 2004
Available online 10 July 2004

Abstract

The objectives of this study were to consider the effectiveness of local anaesthesia (LA) for office-based vitreoretinal (VR) surgery, the requirement to supplement the anaesthetic blockade, the demographic pattern of the sample and the acceptance of LA by patients. This prospective observational audit involved 111 patients that had undergone 128 VR procedures. Assessment data included: patient's information, details of type of anaesthetic, and pain during surgery. A clinical audit was also carried out with telephone survey to establish the postoperative use of analgesics, the frequency of nausea, emesis, and insomnia. Results suggest that VR surgery can be carried out effectively and safely with LA, in an office-based surgery, provided that experienced surgeons exist. We noted a high degree of patient acceptance, a reasonable level of postoperative pain and a low frequency of nausea and vomits.

Keywords: Local anaesthesia; Intraconal; Extraconal; Sub-Tenon blockade; Vitreoretinal surgery; Office-based surgery; Complications

1. Introduction

Office-based ambulatory surgery includes the clinical, organisational and administrative ability to perform surgery in an office setting. In Spain and Italy, there is also a requirement to use local anaesthesia (LA), with analgesia or sedation [1]. Surgical procedures performed in the office tend to be minor. In recent years, LA has been adopted for vitreoretinal (VR) operations [2–4]. In this unit, LA has been introduced over the past 4 years as the single method to proceed with VR surgery. Office-based anaesthesia (OBA) has some components of practice that are unique such as the procedure and patient selection, the extended role of the anaesthesiologist, the anaesthetic management and the patient recovery and discharge [5,6]. An audit of LA for VR surgery was performed over a 16-month period. The aims were: (1) to verify the level of patient agreement with the procedure, (2) to show the suitability of LA for office VR surgery, (3) to assess the frequency of eye pain during the procedures and the effectiveness of sub-Tenon (ST) blockade and (4) to describe the postoperative complications associated with VR surgery under LA, namely, pain, emesis, nausea, and sleep disorders.

2. Methods

Patients were previously selected by the surgeon and anaesthesiologist in the office. Complete oral and written information was given about the process, informed consent was obtained, and relevant preoperative test according with the patient age and American Society of Anesthesiology (ASA) status were carried out. Absolute exclusion criteria were: patient rejection, non-compensated ASA III-IV status, deficient social conditions, severe cognitive impairment, epilepsy, brittle diabetic, drug/alcohol abuser, and patients who can not tolerate supine position.

The patient age, sex, previous surgery, ASA status, comorbid conditions, history of medication use, type of blockade: intraconal (IC), extraconal (EC) or both (I&E) and volume of local anaesthetic were noted. In all cases, a mixture of mepivacaine 2% and bupivacaine 0.5% with or without sodium bicarbonate was used. Hemodynamic variables (heart rate, systolic blood pressure, diastolic blood pressure, and pulsioxymetry) were recorded before the anaesthetic blockade, and during all the process. Intravenous Midazolam or Diazepam was administered for mild

* Corresponding author. Present address: Clínica de Cirugía Ocular, calle Almagro 36, 28010 Madrid, Spain.
E-mail address: jbenatar@telefonica.net (J. Benatar-Haserfaty).

0966-6532/$ – see front matter © 2004 Elsevier B.V. All rights reserved.
doi:10.1016/j.ambsur.2004.04.002

sedation before the blockade, in a weight basis dose, only to those patients who seemed anxious. All blocks were administered by two experienced anaesthesiologists using standard techniques. Each patient received oxygen throughout the procedure. Analgesia was considered adequate when the patient felt no pain by holding bulbar conjunctiva and lateral muscle insertion. Akinesia was considered perfect when no movement was observed in all directions.

The success of anaesthesia was graded by the surgeon and the anaesthesiologist as follows:

- *grade 1*: adequate analgesia throughout surgery without any supplementation;
- *grade 2*: adequate analgesia with supplemental ST injection;
- *grade 3*: inadequate analgesia despite ST injection;

Patients were encouraged to notify the surgeon about pain during surgery. Additional parabulbar ST infiltration to the superior quadrant was administered by the surgeon, to patients who felt pain at the beginning or during the procedure (Fig. 1). This injection (mepivacaine 2%, 2–4 ml) was not included in the mean volume, and was done with the sclerotomy sites temporarily closed, when required. Every procedure was performed by the same surgeon (who had 8 years of experience) and was ranked as: vitrectomy, scleral buckling surgery, cryosurgery, and other. Redo cases, anaesthetic complications and surgery time were also noted.

The nurses were trained to perform an standardized telephone interview by calling to patients six hours after the surgery in order to identify the main sources of dissatisfaction in the postoperative period i.e.,: pain, nausea, and emesis. For postoperative pain paracetamol with or without codeine was suggested. Using a short questionnaire we categorized postoperative pain as follows: no pain; managed with paracetamol, managed with codeine plus paracetamol or unmanageable using the prescribed drugs. Nausea and vomits were graded as no or yes. No prophylactic antiemetics were given. Sleep disturbances were considered 24 h later by the surgeon. Sleep disturbances were scored as follow: awake, sleep intermittent or sleep as usual. Patient acceptance to anaesthesia and surgery were graded by the surgeon 24 h and 1 week postoperatively, as follows: non compliant, compliant, good or excellent. Finally, patients were asked to give any general observations that might help to enhance their care.

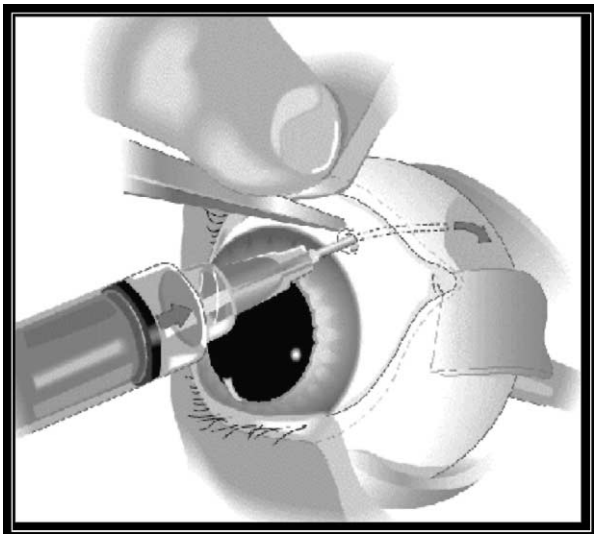

Fig. 1. Parabulbar Sub-Tenon blockade.

Categorical variables are presented as proportions with percentage and 95% confidence intervals (95% CI) and were analyzed with the chi-square (χ^2) test. The corresponding Mantel Haenszel odds ratios (OR) were estimated. Mean and standard deviation were used for surgery time and age and were analyzed by the use of the Student's *t*-test. Multiple logistic regression models were used to asses the association between independents variables (ST requirements, type of surgery, type of anaesthetic blockade, redo cases) and postoperative pain. Statistical tests with $P < 0.05$ were perfomed significant. Data were analyzed using SPSS 11.0 software for Windows.

3. Results

Data were collected prospectively on 111 consecutive patients undergoing 128 VR procedures suitable for OBA, between January 2002 and April 2003. 111 patients received LA for 128 procedures. Procedures included 75 vitrectomies, 45 buckling procedures, 7 cryotherapy and 1 classified as other. All 19 redo cases were performed with LA. Of the 111 patients who underwent VR surgery the mean age was 59 years (S.D. 13 years), and 55% were men. 32% were graded as ASA I, 54% ASA II, 13% ASA III and 1% ASA IV. The mean surgery time for all patients was 83 min (S.D. 29 min). Those procedures which needed supplemental ST blockade (25%) had a mean surgery time of 100 min (S.D. 32 min) versus those who didi not need a supplemental block, 77 min (S.D. 24 min) ($P = 0.000$). The mean volume for the main LA injection (ST not included) was 9.5 ml (S.D. 2.5 ml). Of the 128 LA blocks, 33% were IC, 11% EC and 56% I&E. Addtional sub-Tenon block at the beginning (STi) of surgery was required in 10% cases carried out with I&E block, 21% of IC block, and 36% of EC block ($P = 0.031$) Sub-Tenon blockade during surgery (STd) was needed in 19% of patients with I&E block, 29% with IC block and 43% with EC block ($P = 0.146$). Patients who needed ST blockade ($n = 26$) were younger (meanage = 54 years S.D 13.2 years) than patients ($n = 85$) who did not required it (meanage = 61 years S.D. 13.1 years) ($P = 0.02$). No patient had inadequate analgesia during the surgery after supplemental ST infiltration. Intraoperative complications included quemosis in 7 procedures, 2 cases complained of shoulder pain due to position on the table, in 3 cases urapidil hydrochloride was used to lower blood pressure and 1 case had a blood glucose level of 350 mg/dl, who was treated with an individualized

insulin dose. There were no ophthalmic problems related to anaesthesia in this study.

Patients who underwent cryosurgery ($n = 7$) and other ($n = 1$) were not included in the rest of the study due to the small number of cases. The telephone interview revealed, an overall postoperative nausea and emesis frequency of 8% and 3% respectively. The rate of nausea was 7% in vitrectomy, and 13% in buckling procedures. The rate of emesis was 3% in vitrectomy and 2% in buckling. The surgeon documented sleep disturbances in vitrectomy patients as 19% intermittent sleep and 81% sleep as usual. Sleep disturbances reported in buckling patients were 7% awake, 33% intermittent , and 60% sleep as usual. Patient acceptance of anaesthesia and surgery was compliant 9%, good 68%, and excellent 23% for vitrectomy procedures. Acceptance for buckling procedures was compliant 18%, good 69%, and excellent 13%.

Three predictors of analgesic requirements during and after VR surgery were recognized. (1) Buckling surgery had an odds ratio (OR) of 15 (95% CI = 4–54) for STi, also buckling had an OR of 8 (95% CI 3–20) for STd due to pain, compared to vitrectomy. (2) Buckling had an OR = 5 for needing of analgesia at home (95% CI 2.1–11.7) versus vitrectomy. (3) Those patients who needed STd surgery had an OR = 4.1 for needing analgesia at home (95% CI 1.5–11).

No association was found between the use of sodium bicarbonate or the volume of LA initially employed, and the need of STi or STd.

4. Discussion

The practice of OBA is an integral component of the daily practice of ophthalmic VR surgeons in Spain. The *Consejería de Sanidad de la Comunidad de Madrid* has regulations in place regarding office-based practices [7]. The results of the present study suggest that OBA is an effective and acceptable tool for patients during VR surgery performed by a skilled surgeon with the same surgical standards as in a traditional hospital. VR surgery, unlike cataract extraction, tends to be longer duration and more variable technique. LA has become preferred over general anaesthesia for VR surgery because of improvements in technique, instrumentation and surgical time. The advantages of LA include more rapid return to ambulation, the ability to perform an office-based procedure, patients are often able to commence posturing immediately if required to do so, avoidance of complication of general anaesthesia and surprisingly, quicker surgery. Rao et al. [8] reported that the reason for shorter duration might be that, LA is under time pressure and therefore the surgeon is more directed and purposeful. Different block failure rates have been reported for VR surgery [3,9]. The use of supplemental ST is very common for some VR procedures [2], and several studies have highlighted the efficacy and safety of ST parabulbar block in vitreoretinal surgery [10].

In this audit, buckling surgery, younger age and lengthy procedures were founded statistically correlated with need for supplemental ST block. No patient suffered pain during surgery after adding parabulbar ST infiltration. STi block was needed less often when the anaesthetic method was I&E blockade. All surgeries showed a high level of patient satisfaction. This finding is considered clinically significant by the authors. These outcomes are not easy to compare with other reports because of differences in block techniques, the adjunct of sedation during the procedures, anaesthetic mixtures and number of cases. This study did not address any aspects of well-being condition, a surrogate end point in anaesthetic quality assessment, as recommended by Hofer et al. [11].

The addition of systemic sedation in VR surgery, especially for the painful periods of cryotherapy, scleral buckling, and traction on the globe are recommended in some reports [12,13], whereas in other no sedatives were used [10,14]. The use of sedative drugs is restricted in this office to only those patients in whom gentle reassurance and persuasion fail to calm apprehension. Katz et al. [15] reported an increase in adverse medical events when sedatives and or opiates are used to decrease anxiety and pain during cataract surgery. ST blockade is a suitable alternative to transcutaneous block and conscious or deep sedation for VR surgery [10], since in the OBA setting the patients are transferred from the operating room table to a chair [4].

Any OBA practice must deal with the issues of postoperative nausea and vomiting (PONV) [16]. Nausea appeared in 8% of patients, and vomiting in 3% (two episodes in the same patient); no pre-emptive antiemetics were used. Avoiding opiates during surgery and LA may be the reasons for this low frequency of PONV [6,17]. Analgesic use in the postoperative period was significantly higher in buckling surgery than in the vitrectomy group. A positive correlation was founded between patients who needed ST infiltration and analgesic requirements at home; this outcome may be a predictor to identify patients who will experience more pain after VR surgery, and to take up the measures to avoid it. LA for ophthalmic procedures, as suggested by this study, is the most useful modus operandi in the office, since it may result in more thoughtful analgesia and postoperative pain control, especially when the surgical stimulus is deep and requires great amounts of parenteral medications, or when the purpose is to use fewer medications to diminish side effects and speed up recovery [18].

Rawal et al. [19] reported that sleep disturbances are very common in the postoperative period. The vitrectomy group had less sleeping disorders, but these differences were not statistically significant.

A current overview revealed that the safety of OBA is basically unknown, because no formal scientific study has yet been completed [18]. Concerns may be raised about the risks of OBA for VR surgery [20]. The anaesthesiologist must recognize that safe anaesthesia in office-based practice requires appropriate patient screening/selection, a safely

equipped office, knowledge of the surgical procedure and appropriate care of patient in postoperative recovery. In this small sample audit, there were no medical or ocular complications sufficient to prevent completion of the procedures.

In conclusion, LA appears a safe and effective practice, in selected patients, for various VR procedures performed in an office-based system. Level of patient acceptance seems high with this method. Buckling surgery, younger patients and lengthy surgery times may be considered predictor factors for additional anaesthetic or analgesic requirements during surgery or in the postoperative phase. Further studies should be performed to develop effective plans for the prevention and treatment of frequently seen postoperative side effects.

Acknowledgements

The authors thank the nursing staff of the Clínica de Cirugía Ocular for their cooperation in the postoperative assessment of the patients included in the study.

References

[1] Guzzanti E, Mastrobuono I. Organisational, technological and structural standards for office-based ambulatory and day surgery. Ambul Surg 1999;6:159–65.
[2] Knight HML, Newsom RB, Canning CR, Wainwright AC. Local anaesthesia for vitreoretinal surgery: an audit of patient and surgical experience. Eur J Ophthalmol 2001;11:366–71.
[3] Newsom RSB, Wainwright AC, Canning CR. Local anaesthesia for 1221 vitreoretinal procedures. Br J Ophthalmol 2001;85:225–7.
[4] Green SN, Yarian DL, Masciulli L, Leff SR. Office repair of retinal detachment using a Lincoff Temporary balloon buckle. Ophthalmology 1996;103:1804–10.
[5] Twersky RS. Anaesthetic and management dilemmas in office-based surgery. Ambul Surg 1998;6:79–83.
[6] Hausman LM. Advances in office-based anaesthesia. Curr Opin Anaesthesiol 2003;16:421–7.
[7] LCM 1997\309 (Norma vigente) Decreto 110/1997, de 11 septiembre CONSEJERÍA DE SANIDAD Y SERVICIOS SOCIALES BOCM 24 septiembre 1997, núm. 227, SANIDAD. Sobre autorizaciones de los centros, servicios y establecimientos sanitarios.
[8] Rao GP, Wong D, Groenewald C, McGalliard JN, Jones A, Ridges PJ. Local anaesthesia for vitreoretinal surgery: a case-control study of 200 cases. Eye 1998;12:407–11.
[9] Calenda E, Olle P, Muraine M, Brasseur G. Peribulbar I and sub-Tenon injection for vitreoretinal surgery: 300 cases. Acta Ophthalmol Scand 2000;78:196–9.
[10] Li HK, Abouleish A, Grades J, Groeschel W, Gill KS. Sub-Tenon's Injection for Local Anaesthesia in Posterior Segment Surgery. Ophthalmology 2000;107:41–7.
[11] Hofer CK, Zollinger A, Buchi S, Klaghofer R, Serafino D, Buhlmann S, et al. Patient well-being after general anaesthesia: a prospective, randomized, controlled multi-centre trial comparing intravenous and inhalation anaesthesia. Br J Anaesth 2003;91:631–7.
[12] Roman SJ, Chong Sit DA, Boureau CM, Auclin FX, Ullern MM. Sub-Tenon's anaesthesia: an efficient and safe technique. Br J Ophthalmol 1997;81:673–6.
[13] Yepez JB, de Yepez JC, Azar-Arevalo O, Arevalo JF. Topical I with sedation in phacoemulsification and intraocular lens implantation combined with 2-port pars plana vitrectomy in 105 consecutive cases. Ophthalmic Surg Lasers 2002;33(4):293–7.
[14] Stevens JD, Franks WA, Orr G, Leaver PK, Cooling RJ. Four-quadrant local anaesthesia technique for vitreoretinal surgery. Eye 1992;6:583–6.
[15] Katz J, Feldman MA, Bass EB, Lubomski LH, Tielsch JM, Petty BG, et al. Study of Medical Testing for Cataract Surgery Study Team. Adverse intraoperative medical events and their association with I management strategies in cataract surgery. Ophthalmology 2001;108:1721–6.
[16] Ture H, Eti Z, Adil M, Yllmaz Goguz OKF. The incidence of side effects and their relation with anesthetic techniques after ambulatory surgery. Ambul Surg 2003;10:155–9.
[17] Subramaniam R, Subbarayudu S, Rewari V, Singh RP, Madan R. Usefulness of pre-emptive peribulbar block in paediatric vitreoretinal surgery: a prospective study. Reg Anesth Pain Med 2003;28:43–7.
[18] Koch ME, Dayan S, Barinholtz D. Office-based I: an overview. Anesthesiol Clin N Am 2003;21:417–43.
[19] Rawal N, Hylander J, Nydahl PA, Olofsson I, Gupta A. Survey of postoperative analgesia following ambulatory surgery. Acta Anaesthesiol Scand 1997;41:1017–22.
[20] Benatar-Haserfaty J, Tercero-López JQ. Hypertensive crisis and coma after administration of scopolamine, atropine, and phenylephrine ophthalmic solutions during 2 vitreoretinal operations. Rev Esp Anestesiol Reanim 2002;49(8):440–1.