The Anesthetic and the Akinetic Effects of 1% Ropivacaine Given in Two Different Peribulbar Blocks; Single Medial Canthus or Double Injection Technique

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Received date: June 10, 2017; Accepted date: June 28, 2017; Published date: June 30, 2017

Abstract

**Background:** Owing to the advanced age of patients scheduled for cataract and IOL insertion, and the high concentrations of local anesthetic used in peribulbar blockade, the use of ropivacaine produces an effective motor blockade with minimal risks for neuro and cardiotoxicity; concerning globe injury due to multiple injection the new single injection medial canthus is theoretically preferred to decrease the frequency of globe injury.

**Aim of the work:** To evaluate anesthetic and akinetic effects in single and double injection peribulbar technique to detect the better method of administration in peribulbar blockade.

**Methods:** This single blind randomized study was done on 60 patients ASA I-III underwent cataract and IOL insertion surgery. Patients were taken peribulbar block using 8 ml, 1% ropivacaine with 30 IU/ml hyalurinidase. Patients were classified into two equal groups; group I (n.30) is the single injection group, group II (n.30) is the double injection group. Eye globe and lid akinesia and anesthesia, the need for supplementary injection and the incidence of complications like ecchymosis, high intra ocular pressure, nausea, vomiting and pain were recorded.

**Results:** 26 patients (86.6%) of single injection group vs. 28 patients (93.3%) in double injection group were having complete anesthesia and akinesia after giving block; only 4 patients in group I (13.3%) needed supplementation of block vs. 3 patients (10%) in group II with almost no difference in absence of intra and postoperative complications.

**Conclusions:** Single injection peribulbar block with 1% ropivacaine is as effective as the double injection peribulbar block with 1% ropivacaine in cataract surgery providing effective block with fewer possibility for globe injury with multiple injections.

**Keywords:** Ropivacaine; Peribulbar block; Medial canthus; Double injection

**Introduction**

Ophthalmic procedures such as cataract extraction can be performed with either topical or regional anesthesia regional anesthesia are still widely used in cases of difficult and extended surgery [1]. Retrobulbar anesthesia was the standard technique for regional anesthesia in ophthalmic surgery, however peribulbar anesthesia has lesser incidence of complications [2,3].

The most common disabling injuries are related to nerve blocks, so the proposal of single rather than multiple injection technique of peribulbar anesthesia was to decrease the risks of complications [4-6]. Ropivacaine has less central nervous system and cardiac toxicity [7,8]. Several studies had demonstrated the efficacy of ropivacaine in different regional anesthetic techniques for different eye procedures including vireo retinal surgery [9,10].

The aim of this study is to evaluate the anesthetic and akinetic effects of 1% ropivacaine given in two different peribulbar blocks; single medial canthus or double injection technique.

**Patients and Methods**

After informed consent had taken from all patients including the surgical and the anesthetic procedures 60 adult patients ASA I-III scheduled for cataract surgery and IOL insertion with expected duration less than 70 min duration were enrolled in this prospective, single-blinded, randomized study in Tanta University Hospital between March and December 2016. Patients allergic to local anesthetic, local sepsis impairment of coagulation and orbital abnormality uncooperative patients and who refused the anesthetic technique were not included in the study. After routine preparation and evaluation, irritable patients were premeditated with intra venous midazolam 1-2 mg. The patients were randomly allocated using a sealed envelope technique to 1 of 2 equal groups to receive peribulbar anesthesia with 8 ml; 1% ropivacaine and hyalurinidase 30 IU/ml using either the single injection peribulbar with a 25-gauge, 16-mm in group I (n.30) or the classic double injection pribulbar technique with a 25-gauge, 25-mm in group II (n.30). Injections were done with 25 G needle 2.5 Cm length. Non-invasive blood pressure, electrocardiogram (ECG), heart rate (HR), peripheral arterial oxygen saturation (SaO2) variables were recorded every 5 min till completion of surgery. In both techniques, the patients were in supine position. In single injection
peribulbar blockade patients were asked to maintain eye in the primary position, the injection site was percutaneous limited superiorly by inferior lacrimal canaliculus, medially by lateral margin of nose, laterally by imaginary line joins inferior lacrimal papilla to inferior margin of the orbit and inferiory by inferior margin of the orbit. In double injection technique, patients were asked to maintain eye in the primary position the needle was inserted at the junction of the lateral third and the medial two thirds of the lower orbital margin injecting 4 ml, the second injection is just lateral to supratrochlear notch, injecting a volume of 3 ml then during withdrawal 1 ml was injected into orbicularis muscle. with gentle massaging for 1-2 min, Honnan balloon was inflated to 30 mmHg to promote the spread of local anesthetic solution and avoid rise of IOP (Intraocular pressure) data were collected about patients age, sex, weight, the need for supplementary injections were given by same kind of needle and local anesthetic solution and avoid rise of IOP (Intraocular pressure).

Assessment for akinesia and anesthesia was done after 10 min; eye movements in four directions superior, inferior medial and lateral was recorded using scale from (0-2) 0=no movement 1=reduced movement 2=normal movement [11]. While anesthesia score of 2=complete anesthesia 1=partial anesthesia and 0=no anesthesia. All supplementary injections were given by same kind of needle and additional assessment was performed 5 min after injection. During operation oxygen was administered under the sterile drapes.

The statistical analysis of our results was conducted using the computer program SPSS version 15.0 for Windows (SPSS, Chicago, IL). Data were expressed as mean SD or percentages. The 2-way repeated measures analysis of variance was used to compare the interval data, and Student’s t-test was used as the post hoc test to determine differences between and within groups. Bonferroni correction for repeated comparisons was applied if necessary. P<0.05 was considered significant.

Results

There was no statistical significant difference between the two groups in the demographic data and the duration of surgery. As regard globe anesthesia, 26 (86.6%) in single injection group comparable with 28 (93.3%) in double injection group; had complete anesthesia after the first injection.

When comparing akinesia of the globe or the lid it was more adequate in the second group resulting in 27 (90%) and 25 (83.3%) comparable with 26 (86.6%) and 23 (76.6%) in the first group, these differences were statistically insignificant. Scores for globe anesthesia, globe and lid akinesia were better in the second group than in the first but without significant differences.

Regarding the supplementary injection, there were 4 patients in group 1 comparable with 3 patients in group 2, (13.3%) vs. (10%) with no significant difference.

The incidence of postoperative nausea and vomiting was less than 5% in all cases, only 5 patients (16.6%) in group 1 and 7 patients (23.3%) in group 2 developed ecchymosis with no conjunctiva or globe hematoma the acceptance of the technique was good in all cases 27 patients in group 1 and 28 patients in group 2 would repeat the same technique in the next eye surgery (Tables 1-6).

Table 1: Demographic data of the patients in both groups.

|                  | Group I | Group II | p. value |
|------------------|---------|----------|----------|
| Male/female      | 14/16   | 18/12    | 0.059    |
| Age (years)      | 57 ± 14.7 | 59.7 ± 13.05 | 0.055    |
| Weight (kg)      | 70 ± 11.1 | 68 ± 12.05 | 0.231    |
| Duration of surgery (min) | 47.5 ± 22 | 48 ± 23 | 0.986    |

Table 2: Globe anesthesia in both groups (P=0.47*).

|                  | Group I | Group II | p. value |
|------------------|---------|----------|----------|
| Globe anesthesia score | 4.2 ± 1.1 | 4.3 ± 1.08* | 0.236    |
| Globe anesthesia after block | 26 | 86.60% | 28* | 93.30% | 0.048* |

Table 3: Globe akinesia in both groups (P=0.47*).

|                  | Group I | Group II | p. value |
|------------------|---------|----------|----------|
| Lid akinesia score | 1.17 ± 0.6 | 0.94 ± 0.62** | 0.019*    |
| Lid akinesia after block | 23 (76.6%) | 25 (83.3%) | 0.058    |

Table 4: Lid akinesia in both groups (P=0.4**).

|                  | Group I | Group II | p. value |
|------------------|---------|----------|----------|
| Supplementary block | 4 (13.3%) | 3 (10%*) | 0.782    |

Table 5: Supplementary block in both groups (p>0.05).

|                  | Group I | Group II | p. value |
|------------------|---------|----------|----------|
| Complications after block | 5 (16.6%) | 7 (23.3%) | 0.035*    |

Table 6: Complications after block.

Discussion

Peribulbar anesthesia is achieved by bulk spread of local anesthetic, the choice of the technique depends on the volume of the orbit, and the preference of the anesthesiologist, however in single injection technique the site of injection is relatively a vascular, which decreases the risk of orbital hematoma [12].

In our study, we found that globe akinesia, lid akinesia, and globe anesthesia were slightly better in double injection technique than single injection but still these values were statistically insignificant.
The supplementary injection required in 13.3% of patients in group 1 and in 10% of patients in group 2 results in complete anesthesia and akinesia with pain free and both patients and surgeon's satisfaction all over the surgery.

Our results were in hands with Hallj et al. [13] who showed that adequate block can be achieved with single peribulbar injection either by inferotemporal or medial canthus injection technique, and that there was no evidence that the second primary injection decreases the rate of supplementary injection required, proposing its unnecessary with an increasing risk of globe perforation [14,15].

Also, Leonardo Rizzo et al. [12] showed that medial single injection technique is a simple and satisfactory alternative owing to its painless insertion decreased volume of anesthetic, single puncture in a relatively avascular area and needle passage with less subject to misdirection. With an ideal local anesthetic, we should have rabid onset, dense motor block, and safety.

Our results showed that with the use of 1% ropivacaine with 30 IU/ml hyalurinidase in a volume of 8 ml injection it gives initial good anesthesia and akinesia with almost fewer need for supplementary injection required, proposing its unnecessary with an increasing risk of globe perforation. Moreover, the Ghali et al. [20] used similar needles' lengths and concluded that the single-injection technique is a simple and satisfactory alternative owing to its painless insertion decreased volume of anesthetic, single puncture in a relatively avascular area and needle passage with less subject to misdirection. With an ideal local anesthetic, we should have rapid onset, dense motor block, and safety.

With the use of hyalurinidase 30 iu/ml this helps spread of local anesthetic molecules into peripheral nervous tissue and improves the onset of nerve block.

With the use of hyalurinidase 30 iu/ml this helps spread of local anesthetic and enhances its faster onset [12,17].

Pj Corke et al. [18] who compared 1% ropivacaine and a mixture of 2% lignocaine and 0.5% bupivacainefor peribulbar anesthesia in cataract surgery concluded that, 1% ropivacaine is a suitable agent for single injection peribulbar anesthesia for cataract surgery.

Short needles were associated with a lower incidence of moderate and severe pain in patients undergoing the single-injection technique [19]. So we used relatively short needles (16 or 25 mm) in single- or double injection techniques, respectively, and this was associated with a low incidence of needle-related complications (hematoma and globe perforation) in both groups. Moreover, the Ghali et al. [20] used similar needles' lengths and concluded that the single-injection technique for percutaneous peribulbar anesthesia with a short needle is a suitable alternative to the double-injection technique peribulbar anesthesia for cataract extraction.

Conclusions

1% ropivacaine is a suitable agent for single injection peribulbar anesthesia as well as double injection technique providing both good anesthesia and akinesia with few complications, however single injection peribulbar block is as effective as the double injection peribulbar block in cataract surgery providing effective block with fewer possibility for globe injury with multiple injections.

References

1. Crandall AS (2001) Anesthesia modalities for cataract surgery. Curr Opin Ophthalmol 12:9-11.
2. Kumar CM (2006) Orbital regional anesthesia:Complications and their prevention. Indian J Ophthalmol 54: 77-84.
3. Vaddivelu N, Huang Y, Kaye A, Kodumudi V, Kai A, et al. (2012) Prevention and management of complications of regional orbital anesthesia. Middle East J Anaesthesiol 21: 775-784.
4. Ben-David B (2002) Complications of regional anesthesia an overview. Anesthesiol Clin North America 20: 665-667.
5. Ripart J, Metge I, Prat-Pradal D, Lopez FM, Eledjam JJ (1998) Medial Canthus single injection episcleral: computed tomography imaging. Anesthesia and Analgesia 87: 42-45.
6. Dareaeus S, Gros T, Bassoul B (2003) Orbital hemorrhage after medial canthus episclera anesthesia. Ann Fr Anesth Reanim 22: 474-476.
7. Jadhav V, Jadhav R, diwanmal BM (2015) Ropivacaine: A review of its use in regional anesthesia, chronic pain management and in patients with cardiac diseases in non cardiac surgeries. IOSR-JPBS 10: 43-47.
8. McClure IH (1995) Ropivacaine. Br J Anesth 74: 458-460.
9. Govêia C, Magalhães E (2010) Ropivacaine in peribulbar anesthesia - vasoconstrictive properties. Rev Brav Anstesiol 60: 495-512.
10. Ghali A (2012) the efficacy of 0.75% levobupivacaine versus 0.75% ropivacaine for peribulbar anesthesia on vitreoretinal surgery. Saudi J Anaesth 6: 22-26.
11. Frow MW, Miranda-Caraballo IJ, Akhtar MT, Hugkulstone EC (2000) Single injection peribulbar anesthesia, total upper eye lid drop as an endpoint marker. Anesth 55: 750-756.
12. Rizzo L, Marini M, Rosati C (2005) Peribulbar anesthesia: percutaneus Single Injection. Technique With a Small Volume of Anesthesia. Anesth Analg 100: 94-96.
13. Ball JL, Woon WH, Smith S (2002) Globe perforation by the second peribulbar injection. Eye 16: 663-665.
14. Brahma AK, Pemberton CJ, Ayeko M (1994) Single medial injection peribulbar anesthesia using prilocaine. Anesth 49: 1003-1005.
15. van den, Berg AA (2005) A comparison of two double-injection techniques for peribulbar block analgesia: infero-temporal plus supero-temporal vs. infero-temporal plus medial-percaruncular. Acta Anesthesiology Scand 49: 1483-1486.
16. Gioia L, Prandi E, Codenotti M, Casati A, Fanelli G, et al. (1999) Peribulbar anesthesia with either 0.75% ropivacaine or a 2% lidocaine and 0.5% bupivacaine mixture for vitreoretinal surgery: a double-blinded study. Anesth Analg 89: 739-749.
17. Allman KG, McFadyen JG, Armstrong J, Surrock GD, Wilson IH (2001) Comparison of articaine and bupivacaine/ lidocaine for single medial canthas peribulbar anesthesia. Br J Anaesth 87: 584-587.
18. Corke PJ, Baker J, Cammack R (1999) Comparison of 1% ropivacaine and a mixture of 2% lignocaine and 0.5% bupivacaine for peribulbar anesthesia in cataract surgery. Anaesth Intensive Care 27: 249-252.
19. Mahfouz AK, Al Katheri HM (2007-2010) Randomized trial of superficial peribulbar compared with conventional peribulbar anesthesia for cataract extraction. Clin Ophthal 1: 55-60.
20. Ghali A, Hafez A (2009) Single-Injection Percutaneous Peribulbar Anesthesia with a Short Needle as an Alternative to the Double-Injection Technique for Cataract Extraction. Anesth Analg 110: 245-247.