Original Article

Comparison of Analgesia in Subtenon and Peribulbar Anesthesia

Ayyaz Hussain Awan, Abdul Rauf

Pak J Ophthalmol 2007, Vol. 23 No. 3

See end of article for authors affiliations

Correspondence to:
Ayyaz Hussain Awan
Eye Department
PNS Hafeez, (Naval Hospital)
Sector E-8, Islamabad

Received for publication
September' 2006

Purpose: To compare degree of analgesia in subtenon and Peribulbar local anesthesia in patients undergoing extra capsular cataract surgery.

Material and Methods: Quasi-experimental interventional study carried out in Department of Ophthalmology, PNS Shifa, Karachi extending from October 2004 to March 2005. 100 patients undergoing extra capsular cataract extraction were randomly divided into two groups comprising 50 patients each. Group I was given subtenon and group II peribulbar local anesthesia respectively. Patients were asked about pain scoring during surgery and degree of analgesia was marked on a specified performa.

Results: Analgesia was effective and immediate with minimal volume of anesthetic agent and procedure was less painful in subtenon local anesthesia as compared to peribulbar local anesthesia. There is no need for globe compression and preoperative sedation. The use of topical anesthesia prior to subtenon local anesthesia makes this technique almost pain free. Incidence of top up anesthesia is less in subtenon anesthesia then in peribulbar anesthesia.

Conclusion: The subtenon anesthesia is more effective with fewer complications as compared to peribulbar anesthesia due to the cannula used being blunt and the infiltration being superficial as compared to peribulbar route.

Surgery of the lens has been practiced for at least several thousand years. Nowadays cataract extraction by phacoemulsification is the most popular technique, but due to cost of the machine and long learning curve, extra capsular cataract extraction (ECCE) is still being practiced in large number of centers in our country. Current discussion in the ophthalmic literature suggests an increased interest in various techniques of local anesthesia and day case surgery[1,] as the outcome of day case and routine surgery are the same[2,3].

Retrobulbar block (RB) with injection inside and peribulbar block (PB) with injection outside the muscle cone respectively, are the two most commonly used techniques[4] of local anesthesia. Due to various complications encountered in RB it is being progressively replaced by PB. Subtenon infiltration (ST) anesthesia is another type of local anesthesia in which anesthetic agent is delivered into subtenon space by a blunt cannula, topical anesthesia is used prior to infiltration making it almost pain-free. It is safe and effective as compared to RB[5] and PB[6]. Complete akinesia is rare and this is sometimes limiting[7] however the addition of hyaluronidase significantly improves the quality of motor blockade achieved with ST[8]. Topical anesthesia (TA) is in extremely wide use nowadays for intraocular surgery[9] however the intraoperative pain and discomfort is more marked as compared with paraocular block[10]. Patient's cooperation in TA is extremely important because there is no akinesia.

MATERIALS AND METHODS

A Quasi-experimental interventional study was designed in Department of Ophthalmology, PNS Shifa, Karachi to compare the degree of analgesia in ST and PB, in patients undergoing ECCE. The subjects included in the study comprised of armed forces personals and their families.

Duration of the study was 6 months (October 2004 to March 2005) using non probability convenience sampling of first 100 patients between the ages of 50-65 years requiring cataract extraction with posterior chamber intraocular lens (PCIOL) implantation. Patients less then 50 years of age, suffering from diabetes mellitus or any other systemic disease and those with a known history of adverse reaction to lignocaine were excluded from the study. The degree of analgesia in both types of local anesthesia was measured on the basis of grading mentioned as under:

0=no pain, no sensation

1=slight sensation or discomfort but no pain

2=slight pain

3=moderate pain

4=intense pain

A comprehensive performa was devised to record patient's particulars, the technique of local anesthesia and for pain scoring. The 100 patients selected were randomly divided into two equal groups, each comprising 50 patients. Group I, was given a 2-3ml mixture (2:3) of 2% Xylocaine and 0.75% bupivacaine ST anesthesia and group II, was given a mixture (2:3) of 2% Xylocaine and 0.75% bupivacaine by PB technique with facial block (Van Lint method). Need for supplement anesthesia was also recorded. Group-wise data collected from these hundred patients was included for final analysis.

For the ST anesthesia, after four drops of topical anesthetic, the patient's eye was prepared, draped and lid speculum inserted. In the inferonasal quadrant, 10mm posterior to the limbus, blunt subtenon cannula was slided into the subtenon space through a buttonhole made in conjunctiva and tenon's capsule and 2-3ml of local anesthetic was injected and pad applied for 3-4 minutes.

The PB anesthesia was delivered by two point technique. Facial block was given by Van Lint technique. The orbit was entered at the junction of lateral 1/3 and medial 2/3 of lower lid, just above the orbital margin keeping the 25G needle bevel facing the globe. 1-2 ml of anesthetic solution (2:3 mixture of 2% Xylocaine and 0.75% bupivacaine) was injected anterior to the equator and another 4-5 ml past the equator out side the muscle cone. Then superior to eye ball at the junction of lateral 2/3 and medial 1/3 of upper eye lid, 1.5-2 ml of anesthetic solution was injected. Eye padded and pressure bandage was applied for 15-20 minutes.

Computer based SPSS 8.0 was used to analyze the results. Frequency and percentages were computed to present all categorical variables including M:F for presentation of gender, degree of analgesia and augmentation of anesthesia needed. Chi square test was applied to compare sex and degree of analgesia between the two groups. Fisher's exact test was applied to compare augmentation of anesthesia needed between two groups of patients. Statistical significance was assumed at $p<0.05$. Age was presented by mean ± SD and t-test (unpaired) was used to compare it between the two groups.

RESULTS

There were 50 patients in group-I who received ST and 50 patients in group-II that received PB anesthesia. The two groups were almost similar in terms of age and sex distribution. The mean age in group I was 58.78 years ± 2.65 and in group II it was 58.25 years ± 2.19. The female: male ratio in group I was 1:1.94 and in group II was 1:2.12. So in term of female: male ratio and age distribution there was no significant difference between the two groups (Table 1).

32 patients in group I and 12 patients in group II did not experience any pain or discomfort during surgery, 14 patients in group I and 22 patients in group II experienced slight discomfort but no pain, 3 patients in group I and 12 patients in group II had slight pain and 1 patient in group I and 4 in group II had moderate intensity of pain during surgery (Table 2). There was statistically significant difference in pain score between two groups ($p=0.001$). The degree of analgesia was better with ST anesthesia than with PB anesthesia (Table-2).

One patient in group I and 7 patients in group II required supplement anesthesia (Table 4). The delivery of supplement anesthesia was by the same technique. Here again significantly less number of patients in ST group required supplement anesthesia as compared to PB anesthesia. The mean volume of anesthetic agent used was significantly less in ST anesthesia than in PB anesthesia ($P < 0.001$).

Table 1: Age and sex distribution

Parameters	Group I		Group II	
Age Mean (± SD)	58.78 (± 2.65)		58.25 (± 2.19)	
SEX	Male	Female	Male	Female
	33	17	34	16

Table 2: Study results

Grading of analgesia	Group I n (%)	Group II n (%)
No pain, no sensation	32 (64)	12 (24)
Slight sensation or discomfort but no pain	14 (28)	22 (44)
Slight pain	3 (6)	12 (24)
Moderate pain	1 (2)	4 (8)
Total	50 (100)	50 (100)

During administration of PB anesthesia majority of patients experienced moderate to severe intensity of pain. The use of few drops of topical anesthesia prior to ST anesthesia made this technique almost pain free and the anesthesia was immediate. Analgesia was effective, immediate, anesthetic volume minimal and procedure less painful in ST as compared to PB, anesthesia technique. There was no need of globe compression and no preoperative sedation was necessary. Incidence of top up anesthesia was less in ST then in PB anesthesia. No patient suitable for PB anesthesia was found unsuitable for ST anesthesia.

Table 3: Efficacy of block

		Group 1 n (%)	Group II n (%)	Total n (%)
Block	Successful	49 (98)	43 (86)	92(92)
	Augmentation	1 (2)	7 (14)	8 (8)
Total		50 (100)	50 (100)	100(100)

In complications, conjunctival chemosis and mild subconjunctival hemorrhage occurred in 05 patients in ST anesthesia in our study. This complication reduced as the study progressed and further control of conjunctival chemosis and subconjunctival hemorrhage can be ensured if the anesthetic solution is truly delivered into the subtenon space and not in to the anterior subconjunctival space. However these complications did not affect the visual outcome and resorbed in 5-7 days.

In PB group 1 patient developed post operative ptosis which settled with conservative treatment.

DISCUSSION

Retrobulbar anesthesia was first described in 1884 when Hermann Knapp used a Cocaine injection posterior to the globe to perform an enucleation. It provides akinesia of the extraocular muscles by blocking cranial nerves III, IV, and VI and anesthesia of the conjunctiva, cornea, and uvea by blocking the ciliary nerves. Due to the complications of RB block like retrobulbar hemorrhage, globe perforation, injury to optic nerve, extraocular muscle and elevator muscle, central nervous system symptoms like disorientation, unconsciousness, convulsions and respiratory arrest, it has been progressively replaced by PB anesthesia first described by Davis & Mandel in 1986[11]. In PB anesthesia, anesthetic solution is delivered by a relatively short and sharp needle outside the muscle cone[12] farther the globe, optic nerve, dural sheaths and optic foramen[13]. However imperfect blockade requires supplemental injections. A larger volume of anesthetic (6-10 ml) is deposited into the orbit, which may initially result in tense eyelids. Ocular compression is then used to help spread the anesthetic and soften the globe. PB anesthesia, while providing effective analgesia and akinesia, also has been associated with unique complication of a Brown's syndrome and other rare ocular complications[14]. In addition, preoperative intravenous sedation is often required because patients find the injection painful and frightening. Recently there has been renewed interest in ST anaesthesia[15,16] first described as early as 1884 by Turnbull[17]. Subtenon technique is efficient, simple, easy to learn, reproducible and has low rate of complications[18]. Hyaluronidase is added to anesthetize a greater area with the same amount and concentration of anesthetic agent, and to reduce the induction time. Hyaluronidase, an enzyme, catalyses the depolymerization of hyaluronic acid to a tetrasaccharide and potentially increases diffusion of local anesthetic through tissue planes. The analgesic

effect of ST anesthesia is dose dependant and 3ml is the optimal dose[19]. Pain relief is better than by PB anesthesia as was proved by Kollarits et al. [20], Briggs et al.[21] and Vanden Berg in 2004[22] in their respective studies.

CONCLUSION

In this study two independent samples matched for age, gender and diagnosis were randomized to receive either standard 2-point PB or ST anesthesia. Keeping in view the results of our study and other studies it is found that ST anesthesia provides better analgesia than PB anesthesia. It can be used as a good alternative to PB and RB anesthesia in both anterior and posterior segment surgery.

Another study is required, to see to what extent and by which means akinesia by ST anesthesia can be improved.

Author's affiliation

Surg Cdr Ayyaz Hussain Awan
Classified Eye Specialist
Eye Department
PNS Hafeez, (Naval Hospital)
Sector E-8, Islamabad

Surg Lt Cdr Abdul Rauf
Senior registrar
Eye Department
PNS Shifa, Karachi

REFERENCE

1. **Iqbal Z, Baig MA.** The effect of hyaluronidase on the quality of ocular akinesia in subtenon local anesthesia in cataract surgery: A hospital based study. Pak Armed Forces Med J. 2003; 53: 164-7.
2. **Strong NP, Wigmore W, Smithson S, et al.** Day case surgery. Br J Ophthalmol. 1991; 75: 731-3.
3. **Davies B, Tyers AG.** Do patients like day case cataract surgery? Br J Ophthalmol. 1992; 76: 262-3.
4. **Mudassir M, Butt KJ, Zaidi N, et al.** A comparison of peribulbar and retro bulbar anesthesia in cataract surgery. Ann KE Med Coll. 2000; 6: 399–400.
5. **Khoo BK, Lim TH, Yong V.** Subtenant's versus retro bulbar anesthesia for cataract surgery. Ophthalmic Surg Lasers. 1996; 27: 773-7.
6. **Azmon B, Alster Y, Lazar M, et al.** Effectiveness of sub Tenon's versus peri bulbar anesthesia in extra capsular cataract surgery. J Cataract Refract Surg. 1999; 25: 1646-50.
7. **La Marnierre E, Mage F, Alberti M, et al.** Comparison between Greenbaum's parabulbar anesthesia and Ripart's subtenon anesthesia in the anterior segment surgery. J Fr Ophthalmol. 2002; 25: 161-5.
8. **Rowley SA, Hale JE, Finley RD.** Sub-Tenon's local anesthesia: the effect of hyaluronidase. Br J Ophthalmol. 2000; 84: 435-6.
9. **Roman S, Auclin F, Ullern M.** Topical versus peribulbar anesthesia in cataract surgery. J Cataract Refract Surg. 1996; 22: 1121-4.
10. **Uusitalo RJ, Maunuksela EL, Paloheimo M, et al.** Converting to topical anesthesia in cataract surgery. J Cataract Refract Surg. 1999; 25: 432-40.
11. **Davis DB, Mandel MR.** Posterior peribulbar anesthesia: an alternative to Retrobulbar anesthesia. J Cataract Refract Surg. 1986; 12: 182-4.
12. **Marianne EF.** Anesthesia: Atlas of complications in ophthalmic surgery .1st ed. 1993; 1: 7-18.
13. **Weiss JL, Deichman CB.** A comparison of retrobulbar and periocular anesthesia for cataract surgery. Arch Ophthalmol. 1989; 107: 96-8.
14. **Davis DB, Mandel MR.** Efficacy and complication rate of 16224 consecutive peribulbar blocks, a prospective multi-center study. J Cataract Surg. 1994; 20: 327–37.
15. **Hansen EA, Mein CE, Mazzoli R.** Ocular anesthesia for cataract surgery: a direct Subtenon's approach. Ophthalmic Surg 1990; 21: 696–9.
16. **Greenbaum S.** Parabulbar anesthesia. Am J Ophthalmol 1992; 114: 776.
17. **Turnbull CS.** The hydochlorate of cocaine, a judicious opinion of its merits. (Editorial) Med Surg Rep (Boston). 1884; 29:628–9.
18. **Merle H, Suchocki D, Donnio A, et al.** Evaluation of single-injection caruncular sub-Tenon's anesthesia. J Fr Ophthalmol. 2002; 25: 130-4.
19. **Tokuda Y, Oshika T, Amano S, et al.** Anesthetic dose and analgesic effects of sub-tenon's anesthesia in cataract surgery. J Cataract Refract Surg. 1999; 25: 1250-3.
20. **Kollarits CR, Jaweed S, Kollarits FJ.** Comparison of pain, motility and preoperative sedation in cataract phacoemulsification patients receiving peribulbar and sub-tenon's anesthesia. Ophthalmic Surg Laser. 1998; 29: 462-5.
21. **Briggs MC, Beck SA, Esakowitz L.** Sub-Tenon's versus peribulbar anesthesia for cataract surgery. Eye 1997; 11: 639-43.
22. **Van den Berg AA.** An audit of peribulbar blockade using 15mm, 25mm and 37.5mm needle and subtenon's injection. Anesthesia. 2004; 59: 775-80.