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INTRAOCULAR PRESSURE, RETROBULBAR ANAESTHESIA AND DIGITAL OCULAR MASSAGE

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ABSTRACT

Objectives: To determine the degree of intraocular pressure (IOP) rise following retrobulbar anaesthetic injection as well as the optimal time required for the return of the IOP to the pre-injection level following ocular massage.

Materials and Methods: Using the Perkins hand-held tonometer, the IOP of consecutive adult patients were measured in the operating room before local anaesthetic (3ml of 2% xylocaine with or without adrenaline) injection; immediately after injection and every minute following ocular massage for the next 5 minutes.

Results: Twenty-three eyes of 17 patients, aged 23-71 years, were studied. The mean (±SD) baseline (pre-injection) IOP was 16.6 (±6.8) mmHg. Immediately after the injection the IOP rose by 11.8-80% with a mean of 37.3±16.8% (95%CI: 30.4-44.2). By 3 minutes the IOP had returned to the pre-injection level. After 3 minutes the IOP had become lower than the pre-injection level ($p<0.05$)

Conclusions: IOP rise following retrobulbar injection of 3 ml of local anesthetic varies from 11.8-80%. Digital ocular massage lowers the IOP to pre-injection level in 60.2% in 3 minutes; in 5 minutes it lowers the IOP to pre-injection level in all eyes and to below pre-injection level 86%.

Key Words: Intraocular pressure, retrobubar massage, digital ocular pressure

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INTRODUCTION

Most ophthalmic surgery in adults can be performed with local anaesthesia. Local anaesthesia for eye surgery can be achieved through topical drops, subconjunctival, sub-Tenon, intra-cameral, retrobulbar or peribulbar injections[1]. Topical and intracameral anaesthesia are frequently used for small incision cataract surgery such as phacoemulsification[2]. However, retrobulbar and peribulbar anaesthetic techniques are also commonly practiced especially in developing countries.

In a meta-analysis of the effectiveness of the currently used approaches of regional anaesthesia for cataract surgery, Friedman *et al*[2] noted that there is a strong evidence in the literature that both retrobulbar and peribulbar anaesthesia are equally highly effective. A national survey of local anaesthesia for ocular surgery in the United Kingdom demonstrated a 3.5% incidence of adverse events[4,5]. The study also concluded that serious adverse events associated with local anaesthesia were rare[4,5].

Problems associated with retrobulbar and peribulbar anaesthesia include increased intraorbital pressure with consequent elevation of the intraocular pressure (IOP). Raised IOP increases the risk of of such complications as iris prolapse and vitreous loss during surgery[3]. The need to maintain a low IOP thus making the eye 'soft' during intraocular surgery is very important.

Methods for achieving a low IOP following retrobulbar or peribulbar anaesthetic injection include digital ocular massage, use of fixed weights such as Honan ball or McIntyre device as well as hyper-osmolar agents including mannitol[1].

Recently, Ubah *et al*[3] reported that both digital ocular massage and fixed weight device lowered IOP within 10 minutes of application, with digital ocular massage being faster. However, the minimum application time was not determined and 10 minutes appear too long a time to wait between administering local anaesthesia and the commencement of surgery.

The present study aimed at determining the degree of IOP rise following retrobulbar anaesthetic injection as well as the optimal time required for the return of the IOP to the pre-injection level following ocular massage.

MATERIALS AND METHODS

Between May and July 2005, consecutive adult patients for elective intraocular surgery in one of the 3 consultant ophthalmic surgery units at the Guinness Eye Center Onitsha were recruited into the study. Exclusion criteria included previous intraocular surgery; a feeling of pains warranting discontinuation of the procedure and a refusal ofconsent by the patient.

Two ophthalmologists (SNNN & AIA) experienced in the use of the Perkins hand-held tonometer

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conducted the IOP measurement. Before the study both investigators had measured IOP using Perkins tonometer on 10 patients in the outpatient clinic. A good correlation was noted and inter-observer error was not significant.

With patient lying supine, the IOP was measured at baseline (pre-injection IOP). This was followed by retrobulbar injection of 3 ml of 2% xylocaine with or without adrenaline. The IOP was measured immediately after this injection (zero minute). The eyeball was then covered with cotton gauze and pressed firmly with both the index and the middle fingers for 2 seconds. Digital pressure on the eye was then released for another 2 seconds. The cycle was repeated for 60 seconds and IOP reading taken. In this way the IOP was recorded every minute for 5 minutes. Thus seven IOP readings were recorded for each eye. The patient's vital statistics and clinical diagnosis were also documented. The data obtained were analyzed. Tests for statistically significant associations were performed using the student t-test and 95% confidence interval (95%CI) with alpha at 0.05.

RESULTS

Twenty-three eyes of 17 patients were involved in the study. The age range was 23-71 years; median 61 years. There were 8 male and 9 female patients. The clinical diagnosis in the 23 eyes was namely cataract 11 (47.8%); glaucoma 9 (39.1%) and retinal detachment 3 (13.1%).

The mean (±SD) baseline IOP was 16.6 (±6.8) mmHg. Following injection the IOP rose in all the eyes by the magnitude of 11.8-80%. The percentage IOP rise in the eyes following retrobulbar anaesthetic injection is shown in Table 1. The mean percentage rise was 37.3±18.6% (95%CI: 30.4-44.2).

At one minute of ocular massage following injection, 3 eyes (13%) had returned to the pre-injection IOP while the IOP in 20 eyes (87%) remained elevated. In 2 minutes the IOP in 2 eyes (8.7%) were at pre-injection level and 6 other eyes (26.1%) were below the pre-injection level.

Three minutes after injection and ocular massage, the IOP in all the 23 eyes was lower than that recorded immediately after the anaesthetic injection (zero minute); 7 eyes (30.4%) had returned to the pre-injection (baseline) level while the IOP in 7 other eyes (30.4%) was below the pre-injection level. Thus in 3 minutes 14 eyes (60.9%) had IOP at or below the baseline IOP.

In 4 minutes 18 eyes (78.9%) had IOP below the pre-injection level while IOP had returned to the pre-injection level in 5 other eyes (21.7%). In 5 minutes the IOP in all the 23 eyes had returned to the baselinevalue and 17 eyes (73.9%) had IOP below the pre-injection value.

Table 2 shows the statistical analysis of the mean IOP changes over the 5 minutes during which IOP measured. The IOP gradually dropped following massage. By 3 minutes the IOP had returned to the pre-injection level ($p>0.05$). After 3 minutes the IOP became significantly lower than the pre-injection level ($p<0.05$).

Table 1: Percentage IOP Rise Immediately after Anaesthetic Injection.

% IOP Rise	No. of eyes	%
11 - 20	4	17.4
21 - 30	3	13.0
31 – 40	8	34.7
41 – 50	2	8.7
51 – 60	4	17.4
61 – 70	1	4.4
71 – 80	1	4.4
Total	**23**	**100.0**

Table 2: **Mean IOP changes with ocular massage.**

Time	IOP (mmHg)				
	Range	Mean ±SD	T-value	95% CI	P-value
Pre-injection	10-34	16.6±6.8	-	-	-
0 min	12-38	22.1±7.8	13.19	4.67; 6.45	P<0.001
1 min	10-37	21.3±7.8	8.85	3.36; 5.90	P<0.001
2 min	6-35	18.1±7.8	2.34	0.17; 2.87	P<0.05
3 min	**5-35**	**16.7±7.6**	**0.36**	**-0.82; 1.16**	**P>0.05**
4 min	5-35	15.2±7.7	2.48	-2.64; -0.24	P<0.05
5 min	5-34	14.3±7.7	4.51	-3.36; -1.24	P<0.001

DISCUSSION

The results of this study show that IOP could rise by up to 80% following retrobulbar injection. The degree of IOP rise is affected by orbital volume and eyeball size. These factors were not studied. Another factor that may affect the degree of IOP rise is the volume of fluid injected. In the present study a fixed volume of 3ml of xylocaine was used in each eye.

Retrobulbar injection, being a 'blind' procedure could be associated with such complications as needle stick injury and retrobulbar haemorrhage. But none of these adverse events was observed in the present study, thus supporting the experience of others that these complications are rare[4,5]. Nevertheless it should be cautioned that mild retrobulbar haemorrhage will not be obvious but it may cause a higher IOP rise.

In line with the previous observations[3] the present study showed that digital ocular massage is an effective means of lowering the IOP following retrobulbar injection. In particular it is evident from the present study that IOP could return to pre-injection level or even significantly below the pre-

injection level within 3 minutes of digital massage. No eye retained the pre-injection IOP level after 5 minutes of massage. Therefore ocular massage for 3 minutes seems adequate for most eyes but it may be unnecessary to continue massage for more than 5 minutes if the sole aim is to lower IOP.

Ubah *et al*[3] had shown that both digital ocular massage and fixed weight devices are effective in lowering the IOP after retrobulbar injection of anaesthetic. Digital ocular massage has the advantages of involving no direct extra cost and easy application. However it could be argued that ocular digital massage involves an opportunity cost since it ties down the personnel for the period of the massage. The use of the fixed weight devices allows personnel to go on with other preparations for surgery. Nevertheless ocular digital massage is a good alternative for lowering IOP after retrobulbar anesthetic injection and as shown in this study good results could be achieved in most patients within 3 minutes.

A major weakness of digital ocular massage is that the force of the digital pressure could vary between individuals as this could not be easily quantified. Therefore methods of standardizing the force of the digital pressure therefore needs be evolved. Further studies are also required to determine the variation in IOP following retrobulbar injection and subsequent ocular massage in different clinical condition for example glaucoma versus cataract.

In conclusion this study has demonstrated that IOP could rise by up 80% from baseline following retrobulbar injection of a fixed quantity (3 ml) of local anaesthetic.

It has also shown that ocular digital massage lowers the IOP to or below the pre injection level in more 60.9% of the eyes in 3 minutes. Digital ocular massage for 5 minutes could also lower the IOP to pre-injection level in all eyes and to below pre-injection level in 73.9% of the eyes.

REFERENCES

1. **Peyman GA, Sanders DR, Goldberg MF.** Principles and Practice of Ophthalmology. 1st Edition Vol. I. Philadelphia: WB Saunders Company 1980: 529-32.

2. **Friedman DS, Bass EB, Lubomski LH, et al.** Synthesis of the literature on the effectiveness of regional anesthesia for cataract surgery. Ophthalmology 2001; 108: 519-29.

3. **Ubah J, Ajayi BGK, Bekibele CO, Osuntokun O.** A comparison of fixed weight and digital techniques for intraocular pressure after peribulbar anaesthesia. Nigerian Journal of Ophthalmology 2004; 12: 60-4.

4. **Eke T, Thompson JR.** The National Survey of Local Anaesthesia for Ocular Surgery. I. Survey methodology and current practice. Eye 1999; 13: 189-95.

5. **Eke T, Thompson JR.** The National Survey of Local Anaesthesia for Ocular Surgery. II. Safety profiles of local anaesthetic technique. Eye 1999; 13: 196-204.