OFISA

N E W S L E T T E R

Issue:2; June - Dec, 2010

INSIDE THE ISSUE

From the Editor's Desk

Dear Members,

We deeply appreciate the excellent feedback given to us, for our 1st edition of OFISA Newsletter, that was issued on June 2010.

In our second issue, Prof Chandra M Kumar discusses the complications associated with classical or Atkinson's needle technique and describes the technique of modern needle blocks. Dr. Ian Sundara Raj reports an interesting case of brain stem anaesthesia following a peribulbar block. The causes and management of hypertension in a non-hypertensive posted for eye surgery is discussed by Dr. A S Anantharaghavan. Dr. Jaichandran V V highlights the importance, technique, mechanism and the possible dangers associated with ocular compression following regional blocks.

I hope this issue will be useful and informative not only to practicing ophthalmologists and anaesthesiologists, but also to the young post-graduates.

With regards

Dr. Kannan R
Editor, OFISA Newsletter.

Candid Comments

Words of encouragement after the 1st OFISA Newsletter

"Congratulation. It is a good work.................".

Dr. Waleed Riad ***MD, AB, SB, KSUF***

King Khaled Eye Specialist Hospital

Riyadh-Saudi Arabia

"…… it is very impressive. Keep working on it. Good luck".

Professor Chandra Kumar, ***FFARCS, FRCA, Msc***

The James Cook University Hospital

Middlesbrough, United Kingdom

"........... really a good newsletter; I particularly liked the Ankylosing Spondylitis positioning case. Keep up the good work".

Tom eke, MD FRCO

Spire Norwich Hospital, United Kingdom

"Hearty congratulations, for this wonderful work you have done, a milestone in history of ophthalmic Anaesthesia. My best wishes".

Dr.MM SHARMA

Aditya Jyoth Eye Hospital, Mumbai

Congratulations on the first newsletter. It has come out well.

Dr. Rasesh Diwan.

Raghudeep Eye Clinic, Ahemedabad.

Ophthalmic needle blocks in the 21st Century

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Ophthalmic anaesthesia in 19-20th centuries

Ophthalmic surgery dates back to prehistoric times when early medicine-men, using little more than sharpened sticks, would "couch" cataracts from their patients' eyes. By the early nineteenth century, sophisticated cataract surgical techniques were in place, however anaesthetic modalities were still limited to little more than heavy restraints[1]. The introduction of general anaesthesia in the mid-eighteen hundreds allowed for painless eye surgery, however, the need for the anaesthetist to be near the airway, and hence, the eyes, as well as the side-effects of ether, limited its routine adoption. In 1884, Koller demonstrated that cocaine could be used as an effective topical anaesthetic to abate the pain associated with ophthalmic surgery [2]. Shortly thereafter, Knapp delineated techniques of injecting cocaine within the orbit in order to achieve profound analgesia and akinesia of the globe [3]. In the same year, Turnbull reported a method of achieving ophthalmic analgesia by instilling local anaesthetic in the episcleral space[4]. By the twentieth century, a variety of needle-based conduction anaesthesia techniques were elucidated, particularly by Atkinson who popularized the term retrobulbar anaesthesia[5]. Sub-Tenon's local anesthetic techniques and topical anaesthesia rapidly gained popularity for cataract and other ophthalmic surgical procedures (ie, strabismus and retinal surgery) largely because of their perceived margins of safety [6,7]. In Great Britain, sub-Tenon's anesthesia in particular has risen in popularity and now is used for a large percentage of cataract surgeries [7]. However, there remains a place for needle block or general anesthesia in ophthalmic surgery, because topical and sub-Tenon's techniques are not suitable for every patient, every procedure, nor every surgeon [8].

Terminology of needle blocks

Nomenclature for orbital blocks is imprecise and can be confusing [9]. Currently, the term retrobulbar is applied to a block for which a long, apically directed needle is used. Actually, all orbital blocks are retrobulbar because the term simply means behind the globe [9]. In many patients it is possible to be behind the globe with a 2.2 cm needle. Similarly, the term peribulbar is used to describe a block in which the intent is to stay out of the muscle cone with the needle. In fact, all blocks should be peribulbar (ie, around the globe), because the only alternative is transbulbar, something to avoid. Use of the terms retrobulbar and peribulbar to describe different block techniques seems unsuitable on at least two grounds: they are imprecise and they do not actually describe the anatomical spaces they are meant to describe. It would be more precise and anatomically correct to substitute the term intraconal for retrobulbar, because the block is designed to go into the muscle cone. Instead of peribulbar, the term extraconal better describes the type of block intended to inject anesthetic into the extraconal space. Therefore, the terms intraconal and extraconal are anatomically correct but their widely used expressions are retrobulbar and peribulbar respectively.

Atkinson's needle technique

The Atkinson's or classical retrobulbar block[5] teaching involves raising a skin wheal with local anaesthetic and insertion of needle through the skin at the junction of medial 2/3rd and lateral 1/3rd of the lower orbital margin. Two to 3 cc of local anaesthetic is injected deep into the orbit very close to major structures behind the globe while the patient is asked to look upwards and inwards. A separate 7th nerve block is required. This block is performed by depositing local anaesthetic at some point along the distribution of the nerve from its emergence from the base of the skull at the stylomastoid foramen to its terminal branches. Many complications have occurred following classical retrobulbar block[10,11] and there are many complications which are exclusively associated with 7th nerve block which include difficulty in swallowing and breathing difficulty and other complications related to vagus, glossopharyngeal, phrenic and spinal accessory nerve block have occurred.

Towards the end of 20th Century, the needle block had undergone revolutionary changes[10,11] based on evidence and other modality of local anaesthesia such as peribulbar [12] and sub-Tenon's blocks were introduced [13].

Modern needle blocks

The classical retrobulbar block has now been superseded by a more modern approach to retrobulbar and peribulbar blocks [14]. In modern needle blocks, avoiding infection and discomfort, short and sharp needles, lateral needle placement and the use of higher volume local anaesthetic thus avoiding 7th nerve block are important considerations.

Avoid infection and discomfort

Measures to reduce pain during injection are essential. Topical local anaesthetic drops are instilled to obtain surface anaesthesia. Instillation of antiseptic solution such 5% povidone iodine drop is almost routine [14]. A dilute local injection is helpful before the injection of concentrated local anaesthetic agent[15]. Dilute local solution is prepared by adding 2 cc of concentrated local anaesthetic agent, for instance 2% lidocaine, to 13 cc of Balanced Salt Solution (BSS)[15]. 1.5 cc to 2 cc of this dilute solution is injected through the conjunctiva under the inferior tarsal plate in the inferotemporal quadrant. Slow injection of warm local anaesthetic seems to help [14].

Needle length and size

Needle length is an important consideration in the safe conduct of regional ophthalmic anaesthesia. Traditionally a needle measuring 3.8 cm has been used in most published studies. Anatomical studies of cadaver skulls have shown that traditional 3.8 cm needle could impale the optic nerve as shown by Katsev and Drews[16], who measured distance between the inferior orbital rim and the apex varied from 4.2 to 5.4 cm. The ciliary ganglion was found to lie 0.7 cm consistently in front of the apex. Hence the ciliary ganglion is 3.5 cm from the inferior orbital rim in a shallow orbit. In another study by Birch et al[17] using ultrasound localisation demonstrated that all the needles (3.8 cm long) were placed closer to the hind side of the globe and the needle tip placement ranged from 0.2 to 3.3 cm. In some patients the needle shaft was actually seen to indent the globe. Therefore, patients with shallow orbit are at a greater risk if a 3.5 cm or longer needle is used.

Short needles may reduce the needle related complications. For intra and extraconal injection, shorter 2.5 cm needle is recommended, though some authors claim excellent results with 1.6 cm needle[18]. Having used a needle 2.0 cm for last 12 years with great success it is the author's opinion[14, 19] that the incidence of complications of orbital regional anesthesia such as retrobulbar hemorrhage, brainstem anesthesia, optic nerve damage, intravascular injection and extraocular muscle dysfunction would be significantly reduced by using a shorter needle. With regard to needle gauge, the needle should be 25 gauge, no bigger. Some prefer a 30-gauge but many find it too flexible.

A great deal of controversy surrounds concerning the bevel of needles. The sharp narrow-gauge needles (25-31 gauges) reduce the discomfort on insertion at the expense of reduced tactile feedback and theoretically higher risk of failing to recognize a globe perforation[20]. Conversely the traditional teaching favoured the use of blunt or dull needles with the supposed advantages that blood vessels were pushed aside rather traumatised and tissue plane could be more accurately defined [21] but are likely to cause greater damage when misplaced [22]. Blunt tipped, as opposed to steep bevel cutting needles, have been shown to require more force to penetrate the globe, but translation into a reduction in globe perforation has not been demonstrated [20].

Placement of needle

For decades, common practice has been to insert the needle at the junction of the lateral third and medial two-thirds of the lower orbital rim (the classic point). This insertion site is nearer the globe, is close to the inferior rectus muscle, and is also close to the neurovascular bundle of the inferior oblique. Because it is so close to the globe, it is also difficult from this point to place the needle tip within the muscle cone without trying to redirect it after insertion. From the extreme corner, it is easier to stay far away from the globe and the angle of insertion does not have to change to enter the intraconal space. The initial direction of the needle is tangential to the globe, then past below the globe and, once past the equator as gauged by axial length of the globe, is allowed to go upwards and inwards to enter the central space just behind the globe [23]. The globe is continuously observed during the needle placement. Four to 5 cc of local anaesthetic agent is injected. When performing an inferotemporal extraconal block, it is acceptable to enter at the classic point if the needle remains low and parallel to the orbital floor and is not redirected once inserted [24].

A large volume of anesthetic injected through a short needle in this way will often provide a satisfactory block. Some practitioners prefer to insert the needle into the orbit through the inferior conjunctiva instead of transcutaneously as described above. This is an acceptable technique, especially since the conjunctiva can be anesthetized with topical anesthetic, which avoids the need to inject a skin wheal. Transconjunctival injection can be difficult for some patients, however, especially for those who are very protective, have short palpebral fissures, or have exceptionally deep-set eyes. In these patients, the transcutaneous approach may be easier and perhaps safer. The block technique described above should be contrasted with the classic technique that has been taught, practiced, and described in the literature. In the older technique, the needle enters more medially, as has been mentioned, and is redirected to be aimed toward the apex of the orbit when it is an inch or so into the orbit. It is during this redirection of the needle, especially in patients with long eyes (2.6–2.7 cm or longer), that perforation of the globe probably occurs. Perforation is less likely to occur if the needle is inserted further away from the globe, not aimed at the apex, and not redirected. In the apex, structures are tightly packed together, and a long needle aggressively aimed in that direction has a real chance of causing a major complication. Many patients require a supplementary injection.

A medial peribulbar block is usually performed to supplement inferotemporal retrobulbar or peribulbar injection, particularly when akinesia is not adequate[24]. A 25G or 27G needle is inserted in the blind pit between the caruncle and the medial canthus to a depth of 1.5 cm to 2.0 cm. Three to 5 cc of local anaesthetic agent is usually injected. Some authorities use the medial peribulbar as a primary injection technique for anaesthesia, particularly in patients with longer axial lengths [25].

A combination of intraconal and extraconal block is described as the combined retro-peribulbar block[26].

Descriptions of both retrobulbar and peribulbar blocks vary but nevertheless are commonly used in the published literature. Indeed Thind and Rubin[27] have highlighted in an editorial that a wide range of local anaesthetic injection techniques are in use, some of which may be described as retrobulbar by one clinician and peribulbar by another. Multiple communications exist between the two compartments and it is difficult to differentiate whether the needle is intraconal or extraconal after placement. Computerised tomography (CT) studies after intra and extraconal injections of radio contrast material have demonstrated the existence of multiple communications between these two compartments, the injected material diffusing between the compartments[28]. Injected local anaesthetic agent diffuses and depending on its spread, anaesthesia and akinesia may occur. It is appropriate to assume in clinical settings that if there is a rapid onset of akinesia, the needle tip or injected local anaesthetic agent has entered the intraconal area. If akinesia however is slow in onset and not complete then the needle or local anaesthetic agent has not reached the intraconal area in a sufficient amount and the block is extraconal.

Conclusion

Classical or Atkinson's technique advocated in the 20th Century has been associated with many complications. This technique is not recommended and is unsuitable for modern ophthalmic surgery in the 21st Century. Satisfactory anaesthesia and akinesia can be obtained with short and sharp needle placed in the extreme inferotemporal quadrant. Intraconal and extraconal blocks are invasive techniques and are still associated with pain, sight and life threatening complications albeit rare. At present there is no absolutely safe technique.

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Shivering, a rare complication following peribulbar anaesthesia – A case report.

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Retrobulbar block can cause injury to the optic nerve or inadvertent dural puncture of the optic nerve sheath which can lead to the local anaesthetic spreading into the optic nerve sheath. The optic nerve sheath is continuous with the intracranial subarachnoid space and substances injected via a retrobulbar approach may gain access to the cranial nerve roots, pons, midbrain, and spinal cord.

Shivering is one of the rare complications of retrobulbar block and a case was first reported by Lee and Kwon in 1988[1]. Since peribulbar block is away from the optic nerve this complications is remote after peribulbar block and there are no reports of shivering following peribulbar block.

The author likes to share this rare complication which occurred following a peribulbar block

CASE REPORT

A 63-year-old woman, was posted for phaco-emulcification extracapsular cataract extraction and intraocular lens implantation in the left eye. She had no history of allergy to drugs or injections.

She had previously undergone a cataract eye surgery in the right eye done under peribulbar block with 2% xylocaine and hyaluronidase and had no complication.

A pre-anaesthetic evaluation revealed a history of systemic hypertension, for the past 2 years, which was kept under control with Amlodepine tablet (5mg) taken once-a-day. Her random blood sugar was 150 mg/dL and her blood pressure was 150/90 mm Hg on admission and 140/87 mm Hg before administering the anaesthetic block, See Table 1.

She was administered peribulbar block with 8 ml of 2% xylocaine with hyaluronidase with a 23 G x 1 inch stainless steel blunt needle under monitored care of blood pressure heart rate and pulse oximetry. Soon after administering the block, she complained of being cold and began shivering. Despite being provided with a blanket, she continued to feel cold and shiver. A heater was placed under the blanket and when the patient felt better she was transferred to the operation theatre. However, she again complained of feeling cold and started shivering. The shivering was severe enough to be misjudged as a seizure, but its onset appeared to be slower than a seizure [1] The patient remained conscious during the episode of shivering. We continued keep the patient warm.

When the shivering lessened and the patient felt better, we began the surgery.

During the surgery, the blood pressure rose to 210/114 mm Hg and her heart rate rose to 127 bpm , but the patient never lost consciousness. IV. midazolam 1mg was given and the patient was made to pass urine. Her blood pressure came down to 160/105 (120) mm Hg and the surgery was completed.

After 2 hours she was completely normal and was subsequently discharged.

Table 1. Vitals recorded in the patient during preanaesthetic evaluation, at the time of admission, before and after regional block.

Time	Blood Sugar mg/dL	Blood Pressure mm Hg	Pulse Rate per min	Respiratory Rate per min	SpO2	Remarks
Preanaesth evaluation	102	140/90	80			
AB ward Admission	150	150/90	82			
Preblock		146/85	80	16	100%	Peribulbar block given
Postblock 10-39 AM		153/102	98	16	100%	I.V.Midazolam 1mg Given shivering Covered with blanket
10-48 AM		136/94	100	19	100%	Transfered to OT
10-58 AM		153/102	108	22	100%	shivering
11-10 AM		210/114	127	27	100%	HTN Tachycardia Severe shivering – hot air under blanket
11-14 AM		160/105	113	27	100%	
11-25 AM	85	141/92	115	32	100%	Inj. Hydrocortisone

AB ward: Ambulatory ward

Discussion

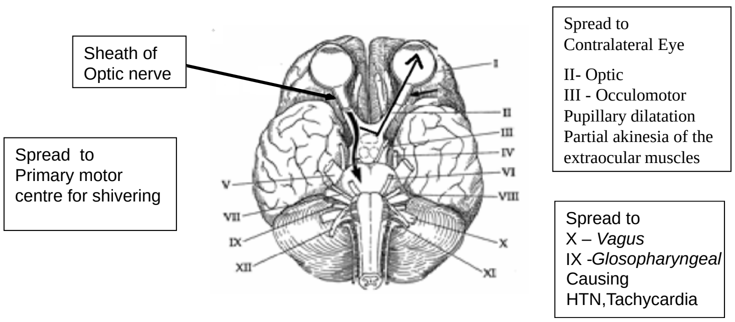

Figure 1: Central and contralateral spread of local anaesthetic following injection into the subarachnoid spacearound the optic nerve sheath.

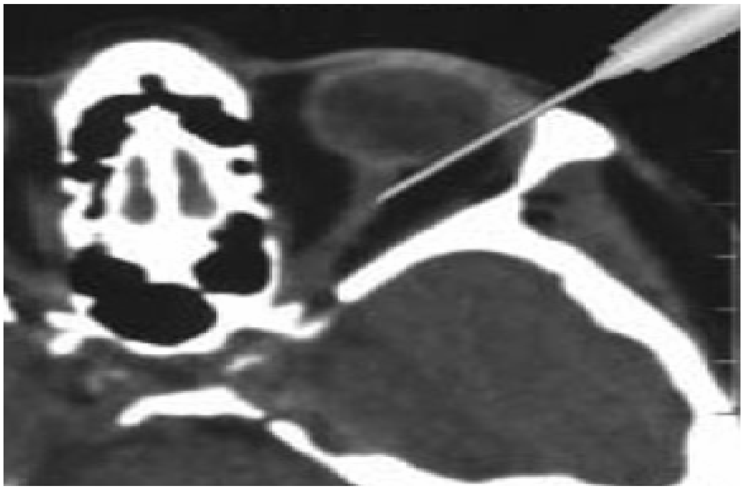

Figure 2: Retrobulbar place needle puncturing the optic nerve sheath.

The shivering could be due to the result of the local anaesthetic solution spreading along the optic nerve sheath into the cerebro spinal fluid space and contacting an area of the brain stem linked to the shivering mechanism,[1] see Figure 1.

The eye being developmentally part of the brain, has extension of the same meninges covering the optic nerve . Solution injected into the optic nerve sheath can enter the subarachnoid space, see Figure 2.This has been demonstrated radiologically by Lombardi[2]

The nature of shivering observed in the present case was quite unique. It was severe enough to be misjudged as a seizure. The patient could not understand why she was shivering.

Local anaesthetic solution spreading along the optic nerve sheath can contact the area of the brain stem linked to the shivering mechanism. In animal experiments, stimulation of the brain stem area linked to the shivering mechanism was found to produce shivering. Local anaesthetic solution applied to the ventro medial reticular formation of the brain stem facilitates shivering ,whereas application to the lateral pontine reticular formation inhibits shivering[3,4.]

Located in the dorsomedial portion of the posterior hypothalamus, near the wall of the third ventricle, is an area called the Primary motor centre for shivering. It transmits signals that cause shivering through the bilateral column of the spinal cord and finally to the anterior motor neurons. These signals are non rhythmic and do not cause the actual muscle shaking instead they increase the tone of the skeletal muscle throughout the body. When the tone rise above a certain critical level shivering begins [5]

Many cases of shivering are usually are attributed to cold operation theatre, anaphylaxis or vasovagal responses But shivering can also be also due to the central spread of the local anaesthetic solution into the brain stem, along the optic nerve. It may be the earliest warning sign of brain stem anaesthesia and demands special care to prevent life threatening complications.[6]

The hypertension and tachycardia are either due to vagolysis or blockage of the carotid sinus reflex via the glossopharyngeal nerve.[7] Pupillary dilatation and partial akinesia of the exraocular muscles of the contralateral eye may occur with or without any other sign. This sign is pathognomonic of the central spread of local anaesthetic agent .This sign should be looked for whenever any abnormal reaction occurs following the block.

Conclusion

As more and more anaesthetists are now becoming involved in administering and monitoring local ophthalmic anaesthesia, a greater understanding of these complications is needed to ensure greater quality of care for local anaesthesia patients.

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Non hypertensive patients developing hypertension during eye surgery

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The incidence of hypertensive response to stress of anaesthesia & surgery is on the rise.

Non hypertensive patients coming for ophthalmic surgery develop hypertension in preoperative, intra operative and post operative period. The rise in blood pressure is noticed in both systolic and diastolic pressures. The systolic ranges from 140 mmHg to 180mmhg and diastolic pressure ranges from 90 mmHg to 110mmHg.

Pre-operative Causes:

Anxiety

Epinephrine containing eye drops

Patients who have discontinued treatment and claim to be non hypertensive.

Intra operative Causes:

Injection pain on local block

Position on the table (Neck in the head rest)

Coexisting arthritis causing discomfort and pain

Local anaesthetic drugs with adrenaline

In adequate block causing pain

Early wearing out of block

Urinary retention

Hypothermia with rigor

Muscle handling during buckling procedures.

Post operative Causes:

Pain

Nausea and vomiting

Prone position nursing

Reflux hypertension after the drug effect wears off.

MANAGEMENT OF HYPERTENSION

A. Pre operative rise of BP

1. Good counseling: Explain the anaesthetic procedure and the approximate time

2. Premedication: Do not make the patient wait too long for his turn. Preferably post the patient as the first case.

Tab .Alprozolam 0.5mg

Tab.Alprozolam0.5mg with Tab.Inderal 20 mg.

Tab.Clonidine (Tab Arkamine 100micro gm)

Inj.Pethidne50mg with Inj.Phenergan 25mg.

B. Intra operative rise of BP

Reassuring talk in the Operating Room before the block

Accurate and adequate block. Top up dose through sub tenon route is ideal. Ensuring comfortable supine position with relaxed neck support. Additional pillows under the knee joint.

To avoid adrenaline containing drugs

For variable bladder habits condom drainage for male patients and Foleys catheter for female patients.

Adequate blanket cover to prevent hypothermia and rigor

Adequate oxygen supply under the drape to prevent hypoxia

To check the effectiveness of the block before starting the procedure

Intra operative Drugs

Lignocaine 2% with Sodium Bicarbonate

Lignocaine with Sodium Bicarbonate + Inj.Clonidine 75mcg

Intravenous fentanyl upto 20mcg

Intramuscular Inj. Ketarol 30mg

Sensorcaine 0.5% for prolonged procedures.

If the systolic blood pressure is more than 180 mmHg and diastolic more than 100mmhg following drugs can be used

Intravenous Inj. Clonidine 75mcg in 500ml of normal saline

Intravenous Inj. Betaloc 1-2 mg -Bolus

Intravenous Inj.NTG in 5% DNS 5mcg/kg/min, to start with and NIBP monitoring every 5 minutes

Nitroderm patch.

C. Post operative rise of Blood pressure.

Inj. Tramadol 50mg i.m

Tab. Ondensetron 4mg 8th hourly

Close monitoring of blood pressure with E.C.G.,SPo2 and Blood sugar.

Calcium channel blockers or beta blockers to be titrated with blood pressure recording.

CONCLUSION

Pre-operative assessment can pick up potentially stressful patients in whom rise in blood pressure can be anticipated and suitable measures can be taken to control it. Various adjuants used along with Lignocaine prolong the block time and other analgesics and anxiolytic drugs help in preventing hypertension in non-hypertensive cases for a smooth intra operative and post operative course.

Importance, mechanism and various methods of Ocular compression

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The main purpose of this article is to recap, briefly, the history, importance and the mechanism involved in ocular compression, look at the various methods of applying it and highlight some of the possible dangers associated with its use.

History:

Using an animal model, Otto and Spekreigse studied the effect of volume discrepancies on intraorbital pressure in the Orbit.[1] When the fluid volume is injected into any orbital compartment a pressure gradient ensues. When a pressure gradient exists, the fluid flows along the septa. Some dissolve in the tissues and some pass through fenestrations into other compartments. When the pressure of the bolus reaches the pressure of the tissue, the fluid stops moving through the tissues. The fluid pressure will then gradually return to the baseline.

During cataract surgery, the external pressure to the eyeball is made up of the actions of the extraocular muscles and the lids as well as the pressures inherent in the maneuvers of the operation. Sedating the patient plus complete anesthesia and akinesia of the lids and orbital muscles reduces the external scleral pressure to a considerable degree. However, there remains the external pressure of the actual manipulations on the eye by the surgeon while extracting the lens.

A major advance in orbital anaesthesia occurred when Kirsch (1955) reported better conditions for intracapsular cataract surgery with five minutes of deliberate pressure over the orbital tissues, with the fingers, to produce hypotony of the globe and diminish vitreous volume. [2] In 1966, Vorsomarthy found that conditions seemed better if digital massage was done after the block and before the surgery started because the anaesthesia spread better.[3]

Thus, one other procedure which greatly added to the safety of cataract operations was the use of digital pressure to the eye following regional block.

Importance of Ocular compression following regional blocks:

Of late, peribulbar anaesthesia is a commonly used regional technique for performing cataract surgery under local anaesthesia[4]. In this technique, the local anaesthetic is injected outside the muscle cone. This results in the need to administer a larger quantity of the drug, as it has to diffuse through the orbital connective tissue septa and the muscle cone to block the motor and sensory nerves of the eye[5]. Larger drug volumes, in turn, raise the intraorbital and intraocular pressure (IOP) to a greater extent when compared with the retrobulbar technique where relatively less volumes of the drug is required[6,7]. But, surgically, a soft and safe eye is required during cataract operation, especially when the intraocular lens implantation is to be done. If the eye is soft before surgery, the vitreous phase will remain concave after the lens is extracted and this will prevent its loss and help in quick and successful implantation of the intraocular lens.[8]

For the following ophthalmic surgeries of intraocular type like intracapsular / extracapsular cataract extraction with or without intraocular lens implantation and trabeculectomy, it is important to prevent any iatrogenic pressure rise before a surgical incision is made. As soon as the sclera is surgically incised, the IOP equates atmospheric pressure. If the pressure is high, at the time of incision, the intraocular contents namely the iris, lens, vitreous and retina, may be expelled through the wound.[9] Sudden decompression of a hypertensive eye may also increase the likelihood of the sclerotic short posterior cliliary artery, in the choroid, being ruptured, thus producing an expulsive haemorrhage in the eye.[10] Hence, it is quite essential to have a soft globe, especially following each injection in fractionated peribulbar anesthesia, and it has to be ensured that the IOP is maintained at a low-normal level, before any surgical incision is made.

Injection into tight orbits or those orbits with tight septal compartments with compact, non-fenestrated septa markedly increase intraocular pressure as it compresses the veins before being sensed as resistance to injection through the syringe. These tight orbits are at risk from blindness with Graves' disease, retrobulbar haemorrhage, trauma etc. Orbital massage could be vision-saving if it allows even a small amount of fluid to move across the septa into areas where the veins are open when the digital pressure is reduced, or through the fenestrations in the orbital septum out into the veins and lymphatics of the anterior orbit.[11]

For a Vitreoretinal surgeon, a relatively soft globe following peri or retrobulbar block, helps them to dissect the tissues easily on the exterior of the globe to permit either an encircling band to be applied over the detachment site or buckle the sclera towards the detached retina. To make the globe softer some form of preoperative ocular compression should be given.

Though the medial peribulbar injections are considered to be safer, yet perforation of the globe has been reported to occur in patients where the second medial injection, placed medial to the caruncle was given immediately following the first injection into the inferotemporal compartment.[12] Injecting 5ml of local anaesthetic into the inferotemporal compartment causes the globe to be displaced medially and superiorly. Before inserting a needle into the medial compartment, the globe should be returned to the anatomical position by compression.

Effective compression of the globe reduces the risk of perforation and also creates sufficient space for supplemental injections to be given.[12]

Oculocompression can be used to aid the oculoplastic surgeon. After injections are made in the lid, compression allows the puffiness from the anaesthetic injection in the lid to disappear, leaving the creases as they were and the anatomic relationship undisturbed by the additional volume of fluid.

Retrobulbar or peribulbar hemorrhage, secondary to injection of anesthetic agents, seems to be inhibited by the application of compression after injection.

Apart from reducing the surgical and needle block complications, the preoperative ocular compression also helps in uniform distribution of the local anaesthetics across the globe and thus helps is producing better akinesia and anaesthesia of the eye.

Ocular compression has also been found to be useful in patients undergoing cataract surgery under topical anaesthesia. Rosenthal, applied Honan balloon following anaesthetic –soaked pledgets into the superior and inferior conjunctival fornices and felt that this would increase the uptake of anaesthetics and improve the quality of topical anaesthesia.[13]

Mechanism of Ocular compression:

The ocular compression helps in decreasing the IOP by the following suggested mechanisms[14:]

1. Decreasing the volume of the vitreous, which is about 50% water in elderly patients.

2. Decreasing the volume of the orbital contents, other than the globe, by increasing the systemic absorption of orbital extracellular fluid, including, presumably, injected fluids such as anaesthetics.

3. Increasing the aqueous outflow facility mechanism.

4. Emptying the choroidal vascular bed.

5. Stretching and distending the sclera. Thus it appears to decrease the volume of the vitreous relative to the size of its scleral coat.

Various techniques of Ocular compression:

Some of the methods of ocular compression followed are:

Subjective compression method:

Super pinky

Digital compression and

Objective compression method:

Honan Intraocular pressure reducer (HIPR).

Subjective methods:

The super pinky is a hard hollow rubber ball, placed directly over the patient's eye with the help of an elastic strap that is threaded through it, see Figure 1.

Figure 1. Super pinky

The digital ocular compression can be done with the help of the three middle fingers placed over a sterile gauze pad on the upper eye lid with the middle finger pressing directly on the eye ball, see Figure 2. The globe is compressed gently and the pressure is released, every 30 seconds, for 5 seconds to allow vascular pulsations to occur.

Figure 2. Digital massage of the globe

Some clinicians, instead of using their fingers, place the thenar eminence of the palm over the gauze covering the eye and apply steady pressure. The rim of the orbit will usually prevent excessive pressure when it is applied with this larger object.

Nonetheless, digital or thenar method can be effective and safe if carefully applied.

Objective methods:

One of the most popular methods of ocular compression worldwide remains the Honan balloon, officially known as the Honan Intraocular Pressure Reducer. This device has several advantages. First, it is easy and reliable to use. It allows the user to set a known and steady level of pressure.

Normally Honan balloon is applied for 20 minutes at a pressure of 30mm Hg following an orbital block.

Possible dangers of ocular compression:

With the subjective methods, the pressure applied is not known. They are not standardized and unfortunately the pressure exerted has not been measured and will vary widely among one individual to another. The optimum pressure to be used should be well below the pressure in the central retinal artery, not more than 30 mm Hg. It should be elevated, high enough, to create a soft surgical eye. Retinal vascular occlusion can occur if higher pressure is exerted by the above methods.

Interrupted moderate digital pressure will produce equally good results with less danger of damage to the retina. Technically, it's quite difficult to apply interrupted pressure to the globe using a Super pinky method and hence many tend to avoid using it, now-a-days. Intermittent pressures can be easily employed with the digital method.

The customary injection-decompression sequence has proven to be reliable but nevertheless, a concern for the ischaemia inducing potential exists, as evidenced by the ongoing research on the effects of increased intraocular pressure on ocular perfusion. Since blood flow to the retina, choroid and optic nerve depends on the balance between the intraocular pressure and the mean local arterial blood pressure, externally applied pressure has the potential to reduce significantly blood flow to these vital areas. Eyes with glaucoma may be at greater risk than normotensive eye, in such cases. In the presence of orbital haemorrhage, most authors warn of ischemia with globe compression in patients with a history of central retinal artery or vein occlusion. Yet, there is lack of clinical evidence to indicate that this is a major problem. Nonetheless, it is wise to be cautious when doing an orbital block and/or compression in such cases.

The other possible complications that can occur, following ocular compression, is corneal abrasion. It is important to be certain that the eyelids are closed before covering the eye with a gauze and applying whatever device is used.

There is concern about ocular compression resulting in dislocation of the lens into the vitreous. This could happen in cases where vigorous pressure is used. Patients who represent a greater risk of this complication are those with dislocated lens, tenous zonules, including patients with pseudoexfolation.[15]

It is important to remember that using compression in patients who have not had an orbital block might increase the risk of the oculocardiac reflex.

It is not recommended that ocular compression be used in cases where globe injury is being carried out under orbital block. Using time, rather than compression, after injecting these patients is a better choice.

Summary:

Ocular compression is a simple and effective method, and if it is properly followed it can definitely increase the success of visual outcome following eye surgery.

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