



# OFISA

## NEWSLETTER

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### INSIDE THE ISSUE

- ★ From the Editor's Desk
- ★ Preoperative Evaluation Of Elderly For Cataract Operation Under Local Anaesthesia
- ★ Is Bolus Injection Of Fluorescein Dye Still Needed For FFA In To days Era?
- ★ Do's and Don'ts for practicing a safe regional anaesthesia
- ★ Ophthalmic Anaesthesia – The ophthalmologist's point of view.
- ★ Forthcoming events  
2d OFISACON, Gridhar Eye Institute, Kochin
- ★ Feedback / Comments

# From the Editor's Desk

I am very pleased to share our 5<sup>th</sup> issue of Newsletter, which has immense applications in ophthalmic anaesthesia and care.

Dr Umesh Chandra throws light on our elderly patient and the challenges faced by the anaesthesiologists in managing them. Dr Veena, discusses the complications occurring in Fundus Fluorescein Angiography. Do's and Don't's while performing a akinetic needle blocks are clearly highlighted by Dr Jaichandran V V. Last but not the least, an interesting article about ophthalmic anaesthesia is written by Dr Akshay Nair, Ophthalmologist.

Happy reading.

**Dr Kannan R**

Editor, OFISA Newsletter



# PREOPERATIVE EVALUATION OF ELDERLY FOR CATARACT OPERATION UNDER LOCAL ANESTHESIA

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Ageing is natural process of life cycle and normally considered as physiological change. A Person is considered Senior citizen(SC) when age is 60 years or more and a new class has been added up as very senior citizen (VSC), when age is 80 years or more. Among both age groups half of populations are visually impaired. According to national census, 2001, government of India, the current population of VSC is more than 1 crores and will increase by many folds in coming years. Over half of senior citizen group will require surgery once in a lifetime. inspite of all altered physioclogical parameters, advancement in anesthetic and surgical techniques makes the procedure possible. We are competent to provide visual support to our fellow senior citizens. This write up has been drafted from 50 best references available in print and web. This is further reinforced by author's own experience in perioperative management of senior citizens at Jamshedpur eye hospital.

## WHY PERIOPERATIVE CLINICS:

The preoperative clinics have been established worldwide for detailed examination and risk stratifications of surgical patients and concept have been successful. Gradually these clinics become more meaningful and services have been extended to patients undergoing surgery with local anaesthesia. Today POC are managing all three phases of surgeries, pre, intra and postoperative are now controlled by Anaesthesiologists. They assess, treat, counsel and manage the critical moments and thus a guaranteed vision care is insured to our senior citizens. The preoperative clinics are being replaced by perioperative clinics (POC) globally.

The complete examination of eye in old age is mandatory for cataract surgery and must be correlated with any systemic illness if it co-exists. The prognosis and repeated counseling must be executed from out patient departments (OPD) and Perioperative clinics (POC).

## CLINICAL SIGNIFICANCE OF SENIOR CITIZEN/ELDERLY:

With ageing, baseline functions of almost all major organ system undergoes progressive decline resulting in a decreased

physiological reserve and they are unable to compensate for any stress. Co-existing diseases add to this decline. Risk factors for postoperative mortality in elderly surgical patient are summarized below.

- Physical status: ASA class 3 & 4
- Emergency procedure
- Severe pulmonary, cardiovascular, renal, and nervous system disease.
- Albumin level of <3.5 g/dl or anaemia
- Patients with restricted activities
- Functional status 1-4 METs

Preoperative screening should be based on individual's co-morbidities and anaesthesiologist must be well versed with patho physiological changes in each system of elderly. The geriatric assessment is well defined and consists of history, physical examination, evaluation of mental, functional and nutritional status: of social supports; and of pertinent risks. Because of increased incidence of illness and disability, elderly patients requires extra time and diligence to assess and track medical problem

## THE EYE IN OLD AGE:

" The insensible approach of old age is nowhere so soon discovered as in the eye; and men are both to think themselves of the declining in age so soon as the eyes give warning thereof"

The knowledge and study of ocular changes in old age are becoming increasingly important because of several factors. Firstly the expectancy in our country is in increasing phase. So ophthalmologists will come across more aged people with visual distribution. Secondly, visual impairment is second most common ailment (next to arthritis) in old people.

The appearance of the changes as an individual grows older. These changes are mild at first, become more marked and characteristic as age advances to the seventh and eighth decade and beyond. Many of changes do not impair the normal functioning of the eyes. A few of these changes may cause visual impairment and other problems. Some of them are amenable by medical and surgical therapy, while others permanent visual deprivation. The brief and age related change



# PREOPERATIVE EVALUATION OF ELDERLY FOR CATARACT OPERATION UNDER LOCAL ANESTHESIA

in the eyes of senior citizens and beyond are outlined so any co- relation and administration of local anaesthetic block may be successfully employed.

**Lids:** The skin of both eyelids loses its elasticity and becomes baggy with puffiness of varying degree, wrinkling and dropping folds (Dematochalasis). These may be fatty alteration of the tissues clinically manifested as yellowish white patches in the median angles of the eyelids (Xanthelasma). The atrophy of the orbital fat may cause the eyeball to sink in giving the appearance of xenophthalmos and pseudoptosis, Atonic muscles and inelastic skin produces concentric lines at lateral angle of eye, commonly known as crow feet. The lower lid may turn out (Senile entropion), leading to degenerative changes in the conjunctiva and cornea and annoying watering of the eyes. The lids may turn into senile entropion, may led to conjunctival inflammation and even ulceration of the cornea.

**Conjunctiva, Sclera & Cornea-** Dull yellow appearance occurs in the conjunctiva, sclera becomes thicker and there are signs of fatty degeneration in the cornea. The sclera becomes gradually thicker and more rigid. Fatty degeneration of cornea and termed as arcus senilis and is commonest fining after 6th decade of life.

**Anterior chamber, lacrimal system, lens, iris & ciliary bodies:** There is a great increase in amount of connective tissue of uveal tract. The ciliary bodies are also thickened and circumlental space is diminished.

**Retina & Choroid:** Arteriosclerosis of the choroidal and retinal blood vessels may be followed by degenerative changes in these tissues. Ophthalmoscope examination may revel age related macular changes (AMRD) and colloidal bodies. Hypertension and diabetes further complicates the issue and mars the full restoration of vision in elderly.

The complete examination of eye in old age is mandatory and must be correlated with any systemic illness if it co-exists. One must ascertain this changes before going a head with the Peribulbar block.

## PREOPERATIVE EVALUATION

This is important tool for Anaesthesiologists and patient safety. The following core points are markers for anaesthesiologists and surgeons.

1. Alert surgical care providers to physiological process that may alter preoperative management.
2. Predict the risks of complications.
3. Determine an index of risk and plan appropriate intervention.
4. Explain the prognosis of patient to next of kin and state of ready preparedness.
- 5 Difficult airway during eye operations:

This can be easily predicted by extension and rotation of neck. Atlanto occipital (A-O) joint extension can easily predictive of difficult intubation. Airway prediction must be done preoperatively as head and neck are draped during ophthalmic operations

## PREOPERATIVE ASSESSMENT:

Preoperative assessment of geriatric patients is more complex and one must evaluate the functional, nutritional status and cognitive impairment. At the same time it is very important to evaluate the physical status and identify the effect of age related disease from aging itself. Evaluation must start several days before the surgery by taking the detailed medical history followed by physical examination and admissible laboratory investigation and specialist consultation if necessary. The anxiety and concerns by these patients regarding risk during surgery and anaesthesia must be minimized.

Organ system functional reserve declines markedly with advancing age. The nutritional status can roughly indicate the recent gradual or rapid loss of weight suggesting the possibility of malnutrition or associated malignancy.



# PREOPERATIVE EVALUATION OF ELDERLY FOR CATARACT OPERATION UNDER LOCAL ANESTHESIA

## **PREOPERATIVE INVESTIGATIONS:**

- Blood glucose.
- Electrocardiogram (ECG) for all patients above 60 years of age and those suffering from history of cardiac ailment.
- All other tests are evidence based.

## **SYSTEMIC EVALUATION:**

Ageing effects cardiovascular, pulmonary, renal, central nervous system and hepato-biliary systems and their functions further deteriorates with stress response of surgery and block. The associated diseases and their further complications poses a tough time for clinicians and patients.

Current trends suggest that the entire cataract surgeries under local anaesthesia must be covered safe with perioperative management (POC). Thus the management must be covered to pre, intra and post operative phase of operations. All the patients of ASA grade3 &4 must be medically covered up by competent professionals and life saving devices must be in ready mode during operations. All patients of ASA grade3 and associated medical conditions must be on medications and stable. They must be subjected to battery of evidence based investigations and assessed. During cataract surgery blood loss is minimal. All patients must be connected to ECG, NIBP and Spo2 monitor and an open vein with suitable device are mandatory during operation. Oxygen and other life saving devices must be in ready mode.

Under no circumstances mortality is acceptable and all efforts must be done to minimize the morbidity.

## **LOCAL ANAESTHETIC AGENTS AND AGEING BODY COMPOSITION:**

The elderly patients are more sensitive to drugs than older patients. Drug absorption, distribution and elimination are altered during administration of local nerve blocks and other sedative and analgesic drugs.

- Alteration in absorption: Decreased gastrointestinal flow, gastrointestinal mortality and skeletal muscle flow contribute to delayed absorption.

- Alteration in distribution: Decreased total body fluid, lean body mass, relative increase in body fat, decrease serum proteins (Albumin) and its binding may hamper the distribution of drugs administered.
- Alteration in elimination: decreased kidney functions and renal blood flow, glomerular filtration rate (GFR) cardiac output and splanchnic blood flow all can contribute to slow delivery of drugs. Decreased hepatic microsomal activity and sluggish delivery of drugs to liver are cause of concern while administration of sedation and analgesia in very senior citizens (VSC) >80 years of age.
- The effect of ageing on three compartments are well documented and clinically proved.
  - ➡ Central compartment (V1) with decreased body water becomes smaller and thus resulted to high peak concentration following boluses or rapid infusion.
  - ➡ Small Peripheral compartment (V2) with reduced lean body mass (10% by 70 years) becomes smaller.
  - ➡ Large Peripheral compartment (V3) with increased body fat enlarges ( 15%) along with V2 may results increased intracellular dehydration and decreased blood volume. They may pose challenge to drug distribution and prolong duration of action of drugs used during eye operation.
- Ageing significantly changes the anaesthetic drug distribution and elimination.

There is serious mismatch between half life (T<sub>1/2</sub> beta), distribution (V<sub>d</sub>) and clearance (C<sub>1</sub>) of drug.

## **ALKALIZATION OF LOCAL ANAESTHETIC FOR PERIBULBER BLOCK:**

Most local anaesthetic are supplied as acidic salts to avoid precipitation during shipping and storage. It has been demonstrated that the alkaline form is an active form of drug. Thus alkalization is done by mixing soda bicarbonate 7.5%. This increases the penetration through the soft tissue and nerve sheath faster resulting decrease in duration of action. The ability of pH adjusted local anaesthetic solution decreases the onset time has been studied and found to be safe and cost effective.



## LOCAL ANAESTHETICS SYSTEMIC TOXICITY (LAST)

Advances in the field of local anaesthesia have been associated with well recognized consideration. Newer drugs with better pharmacological profile failed to eliminate the side effects & have resulted into fatal outcome. Incidences of LAST have been reported low, but gradually it is emerged as major concern due to its life threatening implications. Many theories have been proposed to explain development of LAST but it remains an enigma due to its complexities involved in its mechanism and unpredictable presentation. More potent agents are linked with more serious complications. Neurological symptoms and sign precede the cardiac events. Refractory cardiac complications associated with the use of local anaesthetic should be considered first while managing such cases. Cardio-respiratory support currently is main stay of treatment. Stress however should be on the prevention part and judicious use of local anaesthetics.

The eye being in adaptable organ can function adequately and well even in advance years. But the aging does not affect the capability of the function fully and decrease its efficiency in many ways. A broad based mutidisciplinary approach to plan Perioperative management in elderly eye patients will be more helpful. This can significantly reduce the cardiac, pulmonary, cognitive dysfunction and manage all the co-morbidities inside and outside operating room. We, anaesthesiologists can change the present scenario and can minimize the morbidity,

thus ensure the vision to our most beloved community, the senior citizens. I, strongly advocate the active involment of anaesthesia professionals in Perioperative management of cataract surgery. We, professionals promise that we will work for a better and happy future to all of them.

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# IS BOLUS INJECTION OF FLUORESCEIN DYE STILL NEEDED FOR FFA IN TODAY'S ERA?

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Fundus fluorescein angiography (FFA) is a diagnostic study of the circulation of the dye through the retina of the eye. It is a widely used investigative and monitoring procedure for patients with diabetic retinopathy and other retinal diseases.

Fluorescein dye was initially synthesized by Adolf von Baeyer in 1871(1). Novotny and Alvis developed a photographic system for sequential documentation of fluorescein flow through the ocular fundus in 1960(2).

In wide use for over 50 years, it is a valuable tool in the study, the understanding, and the treatment of ocular diseases.

This is considered a relatively safe procedure, although numerous adverse reactions have been reported in the literature. These are divided into mild (nausea, vomiting, pruritus, sneezing, vasovagal disorders, inadvertent arterial injection), moderate (urticaria, other skin eruptions, syncope, thrombophlebitis, pyrexia, local tissue necrosis, muscular paralysis) and severe (bronchospasm, laryngeal edema, circulatory shock, myocardial infarction, tonic-clonic seizure)(3-5).

Previous studies indicate that the most frequent adverse reactions are mild, such as nausea and vomiting (2% to 14%) and that moderate and severe reactions are infrequent (<1%)(3-6).

The exact mechanism of adverse reactions in fluorescein angiography is not clearly understood. Some proposed mechanisms include: histamine release of non-allergic nature in the absence of antigen-antibody reaction

(anaphylactoid reactions); vaso-vagal phenomenon resulting in bradycardia, arterial hypotension and reduced cardiovascular perfusion; drug allergy of the immediate hypersensitivity type (anaphylactic reactions); anxiety-related medullary sympathetic discharge, eliciting tachycardia and myocardial stress; direct vasospastic toxic effect of intravenous injection; effect of contamination during manufacture of the drug; direct systemic effect of topical mydriatics, particularly phenylephrine; or any combination of the above potential factors(5).

Age related macular degeneration and diabetic retinopathy are the major indication for doing this test.

Some authors report that allergy history, systemic arterial hypertension (SAH) and diabetes increase the risk of adverse reactions to fluorescein injection (6).

Nausea and vomiting are some of the adverse reactions, which interfere with the smooth recording of the various stages of the angiogram.

Studies have showed that slower injection of the dye diminishes the incidence of nausea and vomiting (7) However a bolus injection of the fluorescein dye has always been advocated as it gives better photographic pictures with a good contrast; enabling picturization of all the phases of the angiogram.

This was very essential about a decade earlier as the angiogram was very often the only diagnostic tool available.

However with the development of digital angiography the images are far superior even with minimal fluorescence images can be modulated to give better contrast. Also the exposure / flash is now adjusted to record good quality of angiograms.

Secondly the advent of Optical Coherence Tomography (OCT) has helped immensely in diagnosis and treatment of various retinal diseases.

Most of the retinal conditions can be now diagnosed by an OCT alone or in conjunction with the fluorescein angiogram.

Thirdly, the choroidal vasculature can be effectively studied by ICG video angiography.

Hence giving a bolus intravenous injection of fluorescein may not be a prerequisite for a good angiogram or for retinal diagnosis.

The purpose of this prospective study is to determine the incidence of adverse reactions (nausea and vomiting)

in patients who had undergone fluorescein angiography without a bolus injection of the fluorescein and to determine if a slower injection of the dye interfered in retinal diagnosis and treatment.



# IS BOLUS INJECTION OF FLUORESCEIN DYE STILL NEEDED FOR FFA IN TODAY'S ERA?

## **METHODS**

### ***Patients and medical procedures***

The study was performed in a retina clinic in Mumbai.

It was carried out between January 2007 and January 2012. Patients with prior fluorescein angiography history, pregnant patients or patients in use of corticosteroids, immunosuppressive or antihistamine drugs were excluded. All patients filled out a written consent. Medical preoperative evaluation was performed one hour before the test by an anesthesiologist.

Sodium fluorescein 20% was used in a single 2.5 ml dose, injected into the peripheral forearm vein.

The injection speed was varied randomly and was carried out at three different rates. The injection was given as a bolus, over half a minute and slowly between 45 seconds to a minute.

The images were caught through a Kowa Retinal Camera VX 10 with the aid of a digital program (VK 3).

### ***Data Collection***

Adverse reactions that occurred during and after the angiography were registered in a standardized form by the anesthesiologist.

A special emphasis was given to the history of nausea and vomiting after the injection of the dye.

The timing of onset of nausea, its duration, associated vomiting and persistent nausea etc were recorded.

## **RESULTS**

A sample of 800 patients who were submitted to the fluorescein angiography for the first time was studied.

The mean age was  $58 \pm 16$  years and the median age was 60 years. Four hundred eighty eight (61%) patients were males and 312 (39%) were females.

The dye was injected as a bolus in 200 patients, and 300 patients were injected at a rate over 30 seconds & 300 were given the dye over a minute

The observations of the incidence of nausea and vomiting vis a vis the rate of dye injection were

Rate of Injection	Nausea	Vomiting
Bolus (200 patients)	39 (19.5%)	9 (4.5%)
Over 30 seconds (300 pts)	13 (4.3%)	2 (0.6%)
One minute (300 pts)	04 (1.3%)	1 (0.33%)

The retinal consultants were questioned about the difference in the quality of angiograms & the difficulty in diagnosis after the angiograms.

None of the retinal consultants had any specific problems with the angiogram quality.

In fact most of the angiograms gave a satisfactory image even when only 50% dye was being injected.

## **DISCUSSION**

In this study, the cumulative incidence of adverse reactions to dye injection was 9.5% in patients who were submitted to fluorescein angiography.

Mild reactions as nausea and/or vomiting occurred in 8.5% of the patients. In other studies, they ranged from 3% to 14% (4-7,9,10).

The pathophysiology of these effects involves the activation of chemical receptors in the vomiting nervous center located in the area postrema that function as primary detectors of emetic stimulation and induce vomiting through integration with vagal nerve or vestibular system (11).

Moderate and/or severe reactions as urticaria occurred in 1% of cases. Bronchospasm and laryngeal edema were not seen.

Other authors report frequencies of urticaria between 0.5% and 1.2% and of respiratory distress between 0.02% and 0.1% (4-8,10).

Gender did not show itself as a statistically significant factor for the presence of adverse reactions

The rate of injection of the fluorescein dye quite significantly governed the incidence of nausea & emesis.

Also the concerned retinologists were not specifically affected in the diagnostics by the rate of the injection of the dye.



# IS BOLUS INJECTION OF FLUORESCEIN DYE STILL NEEDED FOR FFA IN TODAY'S ERA?

A possible limitation of this study was the use of 25% fluorescein, while some of the studies used 10% fluorescein. However, in the literature, difference in the incidence or severity of adverse reactions between 10% and 25% concentrations (5,12) was not observed.

## **CONCLUSIONS**

The most common adverse reactions during fluorescein angiograms are nausea and vomiting (seen in about 8.5% of patients).

This can be easily avoided by reducing the rate of injection of the fluorescein dye. This slow injection reduces the rate of build up of the dye in the area postrema, where by reducing the incidence significantly. Also since it does not affect the diagnostic capabilities.

Nausea and vomiting if seen during the angiogram not only interferes with the angiogram but it also makes the patient very reluctant for a subsequent angiogram, even if it is very necessary.

By slowing down the rate of the dye injection the nausea and vomiting incidence can be reduced

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# DO'S AND DON'TS FOR PRACTICING A SAFE REGIONAL ANAESTHESIA

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It is expected that all patients undergoing eye surgery irrespective of anaesthetic technique should not suffer any ill effects from local anesthetic agents or from its techniques. Topical anaesthesia is considered much safer as it avoids many of the potential sight and life threatening complications of needle based orbital anesthesia. But topical anaesthesia requires surgical skill and also cooperation from the patient. Hence some of the ophthalmologists prefer to do the surgery under regional anaesthesia.

Globe perforation, damage to the optic nerve, persistent diplopia by direct injection of the anaesthetic into the muscle and potentially fatal consequences of local anaesthetic agents on the central nervous system are described in the literature following regional blocks.<sup>1-9</sup>

Analysis of the closed claims database of the American Society of Anaesthesiologists shows that eye blocks (retrobulbar and peribulbar) are the leading cause of claims compared with other peripheral nerve blocks, especially for closed claims with permanent disabling complications.

Therefore, to reduce or avoid the above mentioned complications occurring in regional anaesthesia certain **do's and don'ts** steps should be remembered while performing these blocks.

## THEY ARE HIGHLIGHTED BELOW:

- Confirm the eye to be operated upon
- A thorough history and detailed physical examination should be done in the preoperative preparation room
- Explain the procedure clearly to the patient in their native language
- Intravenous line should be started and IV Midazolam 0.5-1mg IV for sedation can be administered
- Monitors (ECG, NIBP and Pulse oximeter) should be connected.

Once the above mentioned preoperative steps is done, then one should proceed for the regional block

## SKIN INFILTRATION

Diluted local anaesthetic solution(1% lidocaine) can be infiltrated at the site of needle insertion using 30G needle to reduce the pain when needle is inserted transcutaneously.

## SITE OF NEEDLE INSERTION FOR THE INFERO-TEMPORAL QUADRANT INJECTION:

The Atkinson's or classical retrobulbar block<sup>10</sup> 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. Many complications have occurred following classical

retrobulbar block.<sup>4-7</sup> Shifting the entry site more laterally along the orbital rim may diminish

the likelihood of block-induced postoperative strabismus thought to be caused by injecting local anesthetic into the inferior rectus muscle. The classical retrobulbar block has now been superseded by a more modern approach to retrobulbar and peribulbar blocks. In the modern retrobulbar block, a 25-G, 31-mm long needle is inserted through the conjunctiva or skin in the inferotemporal quadrant as far laterally as possible below the lateral rectus muscle.<sup>11</sup>

## DIRECTION OF THE BEVEL:

The bevel of the needle should face the globe while entering into the intraorbital space. This reduces the chance of snagging the globe with the tip of the needle.

## DURING BLOCK:

The eye should be in primary gaze when the needle is in the intraorbital space. During regional block asking the patient to move the eye is dangerous, as movement increases the likelihood of vascular or optic nerve damage. The optic nerve will move downwards and outwards when the patient is turning away from the needle placed at the inferotemporal quadrant. Thus there is a high chance for the optic nerve sheath to get sheared away by the tip of the needle.



# DO'S AND DON'TS FOR PRACTICING A SAFE REGIONAL ANAESTHESIA

## **ASPIRATION:**

It is always important to aspirate before administering injection into the orbital space. Only after negative aspiration for blood local anaesthetic solution has to be injected.

## **RATE OF INJECTION:**

Inject local anaesthetic slowly at a rate of 1ml / 10 seconds. At this rate, stretch fibres in EOM are not activated and thus the pain perceived by the patient to injection of local anaesthetic is reduced.<sup>12</sup> Also, this slow injection prevents the retrograde spread of local anaesthetic solution when there is an inadvertent injection into the arterial system.

## **WITHDRAWING THE NEEDLE:**

Withdrawing the needle from the intraorbital space is as important as needle entering the same. To avoid any shearing of the globe, the needle should always be withdrawn along the line of insertion.

## **OCULAR COMPRESSION:**

Once the local anaesthetic solution is injected in the intraorbital space, both the intraorbital and intraocular pressure increases. A soft eye is preferred during cataract surgery, as in this state the vitreous phase will remain concave after lens extraction and minimize intra operative complications.<sup>13</sup> Hence to make the globe softer and to aid in the diffusion of the drug more uniformly massage of the globe is necessary. 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 risk of perforation as it helps the globe to retain the normal anatomical position and also creates sufficient space for supplemental injections to be given.<sup>14</sup>

## **SUPPLEMENTARY INJECTION**

Following adequate compression of the globe, the block should be assessed for analgesia and akinesia. If there is inadequate sensory nerve blockade, then supplementary injection should be given.

Akinesia may or may not be an essential criteria for performing the supplementary injection as it depends upon the skill of the surgeon and type of eye surgery to be performed. Supplementary block should be given at the medial peribulbar space, a relatively avascular space. A 26 G, ½' disposable needle is passed transconjunctivally in the blind pit, between the medial caruncle and canthus. With bevel facing the orbital wall, the needle is passed backwards in the transverse plane, directed at 5° angle away from the sagittal plane and towards the medial orbital wall. If the medial wall is contacted, the tip is slightly withdrawn and needle redirected to a depth of 15-20mm and after negative aspiration for blood, 3-5ml of local anaesthetic solution is injected.

After each injection adequate compression should be given and then adequacy of the block should be assessed. A thorough knowledge of the orbital anatomy, pharmacology of the local anaesthetic solution and training are essential for practicing safe orbital regional anaesthesia.

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## DO'S AND DON'TS FOR PRACTICING A SAFE REGIONAL ANAESTHESIA

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# OPHTHALMIC ANAESTHESIA – THE OPHTHALMOLOGIST’S POINT OF VIEW.

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Ophthalmology has undergone a paradigm shift in recent times – from diagnostic methods to surgical techniques; from therapeutic agents to surgical instruments. Ophthalmic anaesthesia, too has undergone a radical change and this in turn has shaped the future of ophthalmology in many ways. Karl Koller, the Austrian ophthalmologist was the first clinician to use an anaesthetic agent in the eye and with his demonstration of the anaesthetic properties of cocaine in 1884, he had changed the face of ophthalmology for ever. This article will cover the relevance of anaesthesia and newer anaesthetic techniques from the ophthalmologist’s point of view and how anaesthesia affects the outcome of ophthalmic surgery.

The ophthalmologist often takes the role of anaesthesia and the anaesthetist for granted, but this is surely changing. With the advent of techniques such as phacoemulsification, which forms a large proportion of all ophthalmic surgeries, ophthalmology has become a ‘day-care’ practice with more patients preferring ambulatory care as opposed to hospital admissions; quicker surgeries, increasing case volumes, and need to ensure quality control along with efficiency becoming the norm in ophthalmic practice. The days when ophthalmologists themselves would administer retrobulbar anaesthesia for all ophthalmic procedures are long gone and ophthalmic anaesthesia is rightfully getting its place. The quality of the anaesthesia directly affects the outcome of the surgery – both for the surgeon and the patient.

## CATARACT SURGERY

While a peribulbar or retrobulbar block may be the preferred technique for training ophthalmologists, newer techniques of ophthalmic anaesthesia for cataract surgery seem to be gaining acceptance worldwide. Phacoemulsification for cataract surgery appears to require more limited anaesthesia than traditional extra-capsular extraction, and is increasingly performed under topical anaesthesia. This appears to be generally safe and effective<sup>1</sup>. Recently intracameral anaesthetic agents have also come into vogue as well as the use of ‘visco-esthesia’ – where an ophthalmic viscosurgical device (OVD) incorporates an anaesthetic agent like lidocaine 1% for use in cataract surgery<sup>2</sup>.

While the ophthalmologist must keep abreast of recent advances in ophthalmic surgery, it is imperative that the training ophthalmologists also stay equally aware of newer anaesthetic techniques in ophthalmology which are better in terms of patient comfort and ease of administration. Choosing the appropriate mode of anaesthesia for cataract surgery is important, but that depends on level of training of the surgeon and the anticipated intraoperative problems, if any. Off-late, sub-Tenon anaesthesia has come into focus. Sub-

Tenon anaesthesia is an effective, well-tolerated technique for surgery in the anterior or posterior segments of the eye. The advantages of this block are comparable to those of peribulbar and retrobulbar anaesthesia and complications are minimal. Sub-Tenon anaesthesia provides better analgesia than akinesia and potential adverse effects are fewer than for other regional blocks and analgesia and akinesia are superior<sup>3</sup>.

An Indian study has showed that topical anaesthesia caused no pain at all in 98% and sub-tenon anaesthesia caused minimum or no pain in 92% during introduction of anaesthetic agent as opposed to peribulbar (42%) and two values were also statistically significant. Sub-tenon and peribulbar anaesthesia provided significantly more intra-operative akinesia as compared to topical, the rate of intra-operative complications was comparable in all the 3 groups<sup>4</sup>. This goes to show that even in situations where the expected surgical time is longer such as complicated cases or surgeries performed by trainees, sub-Tenon anaesthesia can be the preferred method due the level of akinesia and anaesthesia. In addition less anaesthetic solution and a shorter interval from administration to surgery was required in the sub-Tenon's group<sup>5</sup>. While sub-Tenon's anaesthesia may soon replace peribulbar anaesthesia for cataract surgery, it is widely believed by ophthalmologists that topical anaesthesia is the best form of anaesthesia in terms of ease administration and patient care. It is very interesting to note that there are very few studies comparing topical and sub-Tenon's anaesthesia. A large review which aimed at comparing the effectiveness of topical anaesthesia (with or without the addition of intracameral local anaesthetic) and sub-Tenon's anaesthesia in providing pain relief during cataract surgery provided a different perspective on things - Sub-Tenon



## OPHTHALMIC ANAESTHESIA – THE OPHTHALMOLOGIST’S POINT OF VIEW.

anaesthesia caused more chemosis and sub-conjunctival haemorrhage although this was purely aesthetic. The more serious complication of posterior capsule tear and vitreous loss occurred twice as much in the topical group than with sub-Tenon anaesthesia. However, Sub-Tenon anaesthesia provides better pain relief than topical anaesthesia for cataract surgery<sup>6</sup>. There is certainly growing evidence that Sub-Tenon block seems to be better than retrobulbar block and topical anaesthesia in patient satisfaction<sup>7</sup>.

### GLAUCOMA SURGERY

Ab externo trabeculectomy is the most common surgical procedure to treat glaucoma. Although glaucoma surgeries are usually performed using the traditional peribulbar technique, topical anaesthesia supplemented by conscious sedation is gaining popularity. One study investigating the efficacy and safety of using topical anaesthesia supplemented with conscious sedation for performing trabeculectomy found that topical anaesthesia associated with conscious sedation seems to be efficacious and safe and can be recommended for performing trabeculectomy<sup>8</sup>. Furthermore, a report comparing the long-term results of trabeculectomy surgery with subconjunctival anaesthesia versus topical lidocaine 2% jelly found that though small numbers observed, the 2 anaesthetic techniques did not seem to influence the long-term success of trabeculectomy surgery<sup>9</sup>. While there have been many published studies on the effectiveness of topical anaesthesia in trabeculectomy, it has also been reported that that topical anaesthesia was found to be not only less costly but also more effective than peribulbar anaesthesia in avoiding pain in non-penetrating deep sclerectomy<sup>10</sup>.

Given the demographics of open angle glaucoma and cataract, phaco-trabeculectomy is commonly performed to treat the co-existing morbidities. In this scenario too, despite the slightly increased surgical time, topical 2% lidocaine hydrochloride jelly without systemic is found to be a safe and effective anaesthetic method in phacotrabeculectomy for patients with primary open-angle glaucoma with coexisting cataract<sup>11</sup>. Complications of peribulbar anaesthesia can affect the outcome of glaucoma surgeries far more gravely than cataract surgery and hence the

shift from peribulbar anaesthesia to topical anaesthesia seems logical for glaucoma surgery. The management of these complications Elevated intraocular pressure that occurs with retrobulbar haemorrhage can compromise blood flow to the optic nerve in advanced glaucoma. In this situation immediate measures include intravenous administration of mannitol (1 g/kg body weight of 20% solution) and lateral canthotomy with lateral cantholysis. Surgery should be deferred till the complete absorption of haemorrhage<sup>12</sup>.

Vitreoretinal surgery conventionally takes longer than anterior segment surgery and hence the preference has been general anaesthesia or local anaesthesia and not topical anaesthesia. Conditions such as proliferative diabetic retinopathy often needs surgical intervention when it causes tractional retinal detachment. In these cases, it is obvious that that co-existing morbidities such as diabetes, hypertension and coronary heart disease may be present and hence the surgery must be performed in the least possible time and ensuring that the vitals are maintained within normal. However, not only are the intraoperative considerations to be borne in mind but also post operative pain management which is of relevance following vitreoretinal surgeries.

One of the most relevant questions in contemporary ophthalmic practice which is increasingly becoming a ‘day-care’ speciality - ‘Does the patient need to stop systemic medications prior to surgery?’ This is especially relevant and an important question when the patient is on anti coagulants. One survey found that even though a majority of surgeons did not stop warfarin or aspirin prior to glaucoma surgery, there is a great diversity in current practice with regard to the management of anticoagulant therapy prior to glaucoma surgery amongst glaucoma surgeons<sup>13</sup>.

While investigating the risk for intraoperative and postoperative bleeding associated with antiplatelet and/or anticoagulant treatment in patients having uneventful phacoemulsification, Kobayashi found that patients taking warfarin, aspirin, or both up to the time of phacoemulsification had a significantly higher incidence of subconjunctival haemorrhage than those who discontinued therapy. There was no significant difference in the



## OPHTHALMIC ANAESTHESIA – THE OPHTHALMOLOGIST’S POINT OF VIEW.

incidence of intraoperative and postoperative complications or in visual improvement<sup>14</sup>.

It is clearly necessary to strike a balance between the various risks. Konstantatos suggested the following: continue warfarin preoperatively and confirm that INR (international normalised ratio) is therapeutic; discuss with the patient the risks and benefits of continuing or stopping the anticoagulant; consider an alternative technique with a lower incidence of retro-bulbar haemorrhage, such as topical anaesthesia or sub-Tenon's block if it is acceptable to both the patient and the surgeon; if peribulbar/retrobulbar block is chosen, use a smaller, finer needle in the inferotemporal quadrant with surgeon standing by to decompress the eye if retrobulbar haemorrhage develops<sup>1,15</sup>. Recently it has been observed that there have been many studies which have questioned the need for pre-operative evaluation prior to cataract surgery.

In a landmark study published in the New England Journal of Medicine, the investigators randomly assigned 19,557 elective cataract operations in 18,189 patients at nine centers to be preceded or not preceded by a standard battery of medical tests (electrocardiography, complete blood count, and measurement of serum levels of electrolytes, urea nitrogen, creatinine, and glucose), in addition to a history taking and physical examination. Adverse medical events and interventions on the day of surgery and during the seven days after surgery were recorded. They concluded that routine medical testing before cataract surgery does not measurably increase the safety of the surgery<sup>16</sup>.

A Cochrane review also presented data which suggested that that routine pre-operative testing does not increase the safety of cataract surgery<sup>17</sup>. However, it is not easy to put this evidence into practice in the scenario of a developing country like India, where a patient presenting with proliferative diabetic retinopathy may be diagnosed with diabetes for the first time or central retinal artery occlusion be the presenting feature of previously undiagnosed hypertension. Medical practice is becoming litigious and one must ensure that the patient is thoroughly investigated prior to any surgical intervention, and an ophthalmic anaesthetist must deem the patient fit for surgery

before going under the knife. There is enough evidence to show that pre existing conditions such as diabetes mellitus can adversely affect the outcome of surgery: patients with diabetes mellitus were more likely to have endophthalmitis caused by gram-negative organisms and appear to have a poorer visual prognosis after treatment for endophthalmitis<sup>18</sup>.

The key, therefore lies in optimization of the patient's systemic condition and balancing the patient's graveness of the patient's systemic illnesses against the need and the urgency for the ocular surgery. This underscores the need for a specialist ophthalmic anaesthetist and a close link between ophthalmologist and anesthesiologist in order to ensure the most efficient, comfortable, and appropriate anesthesia for each individual patient and also a safe outcome<sup>19</sup>.

In conclusion, ophthalmic anaesthesia has evolved keeping pace with the developments in ophthalmology itself. Our understanding of peribulbar and retrobulbar blocks has advanced, and sub-Tenon's local anaesthesia has gained in popularity. As said by Venkatesan et al, 'There can be no substitute for sound training and clinical experience in maintaining quality and safety in ophthalmic anaesthesia'<sup>1</sup>. An ophthalmologist, simply cannot take anaesthesia for granted. In children, general anesthesia has an absolute indication, whatever the surgical procedure to be used. In adults, literature demonstrates that local anesthesia (retrobulbar or peribulbar)

is the most frequently used technique. There is a growing interest in topical anesthesia, which has brought many advantages, for glaucoma surgery (trabeculectomy, deep sclerectomy, aqueous shunt surgery and combined procedures). Choice among the different modalities of anesthesia has to be done according to various parameters based on both patient and surgeon point of view<sup>19</sup>.

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## OPHTHALMIC ANAESTHESIA – THE OPHTHALMOLOGIST’S POINT OF VIEW.

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