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From the Editor's Desk

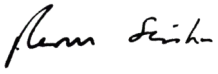
Dear Friends,

We are moving towards new normal life with face mask, having physical meetings, conferences and get together with family and friends. Corona pandemic taught us to be connected via virtual mode if real meeting is not possible. I am pleased that Association of Indian Ophthalmic Anaesthesiologists, AIOA is organizing 2nd National Conference of Indian Ophthalmic Anaesthesiologists Conference at Aravind Eye Hospital, Madurai on 24th and 25th September 2022. All members are invited for this academic feast.

Ophthalmic anaesthesia contribution in the mission of VISION FOR ALL is immense. However, an anaesthesiologist should be aware that vision impairment could be due to many factors other than eye disease or eye injury. In this issue, a review on postoperative vision loss after non-ocular surgery will provide an insight on causes, management and precautions to avoid it. In each hospital, an audit is necessary to review the progress of existing policies and also to know the impact of new policies. A brief communication on clinical audit will give insight about aims, documentation as well as implementation of audits in a hospital.

Ophthalmic department in bigger institute has trained staff along with advance equipment and facilities. In contrast in remote places, it's a challenge to setup any facility. An anesthesiologists perspective for an eye facility setup in remote area are highlighted in this issue. Regional blocks provide excellent anaesthesia for surgeries. Ultrasound has been extensively used to visualize nerves, vessels and surrounding structures for regional blocks. Ultrasound guided ophthalmic blocks, it's uses, future scope and limitations are mentioned in the issue. Eyelid surgeries can be performed with infiltration of local anaesthetics. This issue is providing tips to ensure a safe eyelid infiltration. Medicolegal cases are not new to all of us. Importance of proper pre-anaesthetic evaluation, documentation, communication and conduct of anaesthesia are discussed along with review of some court judgements.

With warm regards



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Indian Journal of Ophthalmic Anaesthesia

The Official Journal of Association of Indian Ophthalmic Anaesthesiologists

Narrative Review

Post-operative Vision Loss (POVL) Following Non-ocular Surgery

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Abstract

Post-operative vision loss (POVL) following non-ocular surgery is a serious complication whose causes are still unclear, although various postulated factors are considered based on published literature. POVL is a rare complication of non-ocular surgery that can occur as a result of injury to any of the visual pathways' several components. Except for mild corneal abrasions that are uncomplicated, an urgent ophthalmology consult is essential. Except for corneal abrasions, the majority of causes of POVL can result in irreversible vision loss. All patients receiving general anaesthesia should have their eyes covered with bandages that keep their eyelids closed to avoid corneal damage. Patients should be positioned so that there is no pressure on the globe. Following POVL, acute evaluation should include a determination of discomfort, visual impairments, and the pupillary light reflex. Inform patients who are scheduled to undergo protracted spine surgery in the prone position, with or without significant blood loss, about the possibility of POVL. Maintain periodic eye examinations throughout the surgical procedure to avoid putting direct pressure on the globe. In high-risk patients, monitor blood pressure with an intraarterial catheter to allow for beat-to-beat monitoring, volume status evaluation, and frequent laboratory sampling. Maintain mean arterial pressure as close to preoperative baseline as possible to optimise perfusion to the spinal cord, optic nerve, and other visual system structures. As a result of the high number of malpractice lawsuits filed against POVL practitioners, access to case reports is restricted for the general population.

Key Words: ischemic optic neuropathy, non-ocular surgery with vision loss, post-operative vision loss.

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Introduction

Post-operative vision loss (POVL) during non-ocular treatment is a catastrophic consequence following surgery under general anaesthesia. There is a variability in the reported incidence of POVL, which ranges from 0.056 to 1.3 per cent,[1] depending on the available literature. Coronary angioplasty (occurrence 0.09%)[2] and spinal angioplasty (incidence as high as 0.2%)[3] are the surgical procedures that pose the most significant risk for POVL. In addition to ischemic optic neuropathy (ION) and causes like central retinal artery occlusion (CRAO), and cortical blindness, other aetiologies include corneal abrasion. Strong evidence indicates that the incidence of POVL is growing, which may be related in part to an increase in the number of spinal surgeries requiring fusion.[3]

Risk factors

Impairment of vision has been strongly associated with male sex, hypotension, extended duration of procedures/surgeries, a requirement of the prone position, and a decreased use of colloids, among other factors. A few modifiable risk factors are obesity, cardiovascular disease, hyperlipidaemia, diabetes mellitus, and tobacco use. Risk factors for POVL after cardiac surgery include low post-operative haematocrit, presence of clinically significant vascular disease, long duration of cardio pulmonary bypass, red cell transfusion, use of other blood components.

Incidence

POVL is a rare complication of surgery, having a higher incidence following cardiac, spine, head and neck, and some orthopaedic procedures than after other treatments. The majority of the information comes from retrospective investigations and case series. Non-ocular operations result in 5.4 per 10,000 cases of transitory POVL and 0.16 per 10,000 cases of permanent POVL.[4] POVL lasting more than 30 days was seen in 4.3 out of 10,000 patients undergoing noncardiac procedures and in 0.08 out of 10,000 patients undergoing cardiac procedures.[5, 6] Incidence of POVL in various procedures is summarised in Table 1.

Table 1 Incidence of POVL in various procedures [4]

Sno.	Type of procedure /surgery	Incidence
1	Appendectomy	0.12 per 10,000
2	Knee surgery	1.08 out of every 10,000
3	Hip surgery	1.86 out of every 10,000
4	Laminectomy without fusion	0.86 per 10,000
5	Spinal fusions	3.09 per 10,000 of all fusions, 0.66 per 10,000 for anterior approach exclusively, and 5.50 per 10,000 for posterior approach
6	Cardiovascular surgery	8.64 per 10,000

Diagnosis of POVL

When a patient complains of vision loss, they should seek immediate ophthalmologic attention to devise an accurate evaluation, diagnosis, and treatment plan as quickly as possible to preserve as much eyesight as feasible. It has been suggested that patients undergo a gross vision screening for each eye as soon as feasible following emergence from anaesthesia for procedures linked with a high risk of POVL, such as cardiac procedures, prone spine surgery, head and neck surgery, hip/femur surgery and long duration surgeries.[7,8]

Eye Symptoms

a) Pain - Eye pain, particularly when accompanied by a foreign body sensation, is indicative of corneal abrasion. Eye discomfort can also arise as a result of acute glaucoma or retrobulbar hematoma, both of which are considered ophthalmologic emergencies. Pituitary apoplexy, acute angle-closure glaucoma, and posterior reversible encephalopathy syndrome (PRES) usually present with headaches.

b) Red eye- The most common causes of a red eye are acute angle-closure glaucoma and corneal abrasion, but it can occur in other conditions.

c) Unilateral or bilateral loss of vision- In the case of CRAO, anterior and posterior ischemic optic neuropathy, damage to the intracranial visual pathways, and retro bulbar hematoma, can cause complete vision loss (either unilateral or bilateral) or visual field deficiency may ensue.

d) Blurring of vision or presence of halos- Symptoms of acute angle-closure glaucoma can include intermittent blurring of vision and the presence of halos. Transient blurred vision is most commonly associated with glycine-induced visual loss, but it can also occur as a result of corneal abrasion.

Examination findings

Pupillary reflexes-

1. A poor or absent direct pupillary response to light in one pupil with a normal response when light is directed to the other pupil ("indirect" response) is observed in patients with unilateral CRAO, ischemic optic neuropathy, and retro bulbar hematoma and this "relative afferent pupillary defect" is revealed by the swinging flashlight manoeuvre.

2. If these processes are bilateral, there will be poor or absent direct pupillary responses and a normal response when light is flashed.

3. In patients with acute angle-closure glaucoma, mid-dilated and nonreactive pupils are noted, whereas in those who have experienced glycine-induced visual loss, sluggish to fix and dilated pupils are seen.

4. In cases of corneal abrasion, cerebral or cortical vision loss, and in cases of PRES, the presence of pupillary light responses is not abnormal.

Expert opinion

The ophthalmologist's evaluation typically includes a review of the patient's medical history, perioperative events, ocular complaints, and an eye examination that includes testing for visual acuity,

colour vision, pupillary light reflex, visual field, slit-lamp bio microscopy, intraocular pressure measurement, and a dilated funduscopic examination unless acute glaucoma is suspected. Further diagnostic testing may be performed based on the findings, and may include computed tomography (CT) or magnetic resonance imaging (MRI) of the head and orbits, with particular attention paid to the visual pathways to screen for infarctions, haemorrhages, and pituitary apoplexy; visual evoked potentials to evaluate optic nerve and visual pathways function, and electroretinography (ERG) if there is any concern about retinal function (as with glycine toxicity).[1,5,6,7,8]

Table 2- Summary of commonly identified causes of POVL

Sno.	Causes	Pathophysiology/mechanism	Clinical presentation	Prevention
1	Abrasion of the Cornea	Inhibition of corneal reflex decreased tear production	Transient blurry vision, tearing, redness, photophobia, foreign body sensation	Artificial tears, antibiotic ointment, eyelid tape, padding eyes
2	Ischemic Optic Neuropathy	Increased intraocular pressure and ophthalmic vein congestion	painless and progressive deterioration of vision can progress to complete blindness	Early diagnosis and management by an ophthalmic expert
3	Occlusion of the Central Retinal Artery	Emboli and direct pressure on the globe	Unilateral or bilateral loss of vision	Vasodilators, ocular massage, and thrombolytic drugs
4	Cortical Blindness	Ischemia or extreme hypoperfusion of occipital lobes	Deteriorating or complete loss of vision	Maintenance of haemodynamic, staged procedures to avoid long duration
5	Traumatic optic neuropathy	Indirect injury to the optic nerve due to intra-orbital haemorrhage, vascular insufficiency, or a nerve sheath injury	Total loss of vision	Immediate decompression of the optic nerve
6	Glycine induced acute transient POVL	Glycine induced decrease in impulses from the retina to the cerebral cortex	Transient blurring or blindness	Techniques to reduce absorption of irrigation fluid
7	PRES after Eclampsia	Preeclampsia toxaemia or eclampsia	Loss of vision or blurring, headache, seizure, altered mental status	Antihypertensives, antiseizure medications
8	Vision Loss After Spine Surgery	External ocular injury (corneal abrasion or sclera injury), acute glaucoma, cortical blindness, retinal ischemia	Loss of vision	Application of lubricants and covering the patient's eyes over closed lids

Abbreviations POVL- post operative vision loss, PRES-Posterior reversible encephalopathy syndrome

Various aetiologies of POVL

1. Abrasion of the Cornea

Causative mechanism

Corneal abrasion caused by general anaesthesia is a result of decreased corneal protection caused by inhibition of the corneal reflex and decreased tear production. Longer surgical procedures and prone or lateral positions during surgery have all been demonstrated to increase the chance of this complication.

Prevention of corneal abrasion

Administrations of artificial tears and antibiotic ointment are typically used in the treatment of CA. Although no intervention is effective in protecting CA during surgery, eyelid tape is the most widely utilised and most effective protection technique. It has been demonstrated that proper placement of eyelid protection can reduce the incidence of CA. While using Mayfield headrest in prone position, proper padding should be used and head position should be carefully examined to avoid pressure over eyes.

2. Abrasion of the Cornea

ION is the most prevalent cause of permanent POVL after non-ocular surgery, accounting for around half of all cases. According to the American Spine Society's Postoperative Visual Loss Registry, ION is responsible for 89% of perioperative vision loss in spine surgery, with posterior ION (PION) accounting for 60%.[7,8]

Causative mechanism

Intraocular pressure (IOP) is increased by lying prone or in the Trendelenburg position during a long surgery, resulting in ophthalmic vein congestion and, in certain circumstances, ION and permanent POVL. A typical manifestation is a painless loss of eyesight after awakening from anaesthesia in the prone position. The presence of anaemia and hypotension is detected in these patients; nevertheless, the specific mechanism by which the ischemia occurs is still a mystery to researchers. However, despite identifying predisposing factors, no single causative mechanism for ION can explain the genesis of the condition in all surgical situations. A case study reported by Quraishi et al. 8 demonstrated that regulating haemoglobin, haematocrit, and systolic blood pressure to adequately maintain ocular perfusion in a patient diagnosed with PION resulted in improved eyesight after surgery in a PION patient. According to Hassani et al9, providing recombinant human erythropoietin after a 6-hour surgery that resulted in severe blood loss reverses the consequences of PION.

Corrective and preventive action

The patient should have a complete physical examination as soon as they discover even minor changes in their eyesight because the feasibility of POVL treatment options tends to deteriorate with time.

3. Occlusion of the Central Retinal Artery

Although it accounts for a small proportion of POVL patients, CRAO ranks as the second most common cause related to spinal surgery. According to the American Spine Association's POVL registry, CRAO is the aetiology of POVL in 11% of all spine surgery cases.

Causative mechanism

Embolism and direct compression of the globe are two conditions that are typically related to CRAO. CRAO, in contrast to PION, exhibits itself more frequently in a single manifestation. Prone-positioned surgery increases the risk of CRAO because the weight of the head against the headrest causes external ocular compression, which can cause vision loss.

Corrective and preventive action

If CRAO is treated within 6 hours, it is considered reversible. A variety of therapies, including vasodilators, ocular massage, and thrombolytic drugs, are effective in alleviating the visual impairments induced by CRAO, but their effectiveness in ION has been inconsistent.10

4. Cortical Blindness

Cortical blindness has been found as the third most common cause of POVL in non-ocular surgical patients. CB is a vision loss produced by ischemia or significant hypoperfusion of the occipital lobes. It is a rare condition that can present as bilateral vision loss ranging from partial to complete loss of vision on one side of the face.

Stroke (32%), heart surgery (20%), and cerebral angiography (12%) account for the majority of occurrences of cortical blindness.

Causative mechanism

Anaesthesia duration, blood loss, position during surgery, and fluid administration are all crucial considerations to consider during the surgical procedure. According to the American Society of Anaesthesiologists' POVL Registry data between 1999 and 2012, 94 % of ION cases stemmed from operations conducted under general anaesthesia for 6 hours or more.[11]

Corrective and preventive action

According to the American Society of Anaesthesiologists' Practice Advisory, the head of patient should be positioned at the same level or higher than their heart and kept in a neutral forward position whenever possible to lower IOP and avoid POVL from forming. To lessen the impact, it has been suggested that procedures needing long-duration anaesthesia be staged over a period. The patient should be advised of the risks associated with staging when compared to prolonged anaesthesia if this sort of procedure is to be utilised in the first place.

5. Traumatic optic neuropathy

Causative mechanism

Traumatic optic neuropathy commonly occurs due to indirect injury to the optic nerve due to intra-orbital haemorrhage, vascular insufficiency or a nerve sheath injury. Direct damage to the optic nerve during dissection and insertion of implant

materials can also occur. Although rare, post-operative traumatic optic neuropathy is a potentially serious complication. Total loss of vision can occur secondary to optic nerve contusion or compression due to hematoma, ischemia or direct bone fragment penetration of the optic nerve.[12]

Corrective and preventive action

This requires immediate decompression of the optic nerve and but high doses of corticosteroids is controversial.

6. Glycine induced acute transient Post-operative visual loss

Glycine is sometimes used as an irrigating fluid during transurethral resection of prostate surgery. Plasma glycine concentration of 5–8 mmol/L causes visual disturbances.

Causative mechanism

Glycine, an inhibitory neurotransmitter in the retina, slows down the impulses from the retina to the cerebral cortex resulting in prolonged visual evoked potentials and absent oscillatory potentials on the electroretinogram.[13] This causes transient blindness, which usually resolves within 24 hours.

Corrective and preventive action

Volume overload and electrolyte abnormalities should be corrected along with necessary supportive care. Bipolar cautery will allow the use of another irrigant such as normal saline, sorbitol/mannitol. Techniques to reduce absorption of irrigation fluid should be employed i.e. operative time less than 60 minutes, low-pressure irrigation, and limited trendelenburg position. Intraprostatic vasopressin injection can cause vasoconstriction and minimise open dilated vessel fluid absorption. Laser or holmium laser technique may be utilised to minimise bleeding and absorption of irrigant. If ≥1000 mL of irrigant is absorbed, the procedure should be halted.

7. PRES after Eclampsia

Causative mechanism

Preeclampsia toxaemia or eclampsia is one of the leading causes of Posterior reversible encephalopathy syndrome (PRES). In PRES associated with PET/eclampsia, Ophthalmic disorders include cortical blindness, central retinal artery and vein occlusions, serious retinal detachment, retinal or vitreous haemorrhages, and ischemic optic neuropathy Purtscher-like retinopathy. Timely diagnosis and treatment are of great importance for a reasonable prognosis of the disease since any delay in this regard can lead to permanent neurological deficits and other complications.[14]

Corrective and preventive action

Treatment includes antihypertensives, mannitol for reducing cerebral oedema, antiseizure medication and magnesium sulphate for managing preeclampsia or eclampsia.

8. Causes of Vision Loss After Spine Surgery

Causative mechanism

POVL after spine surgery could be due to

external ocular injury (corneal abrasion or sclera injury), acute glaucoma, cortical blindness, retinal ischemia or could be IONs whose subtype, PION is most frequently associated with lumbar operations and hence LION (Lumbar ION).[15]

Corrective and preventive action

Corneal injuries can be prevented by applying lubricants and covering the patient's eyes with gauze over closed lids before positioning.[16] The manoeuvres that decrease the chances of embolisation can prevent cortical damage.[17] CRAO can be prevented by avoiding compression of the globe and avoiding pressure by anaesthetic face masks. In prone position, a foam headrest should be used and eyes should be appropriately placed in the opening of the headrest; the position of the head and the eyes should be checked intermittently by palpation or visualisation. The horseshoe headrest (Mayfield) for the prone-positioned warrants caution. For the patient, positioned prone for cervical spine surgery, this headrest should not be used as the surgeon has a greater chance of head movement, leading to compression of the eye.

ASA practice advisory

Inform patients undergoing long-term spine surgery about the possibility of significant blood loss and the rare but unpredictable risk of POVL. Systemic blood pressures must be monitored, and deliberate hypotension should be avoided.[18] Staging of surgical operations, lengthy procedures (> 4 h), and significant blood loss (> 800 ml) increase the risk. It may be useful to position the head equal to or higher than the heart and to employ antiplatelet medicines, steroids, or intraocular pressure-lowering medications.

Patient evaluation and preparation prior to surgery

1. Thorough review of the patient's preoperative history and examination to identify patients who have preoperative anaemia, vascular risk factors (e.g., hypertension, diabetes, peripheral vascular disease, coronary artery disease, previous stroke, carotid artery stenosis), obesity, or tobacco use should be done.[18]

2. Patients should be advised that certain preoperative factors may enhance their risk of POVL during spine surgery. These individuals include but are not limited to, those who are male, obese, have risk factors for vascular disease such as hypertension or peripheral vascular disease, or have diabetic retinopathy.

3. Inform patients scheduled for extensive operations, significant blood loss, or both, that there may be an elevated risk of POVL.

4. Determine on a case-by-case basis whether or not to advise patients who are not thought to be "high-risk" for visual loss.[18]

Intraoperative conduct of anaesthesia

Intraoperative management includes blood pressure control, fluid and anaemia management, vasopressor use, patient positioning, and surgical process staging.[18]

Blood Pressure Control

Blood pressure control in high-risk patients

is determined by various patient variables, including the existence of persistent hypertension, cardiac dysfunction, and renal and vascular illness before surgery. Additionally, other intraoperative factors affect blood pressure management, including fluid management, rate of blood loss, hypotension, and the administration of vasopressors. In high-risk patients, systemic blood pressure should be monitored continuously. The Task Force believes that there is no evidence linking the use of purposeful hypotensive procedures during spine surgery to the development of perioperative vision loss. As a result, the appropriateness of using purposeful hypotension in these individuals should be decided individually. [18]

Intraoperative Fluid Management.

The available literature is insufficient to determine the link between intravascular volume monitoring and the occurrence of vision loss in spine surgery patients (Category D evidence).[18] Although large amounts of crystalloids have been associated with increased intraoperative ocular pressure, periorbital oedema, and double vision in patients undergoing cardiopulmonary bypass, the research on these concerns in spine surgery patients is inadequate (Category D evidence). In high-risk individuals, central venous pressure monitoring should be explored. Colloids should be administered in conjunction with crystalloids to maintain intravascular volume in patients who have experienced significant blood loss. [18]

Anaemia Management

There is inadequate information to determine the efficacy of intraoperative anaemia control during spine surgery (Category D evidence).18 Haemoglobin or haematocrit levels should be evaluated on a regular basis during surgery in high-risk patients who lose a significant amount of blood.[18]

Utilisation of Vasopressors

There is insufficient literature to evaluate the long-term usage of high dose adrenergic agonists during spine surgery (Category D evidence). As a result, the use of adrenergic agonists should be determined on a case-by-case basis.[18]

Positioning of the Patient

Direct pressure on the eye should be avoided to limit the risk of CRAO and other ocular injuries. Consultants and members of all specialised societies concur that using a horseshoe headrest may increase the risk of ocular compression and perioperative CRAO. They all agree that prone-positioned patients' eyes should be checked and documented frequently. Additionally, they all agree on the prevalence of perioperative facial oedema in high-risk patients.[18]

When possible, the high-risk patient should be positioned so that the head is level with or slightly higher than the heart. When feasible, the head of the high-risk patient should be kept in a neutral forward position (i.e., without substantial neck flexion, extension, lateral flexion, or rotation).

Surgical Procedures Staging

Most patients who develop perioperative ION during spine surgery undergo lengthy operations with significant blood loss while lying prone. The consultants and specialised society members believe that lengthy operations should be staged.

While doing staged spine surgery in high-risk patients may result in higher costs and hazards to the patient (e.g., infection, thrombosis, or neurologic injury), it may also help to reduce these risks and the risk of perioperative vision loss in some patients. As a result, phased spine surgeries should be considered in high-risk individuals.

Post-operative Management

If there is any doubt about the possibility of visual loss, an urgent ophthalmologic consultation should be sought to ascertain the cause. Additionally, haemoglobin or haematocrit readings, hemodynamic state, and arterial oxygenation may be optimised. Consider MRI to rule out intracranial causes of visual loss. In high-risk patients suspected of having ION, haemoglobin or haematocrit levels should be elevated, blood pressure increased, and oxygen supplied. In high-risk patients, utilise purposeful hypotension only when the anaesthesiologist and surgeon concur that it is necessary despite using other methods to limit bleeding.[18]

Medico legal aspect/ Informed consent

Because of the variety of aetiologies of POVL and the limited success of current treatments, it is appropriate to consider disclosing information about POVL before surgery. Informed consent is one means of achieving this level of information disclosure. Salgo v Stanford (1957) was the first case in which the term "informed consent" was used, and the court decided that informed consent should include making patients aware of all potential dangers, advantages, and alternative therapies before undergoing surgical or anaesthetic operations. Based on one survey conducted in 2011 it was discovered that out of 437 patients receiving spine surgery at the Mayo Clinic in Florida, 80 percent wanted a full disclosure of the dangers associated with POVL. Patients may also be advised regarding the occurrence of POVL, risk factors that are both modifiable and non-modifiable, and preventative techniques that do not eliminate the possibility of acquiring POVL during the informed consent procedure.[19]

Conclusion

As a result of the low prevalence of POVL and the accompanying scarcity of published information, little is known about this potentially fatal complication. Acute evaluation should include a determination of discomfort, visual impairment, and the pupillary light reflex. Inform patients who are scheduled to undergo protracted spine surgery in the prone position, with or without significant blood loss, about the possibility of POVL. Maintain periodic eye examination throughout the surgical procedure mainly to avoid any direct pressure over the globe. POVL should be assessed immediately by an ophthalmologist to determine the cause and initiate treatment. Measures such as maintaining normal hemodynamic, elevating the operating table's headrest in high-risk patients reduce IOP and increase eyeball blood circulation, hence assisting in preventing POVL in high-risk surgeries. Preventive treatments include proper posture on soft or Mayfield supports and periodic eye examination during the surgical operation.

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Conflicts of interest

There are no conflicts of interest.

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Brief Communication

Clinical Audit

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Introduction

Clinical audit is a key component of the clinical governance framework in an Eye Care Organisation (ECO).[1] It allows organizations to continually work towards improving quality of care by showing them where they are falling short, allows them to implement improvements, and re-audit or close the audit cycle to see if beneficial change has taken place.[2] It provides an opportunity to benchmark their services against the good clinical practice guidelines endorsed in evidenced based medicine. The clinical audit can be a pilot study in nature with either retrospective or prospective design. The organization needs to take care to differentiate clinical audit from research projects, see Table1.[3,4]

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Research	Clinical Audit
May involve experiments based on hypothesis	Audit never involves experiments and involves measuring against preexisting standards /guidelines
Systematic investigation	Systematic review of current practice
Involve Random allocation	Never involve random allocation
Could be new treatment	Never involves a completely new Rx
Creates new knowledge about effectiveness of Rx approaches	Answer the question "are we following best practices?"

Definition

Clinical audit is a quality improvement process that seeks to improve patient care and outcome through systematic review of care against explicit criteria and the implementation of change.[5,6]

Aim

To measure the gap between ideal practice (determined from evidence/guidelines) and actual practice. Critical analysis of skills (self-improvement) and the system that delivers patient care (environment).[7]

The Clinical Audit Cycle

It can be described as a cycle that follows a systematic process of establishing best practice, measuring care against explicit criteria, taking action to improve care and monitoring to sustain improvement.[8]

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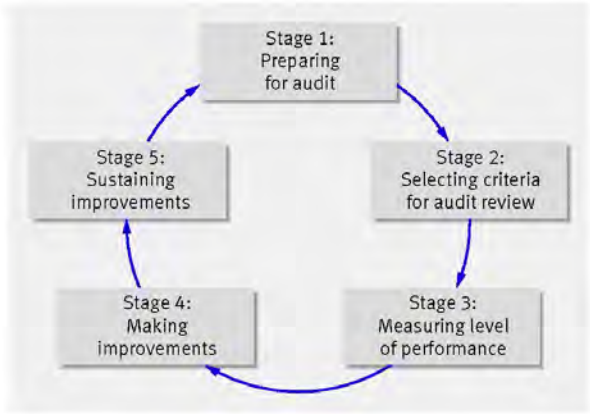
Different stages involved in Clinical audit, see Figure 1.



Stage 1. Preparing for audit and selection of topic

- Project management includes topic selection, planning, resources and communication
- Project methodology includes design, data issues, practicality, stakeholder involvement and provides support fo local improvement.
- Selection of audit team-Multi disciplinar team including doctors, optometrists nurses, pharmacists and hospita administrators.

Audit components

The quality of eye / health care provided ca be audited by examining three interrelated components - structure, process, outcome.5

Structure: Physical attributes of health care, the setting and resources required.

- Environmental Factors (Physical Space)
- Personnel (adequacy, skill)
- Equipment (safety and calibration), medical records (completeness)

Process: Care given by a practitioner / service

- Actions and decisions taken by clinical practitioners together with users

Examples: Red eye management, post-operative pain management.

Outcome: Changes in patient's current and future vision / health status as a result of intervention.

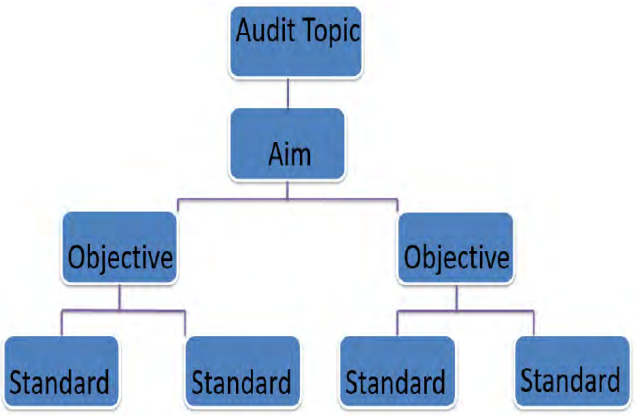
- Describe effectiveness of care

Example: visual outcome after cataract surgery, eye pressure control.

Choosing an Audit topic

- Topic should be well defined, focused and amiable to standard setting.
- It can be local clinical concern or known wide variance in clinical practice.
- It can be a any good-practice guidelines / algorithm issued by a professional or governmental body
- It can be on any sources of information like voice of customer (VOC) –feedback, critical/adverse incident reports, direct observation of care etc.

Stage 2: Selecting Standard Criteria see Figure 2



Defining The Aim/Purpose: Once the topic for the clinical audit has been selected, the purpose or aim of the project must be defined, so that the suitable audit method can be chosen. The aim can be written as a statement about what you want to be happen as the result of the audit.[5]

The following series of verbs may be useful in defining the AIM of an audit.

- To improve
- To enhance
- To ensure
- To increase

Define The Objectives: Objective is the steps that need to be taken in order to assess whether or not the aim has been achieved. The objectives can be different aspects of quality that the project will address.

The Clinical audit project focuses on

Appropriateness- right treatment provided to right patients

Timeliness- treatment provided on time

Effectiveness- was the treatment given in the right way

Each AIM can have 2 objectives

Setting Standards: A standard is an explicit criteria statement describing the quality of care to be achieved, which is objective, definable and measurable. To be set prior to study. Each objective should have two standards.5

Standard = Target + Criterion

(% to be achieved) [Statement of what is being measured + Yardstick (Measurement boundary)]

Target: is expressed as a percentage and defines the level of performance considered acceptable and practical in relation to the chosen criterion.

Criterion: Sure aspect of care that can be used to assess quality.

Yardstick: Indicates the boundaries of the measurement (eg: time frame)

Exceptions/Exclusion is the justifiable reasons for not proving the level of care specified.

Example: Topic: Code Blue Drill / CPR mock drill.

AIM: To improve the resuscitation preparedness during code blue drill.

Objectives:

1.To ensure the timely initiation of CCLS

Standards

1. a. In 100% of the code blue drills a member of the rapid response team in each floor will initiate chest compression within 1 min from collapse.

1.b. In 100% of the code blue drills. The code blue team with defibrillator will arrive within 2 mins.

2.To ensure the steps of CCLS algorithm are appropriately executed.

Standards

2 a. In 100% of the code blue drills. The sequence of resuscitation steps shall be documented in Real-Time.

2b. In 100% of the code blue drills. The variations in code blue mock drill shall be analyzed and CAPA implemented within 2 weeks.

Stage 3 Measuring the Level of Performance

Plan data collection based on inclusion criteria with any exceptions noted. The time period of the clinical audit study depends on the number of cases treated on daily basis and the number needed to make a confident judgment of care provided.5

Sampling-with scientific approach. Process based clinical audit projects usually involve "snapshot "sample of roughly 20-50 cases.

Type of Data Analysis is to be identified at an early stage, as it influences both the type and amount of data collected.

Comparing with Standards Set

The final part of the analysis will entail calculating the percentage of cases meeting and not meeting each standard. Discussion with colleagues about specific cases may

highlight some situations in which it is considered clinically acceptable for standards not to be met.

Interpretations

a) Deficiency of care recognized

b) Specific solutions are proposed.

c) Education impact is appreciated

d) Planned programme for change

e) All staff are involved

f) Active feedback

g) Audit is evaluated

Stage 4. Making Improvements

Communicating the Findings: The first in making improvements is communicating the findings to relevant stakeholders. A combination of passive feedback (written information) and active feedback (discussion of findings) is preferable when communicating the findings of the report.5

Action plan components (Kipling Method-5W's and 1H)

- **Who** needs to take these actions
- **What** needs to change
- **When** the proposed actions will begin
- **Where** change could be achieved
- **Why** change is necessary
- **How** these actions will be monitored for effective implementation

Clinical audit is recognized as an effective means of changing clinical practice to bring about improvements in patient care, management and outcome.11

Clinical audit report - Basic content

1. Title page/slide – Name of the organization, project title, project leads, date of report
2. Background - evidence base
3. Aim, objective and standards-overall purpose, individual steps and quantifiable statements
4. Methodology- population, sample size, prospective or retrospective, time period, data collection method
5. Results- to be presented
6. Conclusions- list key points that flow from the results
7. Action plan- the recommendations after presentation to be either accepted or revised. If required re-audit to confirm improvement
8. References- literature/source of evidence
9. Appendices- a copy of the data collection form to be included in appendix.

Stage 5. Sustaining Improvements

- Monitor and evaluate the change.8,12
- Maintain and reinforce the change

–Reinforcing or motivating factors built in by the management to support the continual cycle of quality improvement

–Integration of audit into the organization wider quality improvement systems

–Strong leadership

The benefits of Clinical audit to healthcare professionals, patients and organization are highlighted in Table 2.

HEALTH CARE PROFESSIONALS	PATIENTS	ORGANIZATION
Workable standards	Improves quality care & service	Improved care of patients
Resolves problems	Prompt changes in delivery of care	Enhanced professionalism of staff
Improves team work & communication	Highlights precise patient needs	Efficient use of resource
Increases knowledge & skills	Involves patient in decision making	Aids in continuing education
Identify Training need	Raises patients confidence in service & care levels	Aids in administration
Measure quality in current practice	Clarity about care and risks involved	Accountability to those outside the profession

Conclusion

- Clinical audit is not just a data collection exercise
- Involves measuring current patient care and outcomes against explicit audit criteria/standards
- Expected to improve practice with evidence.
- Document clinical audit report
- Implement action plan
- Reaudit to confirm improvement.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Brief Communication

Challenges in an isolated remote eye setup- A bird's eye view from an anaesthesiologist perspective

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Among the most frequent surgical eye disorders in India are squint and cataract among the paediatric and elderly age group respectively, and both age groups have distinct physiologies. The difficulties encountered by an anaesthesiologist in an isolated eye setup may stem from ophthalmic hospital (single specialty) setup, ophthalmologic operation theatre setup, systemic condition of the patient, eye condition, prerequisites condition for eye surgery, regional block related difficulties, lack of proper/standard training for practise in regional block, high-volume cataract surgeries and setup, etc.

In remote setup, there may not be a designated post-anaesthesia care unit, thus patients may need to be monitored in the operating room (OR) itself, until they are fully recovered. Situations such as anaphylaxis, seizures caused by local anaesthetic toxicity, and negative pressure pulmonary oedema imply that patients may be placed on ventilators and require specialised ICU equipment that may not be available with remote access or stand-alone eye setups. It is possible that a patient may have to wait longer for a referral to a higher centre due to a lack of transportation or an ambulance.

Another problem we confront as anaesthesiologists is the relative lack of advanced monitoring. While such advanced monitoring is rare, it may be necessary in elderly high-risk patients, particularly those with heart diseases or valvular abnormalities. Lack of trained anaesthesia technicians and frequent shifts between the OR and wards can be a difficult condition in remote setups where people are reluctant to work.

In single speciality practise, physicians may conduct preoperative assessment in the anaesthetic clinic two to three days before surgery. Patients travel further from the eye hospital if they require a specialist's opinion or extra investigations, in contrast to a multispecialty hospital. It is tricky for the accompanying physicians and anaesthesiologist to explain the importance of such specialised tests to patients. Not only is it time-consuming, but it also costs them extra.

Thus, lack of available specialists such as cardiologist, paediatrician, neurologist, nephrologist, etc.

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is one of the major impediments an anaesthesiologist faces during preoperative assessment in a single specialty ophthalmic hospital. There may be a dearth of facilities for conducting specialised examinations like echocardiography.1 There may be scenarios of uncontrolled HT, bronchial asthma, and uncontrolled diabetes. Multiple co-abnormalities, such as VSD, TOF may co-exist with congenital cataracts and may require an expert anaesthesiologist and a backup of cardiac facilities in case of complications or mishaps.

Similarly, in the event of a complication or unpleasant occurrence during eye surgery, anaesthesiologists can offer both basic and advanced life support during the golden hour, but they must be moved by ambulance to a nearby multi-specialty hospital for further management. Furthermore, some patients believe that revealing symptoms or signs such as chest pain, palpitations, or syncope could result in the cancellation or postponement of surgery. This behaviour is influenced by a lack of health awareness, and such a history may not be disclosed even when explicitly questioned. Due to ignorance and illiteracy, preoperative counselling must be administered with extreme care and precision. Before beginning treatment for needle block, the problems must be discussed in their local language.1 The significance of remaining still and following instructions during surgery must be highlighted strongly. Proposed solutions for such challenges include upgrading existing systems/equipment, such as advanced hemodynamic monitoring equipment, a newer generation of supraglottic airway devices, and the availability of all emergency drugs and equipment for difficult airways, such as a fibreoptic airway device and a video laryngoscope.

It is also important to understand when one should refer patients to seek expert opinion. It is critical to understand one's own limitations as well as the limitations of the setup in which one is working. It is necessary to recruit trained personnel with adequate experience, as well as to retain personnel who have been trained under your supervision. There should be at least one high dependency care unit that can be easily converted into an intensive care unit based on the need, as well as one dedicated PACU with the availability of a trained nurse who is familiar with recovery criteria and monitoring. If an HDU/ICU cannot be established, referral and transport facilities to the nearest tertiary care setup or hospital where such services can be provided should be available.

Above all, these patients may not be accompanied by a relative and have impaired vision, sedation is administered with caution. Before surgery, it is essential to obtain the relatives' contact information, as they must be notified in the event of any complications or unexpected incidents. For successful outcome of eye surgery, a thorough preoperative assessment and optimization of medical conditions is essential.

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Letter to Editor

Eyelid infiltration with local anaesthesia - Pearls of Wisdom

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Dear Sir/Madam,

Cosmetic or functional eyelid surgeries such as blepharoptosis repair, correction of entropion, ectropion and blepharoplasty are usually performed by infiltration of the eyelid tissues with local anaesthesia. The mechanism of action through infiltration is that the local anaesthetic blocks the sensory nerve endings of the infratrochlear nerve. Many minor complications like bruising, eyelid hematoma to few major complications like globe penetration, central retinal artery occlusion, vitreous hemorrhage, choroidal rupture and retinal detachment have been reported.[1-4] In this research letter, the authors stress upon some basic methods to be adopted to prevent the occurrence of the above mentioned complications and to ensure a safe eyelid infiltration with local anesthesia.

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During preoperative assessment, it is important and mandatory to determine whether the patient is taking any blood thinner medications or herbal drugs like gingko biloba. If the patient is already on anticoagulant medication, then with the concurrence of the treating physician, it can be withheld accordingly, until the effect wears off.

On the operating table, patient has to be positioned at a comfortable working distance and in a supine posture with good overhead illumination. Before infiltration, corneal protectors in the form of a corneal conformer or a spatula must be used, Figure 1. The needle hub must be securely fastened to a dry syringe tip, maximizing the friction force holding the needle in place. Alternatively, a Luer-lock syringe can be used. 1.5-inch, 27-gauge needle allows for long passes beneath the skin, decreasing the number of times the tissues are entered, thus causing less pain and bruising. A 0.5- inch, 30-gauge needle can be substituted for smaller areas of infiltration. Needleless jet injection devices are not advised to be used because posterior segment trauma has been reported.[4] Bending the needle at 30 degrees from the hub is another good practice reported by some authors which can reduce the complications.[5]

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Also, positioning of a non-injecting hand on the forehead or cheek allows for better visualization and stabilizes the patient. The needle should be oriented parallel to the skin, bevel facing upwards, and passed superficially,

Figure 1 Eyelid infiltration performed with 27G 0.5-inch needle

It is important to instruct the patients not to look away from the site/areas of injection, as this causes traction of the posterior segment and it pulls them closer to the needle tip. Posterior segment trauma is more difficult to manage than corneal or anterior segment trauma. Lastly, because of lower flow volumes through small-bore needles, greater force to syringe plungers may be applied when using a needle with a gauge of 27 or higher. This increases the force transmitted to the face of the needle hub, making needle expulsion more likely. The plunger should be advanced slowly and steadily.[6]

In case, while injecting if there is any resistance felt due to dense scar tissue or abnormal movement of the globe is observed one should not advance the needle or inject the local anaesthetic solution further, without examining or ascertaining the needle position or patency. If there is any bruise or a hematoma is suspected, firm pressure should be immediately applied for 1 to 2 minutes until bleeding stops.

Eyelid infiltration though appears as a simple technique it has to be performed very carefully. Because of the thin and delicate nature of the upper eyelid, the needle can easily be passed full thickness through the eyelid or result in inadvertent ocular complications. For a safe eyelid infiltration anesthesia, a thorough knowledge of eyelid anatomy and an increased level of awareness are essential.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Letter to Editor

Ultrasound Guided Ophthalmic Blocks

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Dear Sir/Madam,

Ultrasound (USG) has been widely used for various regional blocks due to increase in the success rate and safety. Ophthalmic surgeries in adults are mostly performed under regional and topical anaesthesia. Common regional blocks used for ophthalmic surgery are peribulbar block, sub-Tenon's block and retrobulbar block. USG guided ophthalmic blocks may have potential advantages over the blind techniques as it allows real-time visualisation of ocular anatomy, needle and spread of local anaesthetic and may help to reduce complications like globe perforation, intramuscular injection, optic nerve injury etc. A pre-block scan is useful to assess the size, shape and axial length of the globe. It is particularly valuable in patients with altered ocular anatomy like high myopia, staphyloma, scleral banding to decrease the risk of accidental needle perforation of the globe.[1]

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Orbital USG enables real-time visualisation of the globe, the extraocular muscle cone, optic nerve, as well as the needle and spread of the local anaesthetic. Under USG, the posterior chamber of the globe appears anechoic and periorbital area appears hyperechoic. The optic nerve is less echogenic than the periorbital fat and is not always distinctly delineated. The extraocular muscles appear as echogenic bands lateral to the optic nerve and divide the orbit into intraconal and extraconal compartments.[2]

Ophthalmologist and anaesthesiologist should be aware that excessive ultrasonic exposure can lead to multiple bio-effects ranging from acute corneal burn to premature cataract formation.[3] US Food and Drug administration and British Medical Ultrasound Society have issued guidelines to safeguard the eyes from sonic-induced injury.[4,5] For ophthalmic USG, mechanical index (indicates the ability to cause cavitation and mechanical stress to tissues) and thermal index (indicates the ability to raise tissue temperature by 1°C) have been reduced from 6.0 and 1.9 to 0.23 and less than 1.0 respectively. Many new generation USG devices have "orbital" mode which automatically reduces the mechanical index and thermal index within accepted limits. USG transducer should not be in contact with the eye for more than 90 seconds continuously.

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Both linear and curved-array transducers can be used for ophthalmic USG. High frequency transducers (8-20 MHz) are appropriate to visualise the superficial orbital structures. High frequency, narrow sized "hockey-stick" transducer is preferred due to the relatively small size of the eye and physical constraint of the orbital rim, especially in deep, sunken eyes.[6] Orbital sonography is technically easier with the eyelid closed. The eye can be viewed in its long (longitudinal) or short (transverse) axis. The block technique is completed in two stages. First, the needle is inserted in the standard manner. Second, the transducer is positioned on the closed eyelid before completing the block under real-time USG guidance.[2]

USG guided Peribulbar Block:

At the infero-temporal quadrant of the orbit, 25 G, 1 inch needle is directed posteriorly, parallel to the orbital floor up to a depth of 25 mm/needle-hub junction. USG transducer is now placed over the closed eyelid. Once the position of the needle tip outside the muscle cone is confirmed, 6-12 mL of local anaesthetic is then injected. Another alternative approach is through the medial canthus of the eye, in which the needle is introduced at the medial junction of the lids and directed posteriorly up to a depth of 15 mm.[7]

USG guided Retrobulbar Block

In retrobulbar block, 25 G needle is directed towards the apex of the orbit and advanced gradually in a slight medial and cephalad direction under real-time USG guidance to a depth of 25-35 mm. After confirming the needle tip location inside the intra-conal space, 2-4 mL of local anaesthetic solution is injected.[7]

USG guided sub-Tenon's block

In sub-Tenon's block, preferably at the infero-nasal quadrant of the globe, a small, blunt and curved Westcott scissors is used to create a small opening in the conjunctiva and Tenon's capsule, approximately at 4:30 (right eye) or 7:30 (left eye) position, 5-10 mm away from limbus. A blunt metal or plastic cannula is inserted in the episcleral space and directed posteriorly following the curve of the globe. A superficial or deep injection with 3-5 mL of local anaesthetic can then be performed.[7] A characteristic 'T sign' is visualised on USG, which is formed by the local anaesthetic tracking under Tenon's capsule up to the posterior pole, which is intersected by the optic nerve.[8]

Limitations of USG in Ophthalmic blocks

Advanced procedural skill set and ultrasound equipment adhering to international guidelines are prerequisites to perform these blocks safely. Furthermore, USG guided blocks may be time consuming. So this might not be a favourable technique especially in a ophthalmic set up with high patients turnover. Patient may feel discomfort due to pressure of the transducer on the eye.

Also, if too much pressure is applied over the closed eyelids, the globe/extraocular muscles might be pushed closer towards the needle tip. Hence, it is important to apply gentle contact pressure while using USG probe over the eyelids. An extra assistant is required for injection of the drug.

USG guided ophthalmic blocks can be considered for patients with myopic eyes, staphylomas and/ or presence of any scleral band across the globe.

Safety offered by USG guided ophthalmic blocks in contrast to the conventional 'blind' technique, should encourage more anaesthesiologists and surgeons to use in upcoming years.

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There are no conflicts of interest.

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Letter to Editor

Legal Issues in Ophthalmic Anaesthesia

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Dear Sir/Madam,

A large number of people suffer from disorders of the eye. Some can be treated medically but others require surgery. The motto of eye surgery is "so that all may see". Many surgeries can be performed under local anaesthesia (LA) but a significant number need general anaesthesia (GA).

It is a well-known fact that anaesthesia is not one hundred per cent safe. Complications can occur even during minor procedures in healthy individuals because of human error, equipment failure and other factors. Expected and accepted mortility in eye surgery is negligible. Also, there is lesser degree of awareness among patients and the attendant regarding the systemic risks involved in patients undergoing eye surgery under GA/LA. Hence, it is essential for an ophthalmic anesthesiologist to know basically, how to practice and to provide a safe anaesthesia for their patients.

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During preoperative assessment, it is important and mandatory to determine whether the patient is taking any blood thinner medications or herbal drugs like gingko biloba. If the patient is already on anticoagulant medication, then with the concurrence of the treating physician, it can be withheld accordingly, until the effect wears off.

On the operating table, patient has to be positioned at a comfortable working distance and in a supine posture with good overhead illumination. Before infiltration, corneal protectors in the form of a corneal conformer or a spatula must be used, Figure 1. The needle hub must be securely fastened to a dry syringe tip, maximizing the friction force holding the needle in place. Alternatively, a Luer-lock syringe can be used. 1.5-inch, 27-gauge needle allows for long passes beneath the skin, decreasing the number of times the tissues are entered, thus causing less pain and bruising. A 0.5- inch, 30-gauge needle can be substituted for smaller areas of infiltration. Needleless jet injection devices are not advised to be used because posterior segment trauma has been reported.[4] Bending the needle at 30 degrees from the hub is another good practice reported by some authors which can reduce the complications.[5]

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1. If there is any significant possibility of a complication under GA, the surgery should be performed under LA with monitored anaesthesia care. There is no life-saving surgery in ophthalmology, only eye saving surgeries. Hence, it is important to remember not risk life in order to save eyes even if the patient gives consent.
2. Communication between anaesthesiologist, patient, his relatives and ophthalmologist is of utmost importance. When a decision regarding surgery is made by the ophthalmologist, the pros and cons of general and local anaesthesia should be discussed with the patient, his relatives and the ophthalmologist.
3. A thorough pre-anaesthetic evaluation is mandatory before a final decision regarding GA is made. Medical history, physical examination and investiations will guide us in decision making. Wherever indicated, an opinion from a physician, cardiologist, neurologist or any other specialist should be obtained.
4. Conduct of anaesthesia: Equipment check, induction, maintenance and recovery have to be carefully done as per accepted standards. Indian society of Anaesthesiologist and World Federation of Society of Anaesthesiologist guide lines provide that a qualified anaeshtesiologist should continuously attend to any patient under GA. Hence, leaving a patient under GA unattended for whatever reason is not acceptable at all. From induction to recovery, the anaesthesiologist has to remain with the patient.
5. Documentation: Right from preanaesthetic evaluation till recovery from anaesthesia, everything should be properly documented. It is recommended that vital parameters of the patient under GA be recorded every five minutes. Longer gaps between recording parameters gives an impression that anaesthesiologist was not with the patient during that period. Same applies to attending to two patients under GA simultaneously.

In spite of taking all these precautions, one cannot rule out the possiblity of litigation on grounds of medical negligence.

Let us go through a coupleof court judgments so that we can learn to avoid those mistakes that others have made.

1. Asha Devi & ors v Dr. Sanjay Lal Das & Anr. National Consumer Dispute Redressal Commission: Anaesthesia administered by unqualified doctors not possessing Diploma or Degree in Anaesthesiology. It must be noted that any amount of experience cannot substitute for qualification. Not only one should hold a qualification, but it must be registered with the Medical Council. And not only should it be registered but registration has to be renewed periodically as per the rules of the Medical Council. If the qualification is not registered or registration is not renewed, one is not legally authorised to practice.
2. The Medical Director...V Dr. Meenakshidhar. Amrita Institute of Medical Sciences, Ernakulum. (National Consumer dispute Redressal Commission)

Death during squint surgery: A nine-year-old child died during a squint correction surgery under GA. A medical inquiry commission gave the expert opinion that there was no negligenceon the part of doctors. But the court (National Consumer dispute Redressal commission) made the following observations:

It was claimed that Glycopyrrolate was administered to counteract the bradycardia. However, the drug entered in the anaesthesia record was "Glyco". Court observed the "Glyco" cannot be taken as "glycopyrrolate". "Glyco" can mean many things. Hence it observed that Glycopyrrolate was not administered. Therefore, we must use only standard abbreviations in our record or write the full name of the drug administered.

Court observed that proper informed consent was not obtained from the parents of the patient. Consent taken from the mother looks ritualistic. Therefore, an individualised informed consent must be obtained.

It was claimed that a retro-bulbar block was given preoperatively to prevent cardiac arrest. The anaesthesiologist mentioned that the block was administered by the surgeon. However, neither anaesthesia record nor the surgeon's operation notes had any mention of the retro-bulbar block. Hence court concluded that retro-bulbar block was not given.

Therefore, whatever is done should be recorded in the anaesthesia notes. Whatever is not recorded is taken as not done by the courts.

There was no record of a pre-anaesthetic evaluation. It was mentioned that "routine premedication" was given. Court observed that unless specific drugs are mentioned, "routine premedication" can mean anything. Therefore, the court concluded that the medical record was not made properly.

Looking at the above examples tells us that we can never be too careful. Even if you have done thousands of cases successfully, a single case of medical negligence can mar your reputation and confidence. The most neglected aspect of our anaesthetic management is the anaesthesia record. In medico-legal cases, this is the one that can make or break you.

It cannot be emphasized enough that every anaesthesiologist must have sufficient professional indemnity insurance and must keep his medical license renewed and valid.

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Conflicts of interest

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2nd National Annual Conference of Association of Indian Ophthalmic Anaesthesiologists (AIOA)

September 24th & 25th, 2022

In-person Conference
@ Aravind Eye Hospital,
Madurai

Highlights:

- Didactic lectures
  - Basic science/ Complications & challenges faced
- Live demonstration
  - Needle blocks / Eyelid block / Sub-tenon's block
- Panel discussions
- Debates on medicolegal issues
- 1st AIOA Annual Oration – Ocular Hypotonia: Causes & management

The conference also offers a workshop on the following sessions:

- Hands-on practice for needle blocks
- Wet-lab training on Sub-tenon's block using goat's eye
- ABC – CAB: Training on BLS
- Wealth & health wellbeing for doctors

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