

TOPICAL ANAESTHESIA FOR EYE SURGERY

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Local anaesthesia is currently performed for many ophthalmic procedures as it is associated with reduced morbidity and mortality when compared with general anaesthesia. Additional benefits include early patient mobilisation, improved patient satisfaction and reduced hospital stay. A variety of different methods of administration are described which may be broadly divided into 'injections' or 'topical applications'. 'Injection' techniques all involve needle perforation of the peri-orbital skin or conjunctiva and injection of local anaesthetic into the peri-orbital or orbital tissues. Orbital injections are occasionally associated with serious sight or even life-threatening complications. In contrast 'topical' anaesthesia, where local anaesthetic eye drops are applied to the surface of the eye, is non-invasive and has virtually no complications. It is becoming increasingly popular for phacoemulsification cataract surgery although many other procedures may also be performed topically (see Table 1).

Although topical anaesthesia is an extremely simple it may add to the complexities of surgery as operating conditions may be more challenging. Alterations in the practice of both ophthalmic anaesthetist and surgeon may be required. In addition, topical anaesthesia demands understanding and increased co-operation from the patient. This article aims to raise awareness and elaborate upon these changes.

Pre-assessment

Careful patient selection is essential if topical anaesthesia is to be used safely and effectively. Patients need to be co-operative, not unduly anxious, and scheduled for straightforward surgery. During the operation the patient must lie still and be comfortable in the supine position. They must also be able to co-operate and carry out instructions. The lack of akinesia (eye muscle paralysis) may be used by the surgeon as the patient can be asked to consciously fix or alter their gaze during the operation. In addition, because visual function is maintained the patient may be more aware of the operative procedures. Some patients find this stressful and often request sedation.

Short acting intravenous drugs such as midazolam and alfentanil are popular choices although pre-medication with oral benzodiazepines maybe just as effective. Sedation should only be given to help the patient to relax, and not to treat pain during surgery. Patients should be easily rousable and be able to respond when spoken to.

Unfortunately the administration of sedation may generate several problems such as confusion, disorientation and reduced co-operation which result in difficulties for the surgeon. Respiratory depression and a compromised airway can also occur. In the elderly where the sedative effects of these drugs are particularly unpredictable, airway obstruction and respiratory arrests have been reported.

Table 1.

Procedures that can be performed under topical anaesthesia in suitable patient.

- Application of surgical scrubs Povidine 2.5%-10%
- Conjunctiva: Excision of superficial lesions such as cysts or naevi.
- Cornea: Removal of foreign bodies.
Removal of sutures.
Debridement of the corneal epithelium after recurrent erosions / herpetic keratitis.
Corneal scrapings / biopsy with infective keratitis.
Dissolution of Ca²⁺ salts in band keratopathy using EDTA
Removal of pterygia +/- conjunctival autografts.
Refractive surgery.
- Intra-ocular: Cataract surgery. Extra-capsular and Phacoemulsification
- Lid surgery with Eutectic Mixture of Local Anaesthetic (EMLA)

Intravenous access, supplementary oxygen and the presence of suitably trained personnel, usually an anaesthetist, are essential. Appropriate levels of monitoring must be available. As the effects of sedation persist postoperatively, hospital discharge policies need to be flexible. A full explanation of the technique and good communication with the patient often reduces the level of anxiety and keeps the administration of sedation to a minimum.

Perioperative care

Once a patient has been selected they are counselled and consented for their surgery under topical anaesthesia. There is no general consensus on which topical local anaesthetic eye drop provides the best analgesia. Tetracaine, amethocaine, proparacaine, lignocaine and bupivacaine have all been used successfully in a variety of different concentrations. Availability may determine the clinician's choice but it is essential that the preparation is *preservative free*. Manipulation of the preparation pH may alter the duration of action but is of little clinical benefit. Topical NSAIDs and pupil dilating agents are often co-administered.

Application of local anaesthetic eye drops to the cornea and conjunctiva should start in the patient holding area approximately 20-30 minutes before surgery. Different regimes are described but in general two or three drops are applied every five minutes. Sufficient absorption should occur over this period to render the surface of the eye anaesthetised. As the cornea is avascular, once absorbed the local anaesthetic remains for approximately half an hour.

Additional eye drops can be given at any stage during the operation if discomfort is experienced. The use of the Honan balloon to reduce intraocular pressure is not necessary with topical anaesthesia.

For surgery the patient should be positioned in a comfortable supine position. A pillow under the patient's knees will reduce their lumbar lordosis and help alleviate low back discomfort. Attempts should be made to keep the surgical drapes off the patient's nose and mouth during the procedure. Various devices exist that deliver oxygen to the patient during the operation and it is important that the patient is kept at a comfortable temperature (*see Update No. 11*).

Topical anaesthetic application alone produces detectable levels of local anaesthetic agent in the anterior chamber and provides good eye analgesia. However, certain manoeuvres such as iris manipulation, globe expansion and insertion of the intraocular lenses can be uncomfortable. To improve analgesia local anaesthetic can be injected intraoperatively into the anterior chamber of the eye. This 'intracameral' injection produces superior analgesia improving comfort and co-operation. Provided preservative-free solutions are used there are no undesirable effects. 0.5mls of 1% lignocaine is the most popular solution used. Although corneal toxicity has been reported in animal models, clinical studies have failed to demonstrate increased endothelial cell damage.

Patient satisfaction with intraoperative analgesia after topical anaesthesia appears comparable to that of 'injection' techniques. However, topical anaesthesia may

produce higher [but statistically insignificant] ‘pain’ scores than injection techniques. Fortunately any differences are small and relate to increased discomfort rather than pain. Any discomfort is better tolerated if the patient is fully informed pre-operatively. Intracameral injections reduce discomfort scores and improve patient satisfaction. The successful use of acupuncture to supplement topical anaesthesia in cataract surgery has also been described but is unlikely to become standard practice.

The demands on the surgeon and patient limit the use of topical anaesthesia to relatively short procedures. Occasionally a facial nerve block may be requested to reduce eyelid movements. A good surgeon-patient relationship facilitates the procedure. Communication with the patient whilst operating is a surgical skill that has to be acquired. Typically cataract extraction is performed via a temporal corneal incision with the surgeon sitting to the side of the patient. The surgeon should lower the brightness of the microscope light source to reduce photophobia and

limit patient distress. Surgically related complication rates under topical anaesthesia are similar to conventional orbital blocks. However, without akinesia an inexperienced surgeon may experience some difficulty with capsulorhexis and phacoemulsification.

In the event that the patient becomes distressed or the procedure complicated or lengthened a sub-Tenon’s block can be administered by the surgeon to provide a retrobulbar analgesia with akinesia.

Post-operative care

Topical anaesthesia does not cause unwanted post-operative ptosis or diplopia nor does it affect the secretion of tears. As the protective mechanisms of the eye are preserved it is not essential that the eye be patched closed and the rapid return of visual function facilitates an early discharge from hospital. However, patients should be cautioned that vision remains sub-optimal for at least four hours post surgery and they should take additional care.