



FOCUS ON: OPHTHALMIC ANAESTHESIA

Anaesthesia for vitreo-retinal surgery

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S U M M A R Y

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Many patients presenting for V-R surgery are elderly with a high incidence of associated medical conditions. Thorough preoperative assessment is essential especially for those scheduled for general anaesthesia.

Patients on anticoagulants and antiplatelet drugs scheduled for V-R surgery should continue their routine medication. However, where there are specific concerns, the anaesthetist, surgeon and patient should discuss the risks and benefits of continuing their routine medication to agree an acceptable approach.

Local anaesthetic techniques are now far more commonly used than general anaesthesia for V-R surgery. Clinicians must recognize the limitations and contraindications of both approaches.

Whenever local anaesthetic techniques are used, attention to small details can make a huge difference to patient comfort. This often entails meticulous patient positioning and clear lines of communication between patient and the theatre team. Sometimes, sedative drugs are beneficial to patient care.

Careful patient monitoring is recommended during V-R surgery because of the darkened theatre environment, the age and associated medical conditions of many of these patients, and the risk of precipitating abnormal cardiac rhythms from drugs and the oculocardiac reflex.

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1. Introduction

Vitreo-retinal (V-R) surgery has evolved rapidly over the last 30 years allowing the surgical treatment of a wide variety of diseases affecting predominantly the posterior segment of the eye. Approximately 18,000 retinal surgical procedures were performed in England between 2005 and 2006 (Department of Health Hospital Episode Statistics). There are essentially 2 types of operation; one that approaches the problem externally (the cryo-buckle procedure), and the other, internally (vitrectomy).

2. Scope of surgery and implications

2.1. Cryo-buckle procedure

This operation has been used for more than 50 years for the treatment of retinal detachment and may be undertaken under local (LA) or general anaesthesia (GA).

The operation involves observing with the indirect ophthalmoscope to locate retinal holes and treating them externally with cryotherapy. To enable easy movement of the globe, traction sutures are placed round the recti muscles. Pulling on these during

the operation can stimulate the oculocardiac reflex under GA and if there is an inadequate local anaesthetic block. A non-absorbable silicone sponge or solid explant is sutured to the globe and sometimes sub-retinal fluid (SRF) is drained. If SRF is not drained, the intraocular pressure (IOP) rises as the sutures securing the explant are tightened to raise an indent inside the eye. If the IOP rises above the perfusion pressure in the central retinal artery (about 70 mm Hg), it will be occluded. The surgeon ensures perfusion of the central retinal artery (CRA) either by ocular massage or paracentesis but it is essential that the anaesthetist maintains a normal blood pressure so that the surgeon can rely on the perfusion pressure in the CRA present at the end of the operation.

2.2. Vitrectomy

A vitrectomy operation involves an internal approach to diseases of the vitreous or retina. The operation is usually done under LA nowadays. Generally there is no traction on the extraocular muscles and therefore painful pulling on the globe does not occur. Three tiny holes are made in the sclera so that instruments can enter the eye through the pars plana without damaging intraocular structures. A wide angle indirect viewing system is attached to the operating microscope. The surgeon can then examine and treat the retina directly so as to manage retinal detachment, severe diabetic retinopathy and a variety of macular diseases such as macular holes and

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pucker. This technique is also applicable to the management of complex trauma and intraocular infections.

The operation frequently involves the use of agents such as air, air–gas mixtures and silicone oils to tamponade the retina. Gases used include air, sulphahexafluoride (SF6) and perfluoropropane (C3F8). Sometimes these gases are used neat, in which case expansion occurs slowly within the eye over 24 h to twice (SF6) and four times (C3F8) their volume. Often they are diluted with air in non-expansile concentrations to prolong the presence of an air bubble in the eye.

2.3. Urgency of operation

V-R surgery is required urgently in those patients whose macula is still attached at presentation (macular-on retinal detachment) and in whom sub-retinal fluid is likely to extend rapidly, e.g., upper bullous retinal detachments. This is because, once the macula detaches, the chances of getting a good visual outcome are much reduced. On the other hand, once the macular has detached, the outcomes are similar provided the operation is performed within the next seven days.¹

2.4. Treatment to the contralateral eye

Rhegmatogenous retinal detachment is often associated with areas of weakness in the contralateral eye that could predispose that eye to the same condition. Therefore surgeons always examine the good eye preoperatively. If areas of lattice degeneration or other predisposing lesions are found, then commonly laser treatment will be applied around these areas using the indirect ophthalmoscope laser at the time of surgery on the affected eye. If the patient is under general anaesthesia, this prolongs the operation by 15 min or so, and has important implications if the first operated eye has a gas bubble in it (see later).

3. Preoperative assessment and preparation

Many presenting for V-R surgery are older patients with a higher incidence of associated systemic disease. Complication rates associated with anaesthesia correlate with the number of associated disease conditions.²

3.1. History and examination

When a local anaesthetic is planned, history taking and physical examination must focus on issues that might preclude such an anaesthetic approach (See Table 1).

Features such as deep set eyes and nystagmus make a local anaesthetic technique more challenging. General anaesthesia may be indicated when the proposed surgery is on the patient's only eye because local anaesthetic often renders the eye sightless due to temporary effect on the optic nerve, and an anaesthetized eye is prone to corneal ulceration. Some patients who have had previous cryo-buckling procedures may also be better treated under GA principally because the spread of local anaesthetic agents around the globe is hindered by the scarring induced after previous surgery. In addition the anatomy is altered which may predispose to globe perforation. True allergy to local anaesthetic drugs is fortunately very rare and previous adverse reactions to local anaesthetics are most commonly due to the effects of adrenaline or overdosage, or the result of vaso-vagal effects.

Careful preoperative assessment is necessary for V-R patients especially those scheduled for a general anaesthetic due to the higher incidence of associated medical conditions. Issues that require specific consideration include the following:

Table 1
Contraindications to local anaesthesia.

Absolute	Patient refusal True allergy to local anaesthetic Orbital infection Inability of patient to cooperate with theatre staff (dementia, children and those with learning disabilities) Inability to lie still (tremors, epilepsy, dystonic movements)
Relative	Inability to lie flat (cardiac or respiratory disease) Intractable cough Patients with communication difficulties (profound deafness, language difficulties) Prolonged surgery (greater than 2 h) Claustrophobia Previous surgery in the same eye (scleral buckling, excision of orbital tumours) Deep set eyes Nystagmus Operations on the only one sighted or partially sighted eye Young patients

1. Cardiac disease – Patient's condition should be stabilized or optimized prior to surgery. Routine cardiac drugs must be continued throughout the perioperative period. Ideally, elective surgery is deferred for three to six months after a myocardial infarction. Antibiotic prophylaxis is not necessary in patients with valvular heart lesions undergoing V-R surgery.
2. Hypertension – Although common in the elderly population, 'white coat hypertension' should be excluded by multiple readings. Patients with severe hypertension (stage 3) defined as a systolic blood pressure of >180 mm Hg and/or a diastolic pressure of >110 mm Hg should be treated prior to elective surgery. They are at risk of dangerous hypertensive crises causing intracranial haemorrhage, acute left ventricular failure, life-threatening ventricular arrhythmias or renal failure.³
3. Chronic obstructive pulmonary disease (COPD) – LA is ideal for these patients provided they are able to lie flat and still for the duration of surgery. In theory, GA may provoke dangerous bronchospasm or lead to postoperative sputum retention, chest infection and respiratory failure. Fortunately, V-R surgery does not interfere with the mechanics of breathing and most V-R patients can be safely managed under GA. Whenever possible, the chest should be optimized prior to surgery using bronchodilators, steroids or antibiotics, and the patient is advised to stop smoking where appropriate.
4. Diabetes mellitus – Diabetes mellitus is also common in patients presenting for V-R surgery. LA has the advantage of minimal disruption of meals, drug treatment and blood sugar control. When assessing these patients, careful attention must be paid to the potential cardiac, renal and neurological complications of the disease.
5. Current drug therapy – As patients presenting for V-R surgery have a higher incidence of associated systemic disease, a complete list of current medication must be documented, allowing essential drugs to be continued perioperatively and potential drug interactions to be avoided.

3.2. Investigations

As far as ophthalmic patients are concerned, no routine screening tests have been shown to be helpful or to improve the outcome. A large multicentre trial⁴ showed that routine preoperative blood tests and electrocardiogram in cataract patients did not increase the safety of surgery. The Joint Colleges' Guidelines (2001)⁵ for local anaesthesia recommend that tests should only be

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