

Eye Care During General Anaesthesia

Introduction

High standards of clinical practice are greatly valued as they can prevent many of the injuries that occur during anaesthesia due to human error. Ocular injuries are sustained during 0.1- 0.5 % of general anaesthetics when eyes are taped and is usually corneal in nature ^(1,2). When eyes are untaped during general anaesthesia, the incidence of ocular injury has been reported to be as high as 44%. ^(3,4). Intraoperative eye injuries are the cause of 2% of medico-legal claims against anaesthetists in Australia and United Kingdom ^(1,3) and 3% in the USA ⁽⁵⁾.

Effect of General Anaesthesia on Eyes

General anaesthesia causes lagophthalmos in which the tonic contractions of the orbicularis oculi muscle are reduced, i.e. the eyelids do not close fully in 59% of patients ⁽¹⁾.

During general anaesthesia, decreased lysosomal protection and corneal epithelial drying are also common. This is due to the reduction in tear production and tear-film stability that is caused by the anaesthetic.

Bell's phenomenon is a protective mechanism that turns the eyes upwards in order to protect the cornea. It occurs naturally during sleep but this mechanism is also lost during general anaesthesia ⁽⁶⁾.

Mechanism of Injury

The most common ocular injuries sustained during general anaesthesia are corneal abrasions. They can be caused by exposure keratopathy ^(3,7,8), chemical injury or direct trauma ^(7,9).

An open eye increases the vulnerability of the cornea to direct trauma from objects such as face masks, laryngoscopes, identification badges, stethoscopes, surgical instruments, anaesthetic circuits, or drapes.

Exposure keratopathy (Figure 1) refers to the drying of the cornea with subsequent epithelial breakdown ⁽¹⁰⁾. When the cornea dries out it may stick to the eyelid and cause an abrasion when the eye reopens ⁽¹¹⁾.

Chemical injury can occur if cleaning solutions such as povidone-iodine (Betadine), chlorhexidine or alcohol are inadvertently spilt into the eye, for example when the face, neck or shoulder is being prepped for surgery ^(2,3).



Figure 1 : Exposure Keratitis

Therefore, the anaesthetist must ensure that the eyes are fully closed and remain closed throughout the procedure. Seemingly trivial contact can result in corneal abrasion and the risk of this occurring is markedly increased if exposure keratopathy is already present ⁽³⁾. Corneal abrasions can be excruciatingly painful in the postoperative period, may hamper postoperative rehabilitation and may require ongoing ophthalmological review and after care. In extreme cases there may be partial or complete visual loss.

Methods to Prevent Eye Injuries

Methods to prevent intraoperative corneal injuries include simple manual closure of the eyelids, taping the eyelids shut, use of eye ointment (although this is controversial, see below), bio-occlusive dressings and suture tarsorrhaphy. However, none of the protective strategies are completely effective; vigilance is always required i.e. the eyes need to be inspected regularly throughout surgery to check they are closed ⁽¹⁾.

Problems with current methods

For many years, in most western countries, the eyes of patients undergoing general anaesthesia have been routinely taped or stuck down with adhesive dressings in an attempt to combat these problems.

Unfortunately many of the adhesives used on medical products today are inappropriate for their use. Their adhesive strength may change when reaching body temperature, particularly when left on for extended periods of time ⁽¹²⁾. As the operation progresses this can cause the adhesive to stop working and become goeey, causing the eyelids to move apart and leaving behind a sticky residue. This leaves the cornea exposed to epithelial drying and/or abrasions, sometimes caused by the tape that was originally applied to protect the cornea. Alternatively, the adhesive strength may increase, which upon removal can result in eyelid bruising, tears, or eyelash removal (Figure 2).

Rolls of tapes are often “laying around” the operating theatre or kept in health care workers' pockets (Figure 3). Therefore they can be a source of hospital acquired infections (HAI's) such as MRSA & VRE, with a 2010 study showing that 50% of partially used tape rolls tested positive for MRSA, VRE or both ¹⁵.

Most of these tapes are translucent and so it is not possible to see if the patient's eyes are opened or closed throughout the case. It is not uncommon for the eyelids to move open as the case progresses, even with adhesive tapes stuck onto them. In a practical sense, these medical tapes/dressings may be difficult to remove from a patient because their ends can become stuck flush with the skin. The possibility of tape removal causing trauma is also significantly increased in older people, people with sensitive skin, dermatitis, dehydration or side effects of medications ¹⁶.

As noted above, there have been several studies looking at the efficacy and safety of eye ointments/lubricants as adjuncts with tape or as a stand-alone management for intra-operative eye closure. Unfortunately many in common use have problems. Petroleum gel is flammable and is best avoided when electrocautery and open oxygen are to be used around the face. Preservative-free eye ointment is preferred, as preservative can cause corneal epithelial sloughing and conjunctival hyperaemia ⁽⁹⁾. They have been implicated in blurred vision in up to 75% of patients and they do not protect from direct trauma ^(6, 13).

Adverse Outcomes Associated With Intra-operative Eye Injuries

Some of the adverse outcomes associated with intra-operative injuries include:

- Increased length of stay. This is due to ophthalmology consults required, associated infections and treatment ⁽¹³⁾.
- Increased costs. This is due to increased length of stay, cost of treating the complications ⁽¹⁴⁾.
- Pain and discomfort for the patient. Corneal abrasions are extremely painful for the patient and the treatment consists of drops and ointments applied in the eye which may cause further discomfort for the patient ^(13, 14).



Figure 2 : Tensile forces on delicate eyelids during tape removal



Figure 3 : Translucent tape awaiting placement

Recent Advances

Recently there has been renewed interest in the protection of patients' eyes under general anaesthesia with specialised products such as EyeLocc™ (KLZ Medical, Australia) coming onto the market (Figure 4).

The EyeLocc™ is an innovative dressing specifically designed for eyelid occlusion. It is shaped to conform to the eye socket and has non-stick tabs on both sides of the eye for easy application and removal. The EyeLocc™ allows for the eye to be completely sealed for maximum protection from outside harm, as well as moisture maintenance without the need for drops or ointments. The adhesive has been carefully selected to provide adequate security while still avoiding eyelid bruising and tears. It is also supplied sterile to address the HAI risk posed by tape.



Figure 4 : New style dressing

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