



Anaesthesia explained for Moorfields Eye Hospital

This leaflet is for adults who are going to receive an anaesthetic for their surgical procedure. It aims to explain anaesthesia in full detail as well as answer some frequently asked questions patients may have.

This leaflet will explain:

- what an anaesthetic is
- the different types of anaesthesia you might have
- who gives you the anaesthetic, and how
- what you need to do to before your anaesthetic
- the risks and potential side effects of anaesthesia

If you would like further information, we have included some useful websites at the end of this leaflet for you to refer to.

What is anaesthesia?

Anaesthesia is designed to stop you feeling pain during your surgical procedure or operation. It can also reduce sensation (i.e. numb a specific part of your body). Not all types of anaesthesia will make you unconscious

– there are many types of anaesthesia that can be given in different ways and used on different parts of the body. Anaesthetics are the drugs (gases, drops and injections) used to provide anaesthesia. An anaesthetist is a doctor who has specialist training in looking after patients before, during and after an anaesthetic. The anaesthetist gives the anaesthetic and monitors you throughout your procedure.

What are the types of anaesthesia?

There are three main types of anaesthesia used when you have your eye operation, which may be used on their own or combined:

1. Local anaesthetic
2. Sedation
3. General anaesthetic

The type of anaesthesia you have will depend on what type of surgery you are having, the length of surgery, your general health, and your preference. The decision will be made between you, the anaesthetist and the surgeon based on these factors.

1. Local anaesthetic

This can be in the form of drops, sprays, ointments or injections to numb a part of your body. In eye surgery, drops – alone or combined with a small injection to the eye – will make the front of the eye numb and free from pain. This is commonly referred to as ‘freezing’ the eye. You will remain conscious throughout the procedure.

The most common way to freeze the whole eye is by a procedure known as a **‘Subtenon’s block’**. This takes a few minutes to perform and can occasionally cause mild discomfort for up to a minute (see appendix 1, page 11 for more detail). In some cases this can be combined with a mild sedative (see sedation, below).

Operations commonly performed under local anaesthetic include cataract, retinal, glaucoma and laser procedures. Surgery that is complicated or lasts longer may require sedation or a general anaesthetic.

2. Sedation

Sedation means using small amounts of anaesthetic or other drugs to relieve anxiety and make you feel sleepy. However, sedation is not the same as a general anaesthetic; you will usually be conscious and aware of your surroundings. You will still be able to hear voices and noises around you, and you may be aware of touch and some pressure sensations. You may also have some memory of your operation.

The purpose of sedation is to improve comfort, reduce anxiety and help you relax during the procedure. However, sedation does not necessarily relieve pain: a local anaesthetic ‘block’, as described above, will usually be applied to numb the eye, **after** you have been given the sedation drugs.

The levels of sleepiness/sedation can range from:

- **Very light anxiety relief** – you will be fairly awake for the operation
- **Moderate** (also known as conscious sedation) – you will feel sleepy but still aware of the procedure
- **Deep** – used in certain procedures on the eyelids. This puts you into a deeper sleep, but only for the initial part of the process while the surgeons inject local anaesthetic (which can be uncomfortable). You will then be awake for the rest of the operation. You will still be able to communicate throughout the procedure and have some understanding of what is happening. However, later on you may remember little or nothing about what happened. The sedative will be given to you intravenously, i.e. through a drip (cannula) placed into your vein (see appendix 2, page 14 for more detailed information).

Light to moderate sedation is used for procedures carried out under a local anaesthetic, including cataract, retina and glaucoma surgery.



Deep sedation may be necessary during some types of eye lid surgery (adnexal or oculoplastics). The surgeon will inject local anaesthetic just under the skin of your eye lid. It can be painful at first and you will be given deep sedation to tolerate this. The sedation wears off quickly so that you can then cooperate with instructions from the surgeon.

3. General anaesthesia

This puts you in a deep sleep which is different to normal sleep. General anaesthesia means that you remain in a state of unconsciousness controlled by your anaesthetist, and it is designed so that you will feel nothing throughout the procedure. The anaesthetist will stay with you throughout your procedure and you will be continuously monitored.

There are some side effects and risks of general anaesthesia, described below. (Also see appendix 3, page 16 or more detailed information.)

Can I choose what type of anaesthesia to have?

The most suitable anaesthetic for you will be decided after discussion between you, the anaesthetist and the surgeon.

General anaesthesia is desirable for some surgical procedures where it may be safer or more comfortable for you to be unconscious. It is usually used for longer operations or those that may be very painful.

General anaesthesia, however, does have more side effects and risks than local anaesthesia or light sedation. There may also be reasons from your medical history that will mean a general anaesthetic has extra risks, and it may be safer for you to have a local anaesthetic. (See below).

A general anaesthetic also takes longer to recover from than a local anaesthetic. You will need to 'fast' (not eat or drink anything) for a period before your operation. You can eat and drink afterwards once you have fully woken up from the anaesthetic.

With most procedures under sedation, you may eat and drink normally, and can eat and drink immediately afterwards.

The anaesthetist will be able to answer any questions you have. Let them know if you are unsure about any part of the procedure or if you have any worries or concerns.

(See appendix 3, page 16 for more detailed information).

Risk of side effects and complications

No medical intervention or treatment is without risk of side effects or complications. In anaesthesia, side effects can range from temporary discomfort, such as nausea, to permanent disability or death. Please be reassured that modern medical and



your vein, there may be some noticeable swelling and soreness of the skin around it; again this usually gets better without any treatment

- **Confusion and memory loss:**
This is common among older people straight after an operation under general anaesthetic. It is usually temporary, but may occasionally result in subtle changes in memory or other cognitive abilities (see appendix 8, page 29)

Uncommon side effects and complications

Uncommon side effects have up to a one in 1,000 chance of occurring.

- **Chest infection:**
Occasionally, a chest infection can develop after a general anaesthetic, particularly if you smoke or have any chronic lung problems. Smoking may also lead to breathing difficulties during and on waking up from the anaesthetic. It is important that you give up smoking for as long as possible before the anaesthetic (see appendix 8, page 29)
- **Muscle pains:**
A generalised muscle ache that lasts for hours to a few days is often related to a particular type of anaesthetic drug that causes muscle contraction. It may also be due to the position you need to lie in on the operating table. The theatre team will do everything we can to ensure that you are comfortable and protected during your operation

- **Slow breathing, or difficulty breathing:**
Some pain-relieving drugs, such as morphine, can cause slow breathing or drowsiness. Breathing difficulty may occur if muscle relaxants (paralysing drugs) have been used and have not been reversed and/or fully worn off. We will always make sure your breathing is adequate before you leave the hospital
- **Damage to teeth:**
Tooth damage is rare, but may occur from placing a breathing tube in your throat or your windpipe for a general anaesthetic. Tooth loss or damage is more likely if you already have weak, damaged or loose teeth. Your anaesthetist will ask you about any loose teeth, caps or crowns before your anaesthetic (see appendix 7, page 25)
- **An existing medical problem getting worse:**
Your anaesthetist will want to know that you are as fit as possible before your surgery, to reduce the risks of any complications. This is why you undergo a thorough assessment in the pre-assessment clinic before your surgery. If you have any existing medical conditions (e.g. heart disease, high blood pressure, diabetes or asthma), you will be checked to make sure that they are sufficiently under control. If not, they will have to be treated and/or investigated by your GP before surgery.



Rare or very rare complications

Rare complications have up to a one in 10,000 chance of occurring. Very rare complications may occur in up to one in 100,000 patients.

- **Awareness (becoming conscious during your general anaesthetic):**
Awareness can range from slight movement to being aware of your environment. It is very uncommon to 'wake up' or become aware while you are under a general anaesthetic, and we take every precaution to minimise this risk. You will be fully monitored throughout your operation, including continuous monitoring of the 'depth of anaesthesia' to ensure you are completely asleep, and an anaesthetist is present at your side throughout, constantly checking you are stable and asleep. Awareness during a general anaesthetic is therefore very rare (see appendix 10, page 36)
- **Damage to eyes due to anaesthetic:**
Anaesthetists and surgeons take great care to protect your eyes from pressure, dryness and injury during your operation. Complications or risks of the surgery to your eyes will be explained to you by your surgeon and happen rarely
- **Heart attack or stroke:**
The risk of this occurring in a fit and healthy person is very rare. If you have any underlying medical conditions related to your heart or

circulation, the risk of a heart attack or stroke is increased and varies from person to person. Your anaesthetist will discuss this with you in more detail when you meet

- **Serious allergy to drugs:**
A serious allergy, known as anaphylaxis, is very rare. You will be asked about allergies throughout your journey in hospital, as well as just before your operation, so that we can ensure that no drugs or medicines are used that you are allergic to. One of the reasons for continuously monitoring you during your operation is that if you were to develop a new or unknown allergy, it will be noticed and treated very quickly (see appendix 11, page 39)
- **Nerve damage:**
Nerve damage, although very rare, is usually temporary and results in weakness or numbness of the area around the nerve. Nerve damage may occur in the eye or face, in any body part that is pressed against a hard surface for a significant time, or in areas where injections are performed. Great care will be taken to protect you from nerve damage. In very rare cases, nerve damage may be permanent, causing persistent numbness, weakness or increased sensitivity in the affected area
- **Death:**
Deaths caused by anaesthesia are extremely rare. The risks depend on



the type of surgery, the type of anaesthesia and any underlying medical problems. Eye surgery is considered to be low risk surgery (See Appendix 12, page 44)

- **Equipment failure:**
Vital equipment that could theoretically fail includes the anaesthetic gas supply, ventilator (breathing machine) and monitors. Alarm systems immediately alert us to any problems, and anaesthetists have immediate access to back-up equipment

Preparing for your operation

Before you come into hospital there are some things that you can do to reduce the likelihood of difficulties with the anaesthetic.

- **Stop smoking:**
If you smoke, you are more likely to develop a chest infection after a general anaesthetic, and/or have other breathing complications, because your lungs and airways are more irritable than in non-smokers. Giving up at least two months before your operation is the best way to reduce these risks; but if you are unable to quit completely, you should try to give up (or at least cut down) several weeks before – the longer, the better. Even stopping the day before will slightly improve oxygen levels in your blood.

- **If you are overweight:**
Reducing your weight will decrease many of the risks, improve heart function and help you recover faster.
- **If you have loose or broken teeth, or crowns that are not secure:**
You may want to visit your dentist to have these repaired to reduce the risk of further tooth damage or loss during your anaesthetic.
- **If you have long-term medical problems (such as high blood pressure, diabetes or asthma):**
You should ask your GP for a check-up.
- **If you wear make-up, nail varnish or false nails:**
These should be removed before coming in for surgery, as they may pose an infection risk and interfere with essential monitoring.

Pre-assessment clinic

You will be asked some questions about your health before your operation. This will include filling in forms and seeing a specialist nurse. If necessary, you will have further tests, such as an ECG and blood tests. If you have any uncontrolled or serious medical problems these will be identified at this stage; you may need to see your GP to review or change your treatment before your operation can take place. It is important to bring in a list of all tablets and medicines that you take. It will also be useful if you can bring in



any copies of recent blood tests or medical investigations you have had. You may also see an anaesthetist at this stage if any complicated medical problems are picked up.

On the day of the operation

Fasting (not eating or drinking):

This is only required for a general anaesthetic or deep sedation. You do not need to fast if you are having a local anaesthetic or light sedation.

The hospital will give you clear instructions about fasting:

- **No food or drink (except water) for six hours before your operation:**

You must not eat for six hours before a general anaesthetic or deep sedation. Your stomach needs to be empty because any stomach contents can come up the back of your throat and go 'down the wrong way', i.e. into your lungs. This could cause pneumonia or even death.

- **Drink water only up to two hours before your operation:**

You can still drink water up to two hours before, because your stomach absorbs water faster than food and other liquids. However if you drink water less than 2 hours before a general anaesthetic or deep sedation, the risks of fluid going into your lungs are the same as above

- **If you are a smoker:**
You should not smoke on the day of your operation, as this can cause breathing problems.
- **If you are taking medicines:**
You should continue to take these as usual on the day of surgery with a small sip of water, unless your anaesthetist, nurse or surgeon has specifically asked you not to. Bring all your medications with you on the day.
- **If you are taking blood thinning medications (e.g. warfarin, rivaroxaban, aspirin or clopidogrel):**
You may be asked to stop these for a few days before your operation to reduce the amount of bleeding. This will only apply to certain operations particularly adnexal (ocuplastics) procedures and your surgeon will let you know in advance if you need to stop these.
- **If you feel unwell on the day or day(s) before:**
Please phone the hospital or ward for advice as soon as possible.

When you arrive on the ward you will need to check in with the ward reception. The ward staff will show you where to wait, where to leave your things and let you know if you need to get changed. They will ask you a few additional questions, carry out further





checks, such as blood pressure, and give you eye drops if you need them.

Meeting your anaesthetist

If you are having a local anaesthetic, your surgeon will often discuss your anaesthetic with you. In some cases, an anaesthetist may also meet you before the operation. If you are having a general anaesthetic or sedation, you will normally meet your anaesthetist before your operation on the day of surgery.

The anaesthetist may want to examine you (e.g. listening to your chest, checking your jaw and/or neck movement). He/she will discuss the anaesthetic with you. You can ask questions if you have any concerns or queries at any time.

Time for the operation

The ward staff will advise you when it is time for your operation. A member of staff will escort you to the anaesthetic room on foot, or in a wheelchair/on a bed if necessary. You can wear your glasses, hearing aid and dentures until you are in the anaesthetic room. Jewellery and piercings should be removed or taped over. Once in the anaesthetic room, the theatre staff will do some final checks – your identification, any allergies, what operation you are having, and your consent form.

Appendix 1 – Local anaesthesia for your eye operation

What are the advantages of local anaesthesia?

A local anaesthetic generally works very well at preventing you from feeling any pain during the operation. It also gives you pain relief after the operation for up to several hours. It usually has fewer risks and side effects than a general anaesthetic, especially if you are elderly. This is because it doesn't normally affect any other part of your body, such as your breathing or your heart. People recover more quickly following surgery under local anaesthetic and can almost always go home on the same day. You can continue to take any prescribed medicine you are on, and should be able to eat and drink as normal.

I would really prefer a general anaesthetic – do I have a choice?

Yes – you have the right to be fully involved in all decisions about your care.

If you do have a strong preference for a general anaesthetic, you should discuss it with your anaesthetist and surgeon. Usually this will be fine, but there may be a medical reason why you should not have a general anaesthetic. You may also need to wait longer for your operation. Finally, some hospital sites are not able to provide operations under general anaesthetic.



Some patients may experience a drooping eye lid, known as ptosis, after a local anaesthetic to the eye. This usually wears off after a few hours but may occasionally last for a few days.

Serious complications are very rare

Although very rare, damage such as globe (eyeball) perforation, and damage to the optic nerve and eye muscles can happen. There may also be damage to blood vessels causing serious bleeding. Very rarely, these can permanently damage the eye or sight. There can also be effects on your heart, blood pressure and breathing and, very rarely, these can be serious or even life threatening. Your anaesthetist or eye surgeon will be able to provide more information about these complications.

Is there anything that makes a person unsuitable for a local anaesthetic to the eye?

Yes – in order to have a local anaesthetic, you will need to be able:

- to lie reasonably flat and still for the duration of the surgery.
- to follow simple instructions.

Local anaesthetic is not normally recommended if:

- we cannot position you adequately, while keeping you comfortable.
- you have an illness (eg Parkinson's) or a persistent cough that makes staying still difficult.
- you have severe hearing difficulties.
- you will have difficulty understanding what is being said.

- you have severe claustrophobia.
- you have a known allergy to local anaesthetics.

Please note that being unsuitable for a local anaesthetic does not necessarily mean that it will be safer for you to have a general anaesthetic.

Appendix 2 – Sedation

What is sedation?

Sedation is a general term for giving medications to make you less anxious, a little sleepy and more relaxed. These are administered intravenously, through a plastic tube (or cannula) that is placed in a vein in the back of your hand or arm. This cannula is also sometimes called a drip or 'butterfly'.

Sedation will be given to you in the anaesthetic room or operating theatre. It may be one or a combination of drugs administered either as a single dose or connected via a pump and given continuously through a tube.

Will I be asleep?

Sedation will not make you completely unconscious like a general anaesthetic. You will be partially or fully awake. You will need to be responsive and able to follow commands. Light or moderate sedation is usually given purely to reduce anxiety and, in most cases, it is best that you remain awake and cooperative.

Heavy sedation, known as deep sedation, is used for certain types of surgical procedures, particularly to the

eyelids. These drugs will make you very sleepy at first and then wear off a little. While you are sleepy the surgeon will numb the skin around your eye by injecting local anaesthetic liquid. As the local anaesthetic takes effect and numbs the eye, the sedative drugs will wear off. It is important that you can obey commands from the surgeon such as 'open your eyes' and 'look up' when asked to as part of the procedure.

How long will the drugs last?

Most of the drugs are short acting and the initial effects wear off within minutes to a few hours. However, you are advised **not to travel alone, drive, look after children alone or operate any heavy machinery** in the first 24 hours. It is also recommended that you do not make any life changing decisions, such as writing a will, in the first 48 hours.

What are the side effects or risks of sedation?

Most of the side effects are mild and wear off after a few minutes or hours, as the drug wears off.

Side effects vary depending on the drug used. The more common ones include:

- Nausea and sickness
- Itchiness
- Confusion
- Anxiety
- Hallucinations
- Drop in blood pressure
- Allergic reactions
- Difficulty breathing (see risks under 'GA information', page 4)

You will be monitored throughout your procedure, and medications can be given to counteract side effects or reverse the sedation.

Appendix 3 – General anaesthetic

What is a general anaesthetic?

General anaesthetics (or GAs) are medications or drugs used to cause a loss of consciousness so you are unaware and have a loss of sensation during surgery.

Anaesthetics interrupt the passage of signals along the nerves. This means that stimulation of the body is not recognised by the brain although the body does react to the anaesthetic in different ways.

How is the general anaesthetic given?

A general anaesthetic will be given to you by a specialist doctor, called an anaesthetist. The anaesthetist will induce 'sleep' using a liquid injection or a gas. Liquid injection is the most common way of starting the anaesthetic. The liquid will be injected into your vein through a cannula. This is a plastic tube that will stay in a vein in your hand or arm. After a few seconds you will start to sleep. Gas is occasionally used, which you inhale through a clear mask.

How do I stay asleep?

You will be kept asleep (anaesthetised) throughout the procedure either via the liquid anaesthetic pumping continuously into your veins, or by breathing the

anaesthetic gas through a tube in your mouth.

The anaesthetist will stay with you throughout the surgery, keeping you safe and making sure you are receiving the right amount of anaesthetic to keep you asleep. You will be connected to monitors that check your body function. You will also receive any other drugs and fluids that you need.

What happens to me when I fall asleep?

Once you are fully anaesthetized, a tube will be placed into your mouth to the back of your throat to maintain your breathing throughout the operation.

This is necessary because the anaesthetic drugs reduce your ability to breathe for yourself. Unless the operation is very quick, all patients need some kind of breathing tube for safe breathing.

This tube in your mouth is connected to a ventilator (breathing machine) that controls and measures your breathing, and delivers anaesthetic gas (if being used).

Muscle relaxant drugs may be used to temporarily paralyse your muscles, in order to facilitate the insertion of the breathing tube. This drug usually wears off after 30 to 40 minutes, or may be reversed by another drug at the end of the operation, to ensure the paralysis has completely disappeared by the time you wake up.

What other drugs will I be given?

While you are asleep you will likely be given pain-relieving drugs, anti-sickness drugs, muscle relaxants and

antibiotics, as needed. Intravenous fluids are often given through the drip to keep you from becoming dehydrated. You may also be given drugs to help keep your heart rate and blood pressure at normal levels.

How do I wake up?

At the end of the operation, your anaesthetist will turn off the anaesthetic drugs, and you will gradually start to wake up. At first you will still have the breathing tube in your throat. As you start to wake up, the tube will be removed and replaced with an oxygen facemask. This may happen in the operating theatre or the recovery ward. In the recovery ward a designated nurse will continue to monitor your blood pressure, oxygen levels and pulse rate. Once you are stable and more awake your cannula will be removed and you will be transferred back to the ward.

How will I feel afterwards?

You may feel a little drowsy for a few hours. Some people feel nauseous. If so, we can give you some anti-sickness medicine. The anaesthetic drugs should be out of your body within 24 to 48 hours. You may also have some pain after the surgery. We will try to control this as completely, and as quickly, as possible. The nurses and doctors will speak to you about what to expect, and will prescribe painkillers if you need them.



Appendix 4 – nausea and vomiting

Will I feel sick after my operation?

Not everyone feels sick after an operation or anaesthetic, although it is a common problem. Overall, about one third of people (one in three) will experience a feeling of sickness after having an operation, but it depends on what operation you are having, what anaesthetic and other drugs you receive, and on each individual (see below).

Why do some people feel sick after operations?

There are a number of factors that affect how likely you are to feel sick after an operation:

- The operation you are having – some cause more sickness than others
- Very long operations – your anaesthetist will be able to tell you if your operation is likely to cause post-operative nausea and vomiting
- Drugs that are used – some drugs are known to make sickness more likely, such as:
 1. Anaesthetic gases
 2. Pain relief drugs, especially opioids (i.e. morphine-based painkillers, such as codeine)

Who is more likely to suffer from post-operative sickness?

- Children
- Women
- Non-smokers

- Those who suffer from ‘travel sickness’
- Anyone who has suffered from postoperative sickness before

Excessive fasting and dehydration (i.e. not eating and drinking) before an operation can also contribute to feeling sick afterwards. While it is essential to avoid eating for six hours and drinking water for two hours before an operation under general anaesthetic or deep sedation, you should try not to go too far over these limits. Drinking plenty of water up to two hours before the operation is particularly important to ensure you don’t become dehydrated. Finally, being very anxious can make you more likely to feel sick, so please do tell your anaesthetist if you are feeling anxious. He/she may be able to reassure you, and/or offer you a medicine to make you feel more calm.

Travelling shortly after receiving a general anaesthetic

If you are going home the same day, you may find that you feel sick or vomit during the journey. You are more sensitive to travel sickness during this time.

I felt sick after my last operation. Will this happen after this operation?

Not necessarily. The possibility of experiencing sickness after surgery gradually declines as you grow older, but if you had sickness after surgery previously, you are more likely to have it again than if you have had a previous anaesthetic without any sickness. Your



operation may also be different and less likely to cause sickness. Tell your anaesthetist if you felt sick after any previous operations – it may be possible to tailor your anaesthetic to reduce the likelihood of a recurrence.

How long does the feeling of sickness last?

Usually the sensation of sickness lasts an hour or two, or stops following treatment. Uncommonly, it can be prolonged and last for more than a day.

Can feeling sick after an operation harm me?

Feeling sick or vomiting after an operation is distressing and unpleasant. It can make the pain of your operation feel worse, particularly if you are vomiting or retching (trying to be sick, but with nothing coming up). It can delay when you start eating and drinking after your operation. This may keep you in hospital longer. Very rarely, if vomiting is severe and persistent, it can cause more serious problems, such as damage to your operation site, tears to your oesophagus (gullet) or damage to your lungs.

Can anything be done to prevent me from feeling sick after my operation?

Yes, although the risk of sickness can never be completely eliminated. Your anaesthetist will assess your risk of sickness when they visit you before your operation. There are various ways in which your anaesthetist can change

your anaesthetic in order to reduce your chance of suffering sickness.

You are likely to be given anti-sickness medicines, called anti-emetics, as part of your anaesthetic. You may receive intravenous fluids via a cannula (fluid goes into a thin plastic tube placed in a vein – often called a drip). Fluid may be given for a variety of reasons, but studies have shown that in certain groups of patients, giving fluid can help to prevent sickness.

Is there any treatment available if I feel sick after my operation?

Yes. If you feel sick after your operation, the methods used to prevent you feeling sick can also be used to treat it. For example, you could be given anti-emetic (anti-sickness) drugs and intravenous fluids. Ask for help as soon as you feel sick.

What drugs may I be given and do they have side effects?

Anti-emetic drugs can be given as a tablet or an injection. Injections can be given intravenously into your cannula, or into your leg or buttock muscle. Intravenous injections work more quickly and reliably. There are several different types. A combination of anti-emetic drugs may be given, as this is more effective than one drug given on its own.

All medicines have some side effects, although with anti-emetics these are generally minor and temporary, or rare. The following are commonly-used anti-emetic drugs with their side effects.



How likely you are to get the side effect is given in brackets:

- **Cyclizine (valoid)** – may cause drowsiness and a dry mouth (common)
- **Ondansetron (zofran) or granisetron (kytril)** – can cause headaches (uncommon)
- **Dexamethasone** – although a steroid drug, the single dose given to prevent nausea and vomiting is not associated with the side effects seen with long-term steroid use. It can cause a temporary burning sensation in some areas of the body
- **Prochlorperazine (stemetil) or metoclopramide (maxolon)** – may cause tremors or uncontrolled body movements, known as an extrapyramidal reaction (rare)

Appendix 5 – Sore throat

Why do some patients get a sore throat?

During any general anaesthetic, your anaesthetist will use one or more airway devices to make sure that you can breathe freely with minimal risk of problems. The choice will depend on your medical condition and what operation you are having. He/she may use the following:

- **Face mask** – this is held firmly onto your face by your anaesthetist. Sometimes a separate plastic tube (a Guedel

airway), which sits over your tongue, is needed as well

- **Laryngeal mask airway** – this is a tube which sits in the back of the throat above the opening to the trachea (windpipe). It may have a soft inflatable cuff. When in place it allows gases to move freely in and out of the lungs. It does not prevent the entry into the lungs of stomach contents that may have collected in your throat. It is therefore not suitable for all operations
- **Tracheal tube** – this is positioned in your trachea and has a soft cuff, which is inflated. This tube protects the lungs from the entry of any stomach contents that have collected. There are a number of reasons why this type of tube might be used at Moorfields, including surgery on patients with gastro-oesophageal reflux disease and those who are overweight

All of these tubes or masks are placed after you are anaesthetised and you are not usually aware of their use. However, any of them may contribute to a sore throat after the operation, because of the following:

- During insertion, any of the tubes or the equipment used to accurately place them may cause irritation or minor damage to your throat. The tracheal tube and the



laryngeal mask airway may have a cuff, which is inflated for the duration of your anaesthetic. This may press on parts of your throat causing swelling and pain afterwards

- Anaesthetic gases and some drugs can dry your throat. This may contribute to a sore throat following your anaesthetic. Uncommonly, placement of an airway tube is technically difficult. It is possible that more significant damage to the vocal cords and other structures can, occasionally, occur in these circumstances

How likely is a sore throat to occur?

After a general anaesthetic with a tracheal tube the risk of developing a sore throat is estimated to be around two in five people. After a general anaesthetic with a laryngeal mask airway, the risk is estimated at about one in five. If any additional tubes are required in your nose or mouth, there is an increased chance of getting a sore throat. Women are more likely to get a sore throat than men, and younger patients are more likely to have a sore throat than older people.

What can be done about it?

There is some evidence that a sore throat can be prevented or reduced by the use of local anaesthetic or steroid applied directly to the throat before the tube is placed. However, for long operations local anaesthetic is likely to have stopped working before the end of

the operation. If a sore throat occurs, symptoms usually disappear without any specific treatment over the course of a few days. If the pain is severe, pain relief medicines such as paracetamol and gargling with soluble aspirin may help to reduce inflammation and pain.

What happens if the symptoms do not disappear?

If your symptoms have not disappeared after two days, or if you have a persisting hoarse voice, you should contact your GP for further advice. If, at any time, you are having difficulty breathing or cough up blood, you should contact your GP or your anaesthetist urgently for further advice.

Appendix 6 – Shivering

Shivering after an operation is a very common problem. Although it can be very distressing, shivering is not usually dangerous and should stop within 20 to 30 minutes. It can occur after a general anaesthetic and during or after local anaesthetic or sedation.

What causes it?

Most of the time, shivering after an operation is due to a fall in your body temperature. Anaesthetic drugs and gases can contribute to this fall by reducing your body's natural ability to regulate your own temperature.

Shivering may also occur without a fall in body temperature. It can be caused by anaesthetic drugs and gases, and is more likely if you have pain following your operation.



What is done to prevent it?

Care is taken to keep you warm before, during and after your operation. If you are kept warm before your operation, you are less likely to be cold afterwards. There are some things that you can do to help you stay warm before your operation:

- Remember that the hospital may be colder than your own home. Bring warm clothing, such as a dressing gown, to keep you comfortably warm before your operation.
- Tell staff if you feel cold at any time during your hospital stay. By keeping warm before your operation, you can help avoid shivering afterwards.

Depending on the length and type of your operation, your anaesthetist and recovery nurses may use some other ways to keep you warm. These can include heating any intravenous fluids that you may receive and using a heated blanket filled with warm air.

How often does shivering happen?

Even using measures to prevent a fall in body temperature, shivering may still occur in up to one in four patients following a general anaesthetic. The risk of shivering is increased in younger patients and during long operations.

What can be done if shivering occurs?

Your temperature will be measured before and often during the operation. When you get to the recovery room, your temperature will be measured again. If you are cold, the nurses will use warming blankets to help warm you up again. This is usually all that is required to stop shivering, although it may take some time for your temperature to return to normal.

There are also a number of drugs which can be used to treat shivering, although it is usually considered best to wait until the shivering stops on its own. None of the drugs is 100% effective and all may have side effects. The most effective drugs include pethidine, clonidine and doxapram. If you are in pain following your operation, treatment of your pain may also help to reduce your shivering.

Shivering will stop on its own and, although distressing, it is generally not dangerous. It does, however, increase your body's requirement for oxygen so you may be given additional oxygen via a mask.

A nurse will be with you in the recovery room and they will make sure that you are warm and as comfortable as possible following your operation. When you are ready to drink, hot or warm drinks are a good idea, as they will help to warm you up. Having suffered from post-operative shivering in the past does not mean that you will shiver after future operations.

Appendix 7 – Damage to the lips, teeth and gums





During a general anaesthetic, it is possible for your teeth to be damaged. This happens in about one in 4,500 general anaesthetics. Minor damage to the lips or tongue is very common. More serious damage to the tongue is rare.

Why does damage happen?

General anaesthesia is a state of controlled unconsciousness. When you are anaesthetised, you become less able to breathe freely through your nose or mouth. Your anaesthetist will insert a breathing tube or other airway device to ensure that you can breathe properly – this is essential for your safety. The devices used are described in more detail above (Appendix 5). The placement and removal of these devices can sometimes cause damage to the teeth or soft tissues of the mouth.

What type of damage may occur?

Minor cuts or bruising to the lips and tongue are common, probably occurring in about one in 20 general anaesthetics. These injuries heal very quickly and can be treated with simple ointments.

Sometimes teeth or dental work such as crowns, bridges, implants or veneers may be broken, chipped, loosened or completely removed by accident. The most frequently damaged teeth are the top front teeth (incisors). Damage to a tooth requiring subsequent removal or repair occurs in about one in 4,500 general anaesthetics. Occasionally, pressure from an airway device causes damage to nerves which control

movement and feeling in the tongue. This can cause numbness and loss of normal movement of the tongue for a period of time. These changes usually recover over a period of weeks or months.

How does damage to teeth occur?

The placement of a breathing tube to keep you breathing safely after you are anaesthetised is not always straightforward. Anaesthetists are trained in the use of these airway devices but, even in skilled hands, there may be some technical difficulty and a degree of force may be needed. This can sometimes lead to damage to teeth, lips or tongue. Damage to teeth, lips or tongue can also occur during the operation or at the end of the operation as the device is removed. This is due to unexpected biting or other jaw movement. Damage is more likely if your teeth are already loose or damaged.

What about false teeth?

You will usually be asked to remove false teeth before a general anaesthetic. This is because they may be dislodged or damaged as your anaesthetist places the airway device. Sometimes, your anaesthetist may ask you to leave your false teeth in place. This is most likely if you have teeth of your own among the false teeth and your anaesthetist thinks the false teeth will help protect your own teeth.

Who is at increased risk of damage to teeth?





Anyone undergoing a general anaesthetic is at some risk. Wherever possible, your anaesthetist will assess your airway before the anaesthetic starts, and may:

- Look in your mouth
- Ask you to move your neck
- Ask you about your teeth and any crowns, bridges, veneers, implants or loose teeth that you may have

The following factors mean that damage is more likely:

- Reduced mouth opening
- Reduced neck movement
- Prominent upper teeth or small lower jaw
- Certain medical conditions such as rheumatoid arthritis and ankylosing spondylitis
- People requiring an emergency general anaesthetic
- People who are very overweight
- People with teeth and/or gums in poor condition (large amounts of decay, failing dental work, loose teeth). Most tooth injuries happen to people with teeth already in poor condition, or with crowns, bridges, veneers, or implants on their front teeth
- People who need to have a new breathing tube inserted after the operation has started (which is occasionally necessary if the existing airway becomes unsatisfactory during the operation). Insertion of an

alternative airway device may be more difficult

Your anaesthetist will be able to tell you if you have any features described above, which could make it more difficult to insert an airway device. However, difficulties can also arise unexpectedly, without a specific risk factor being apparent in advance.

What about orthodontic appliances?

Increasingly, children and young adults are benefitting from orthodontic treatment. If you have removable braces, your anaesthetist will probably ask you to take them out. Fixed orthodontic devices are left in place, but are vulnerable to damage. Even in skilled hands it is possible that insertion and removal of airway devices, or the removal of secretions from the mouth with suction, may result in dislodgement of brackets, wires or bands. It is important that you talk to your anaesthetist about any orthodontic appliances that you have.

What steps are taken to prevent damage to my teeth?

All anaesthetists are trained to avoid damage to teeth as far as possible. Your anaesthetist will take maximum care during the insertion of any airway devices, and place the breathing tube as gently as possible. If you have any features that make it more difficult to insert a breathing tube, your anaesthetist will choose a suitable technique which will allow safe



insertion. This should be discussed with you beforehand.

Is there anything I can do to prevent damage to my teeth?

If your teeth or gums are in poor condition, or any teeth are loose, it is advisable to visit your dentist before a planned operation for a check-up and dental assessment. Please alert the anaesthetist to any loose teeth or dental work before your operation. If you know there have been difficulties with placing a breathing tube in your airway before, or you have had damage to your teeth during a previous anaesthetic, it is important to tell your anaesthetist. It may be necessary to find your previous anaesthetic records to find out exactly what happened. It is helpful if you tell the surgeons and anaesthetists caring for you as early as possible. Your GP could do this for you, or you can tell the surgeon or the nurses at the pre-assessment clinic. If your anaesthetist tells you that there were difficulties, it is very helpful if you know what the difficulties were. If you are not sure, ask your anaesthetist to write them down in a letter for you to show to anaesthetists in the future.

What happens if my teeth are damaged during an operation?

Your operation should proceed as planned. If a tooth has become completely dislodged it must be secured or removed before you wake up. If a tooth is chipped or cracked, any fragments will be removed and the anaesthetist will record the damage.

You will be informed when you have recovered. Immediate treatment will involve pain relief, if required, and an explanation of what has happened. The tooth may require repair, re-implantation or extraction depending on the nature of the injury and pre-existing health of the tooth. Damage to veneers, crowns, implants, bridges or fixed orthodontic appliances may require repair. This treatment will need to be done or arranged by your own dental practitioner, as he/she is in overall charge of your dental care.

How likely is damage to teeth, lips and tongue?

Minor injuries to the lips or tongue are common, and are often unreported which means accurate figures do not exist. A small study of 404 patients suggests that minor injuries occur in about one in 20 patients. Damage to a tooth which requires subsequent repair or extraction happens in about one in 4,500 general anaesthetics. This figure comes from a large study of just under 600,000 patients. Nerve damage to the tongue due to pressure from airway devices is reported, but accurate figures do not exist. It is likely to be rare or very rare.

Appendix 8 – Becoming confused after an operation

Becoming confused is a fairly common risk after an operation. Confusion predominantly affect patients aged over 65 after a general anaesthetic or deep sedation.



Behaviour and memory can also be affected, and there may be some deterioration in more complex mental functions such as the ability to get dressed or do the crossword.

There are two types of confusion which can occur after surgery and an anaesthetic:

1. **Delirium** (or post-operative delirium) is a short-term complication which happens very soon after an operation. It has a number of causes which are often treatable, and usually resolves within hours to a few days
2. **Post-operative cognitive dysfunction** (POCD) is a more persistent decline in brain function. Its cause is not well understood, but it most commonly affects those over 60. It usually gets better over weeks to months, but there is some evidence that in a few people it may be permanent

Neither of these is the same as dementia, which is a progressive disease of the brain. However, people with existing dementia are more likely to experience both post-operative delirium and POCD.

Occasionally, mild early dementia has not been noticed by the patient or friends and family, and may appear to have been precipitated by the operation. Post-operative delirium and POCD are distinct entities, but some

elements (for example poor memory) be features of both, as well as of dementia.

What is post-operative delirium?

Delirium is a state of confusion. It can happen during an illness as well as after an operation. After an operation the person usually wakes up behaving normally. The confusion appears during the first few days after the operation. The severity of symptoms varies and tends to fluctuate over the course of the day, being better in the mornings and worsening in the evening and at night. It can be frightening – certainly for the person who is affected, but also for the patient's relatives and friends.

What is it like to have delirium?

Symptoms – and their severity – vary considerably in different people. Some people become agitated and confused. Others become quiet and withdrawn. Here are some typical symptoms:

- Not knowing your own name or where you are
- Not knowing what has happened to you or why you are in hospital
- Loss of memory – being unable to recognise family members
- Reversal of sleep patterns – sleeping during the day and being awake at night
- Being incoherent, shouting and swearing
- Emotional changes such as tearfulness, anxiety, anger or aggression

- Trying to climb out of bed, and pulling out drips and tubes
- Appearing indifferent to whatever is going on
- Becoming paranoid and thinking that people are trying to harm you – this can be particularly distressing for friends and relatives
- Occasionally, there may be visual or auditory hallucinations (seeing and hearing things that do not exist)

simply due to lack of glasses or hearing aids

- Low oxygen levels due to:
 - Effects of the anaesthetic
 - Effects of medicines on breathing, especially medicines for pain relief
 - A chest infection
 - Other lung problems

Friends and relatives can help the relative who has become confused and disorientated post operatively by making sure that glasses and hearing aids are available, and by quietly reassuring the person about who they are and what has been happening.

Why does post-operative delirium develop?

In the first few days and weeks after your operation, your body is repairing itself. The body's response to the physical challenge of recovering from surgery can affect the way the brain works. Some specific contributing factors, many of which can be effectively treated, are listed below:

- Infections, such as wound, urine and chest infections
- Poor pain control
- Side effects of the medicines for pain relief and other medicines
- Dehydration
- Inadequate nutrition
- Prolonged constipation
- Sleep disturbance
- Not taking the drugs that you were taking before the operation
- Loss of vision and hearing makes symptoms and behaviours of delirium worse – sometimes

Who is at risk of developing delirium?

Some people are more likely to develop delirium. This includes people with:

- Existing dementia or brain disorders
- Advanced age
- High alcohol intake
- Poor mobility (unable to walk about easily)
- Previous surgery, especially hip or heart surgery
- Depression
- Poor eyesight or hearing
- Heart failure

Does delirium improve and go away?

In most people who develop delirium, it usually improves once any identified causes are treated. However, patients who suffer delirium are likely to stay in hospital longer than those who do not.



There is a slightly increased risk that people who have had severe delirium will end up living less independently than before.

What is post-operative cognitive dysfunction (POCD)?

POCD involves experiencing difficulty with the higher mental tasks that people use every day. For example, concentrating on a story or film, recalling what was recently heard or said, completing several tasks at the same time, doing a crossword, or making a shopping list. At first, recovery from the operation may seem to be going well. Then, during the weeks or months after the operation, the patient (or their family and carers) may gradually notice struggling with tasks which they found easy before the operation, like performing mental sums or playing chess. The severity of POCD can be very variable. Some people may notice only subtle memory changes, while others may find they can no longer complete tasks which they were previously able to perform without difficulty.

Do you ever fully recover from POCD?

POCD tends to resolve as healing from the operation continues, but full recovery may take months or even years. It is difficult to measure the symptoms of POCD, which is why doctors are not certain how often it happens. One study suggests that 10% of people have POCD three months after their operation, but only 1% after

one year. Furthermore, most of the evidence comes from patients having major surgery, so there is no reliable data for POCD rates following eye surgery.

What is it like to have POCD?

Most people with POCD feel quite normal when they first come out of hospital. However, as they return to normal life, they start to notice that things are not as they were before surgery. A problem with memory is one of the first things they notice. For example, they go to the shops and then cannot remember what they wanted to buy. Items are misplaced around the house, and it may be difficult to remember the names of people they do not see very often. There can be difficulty learning to use a new gadget, and the ability to calculate and problem-solve can be affected. This can be a frightening period, and independence and confidence generally may be reduced. However, with support, people with POCD can develop strategies to cope – for example using calendars and lists to help with everyday activities.

Why does POCD develop?

The cause of POCD is unclear. Problems with the blood vessels of the brain, reduced blood pressure during and after surgery, stress levels while in hospital, genetic susceptibility, and increased inflammation in the body and brain have all been suggested as causes.



Some medicines given in hospital seem to be more likely to be associated with POCD, but it is unclear whether these medicines actually cause POCD. POCD may be more likely to develop in patients who have general anaesthesia or deep sedation than just local anaesthesia and/or light sedation.

Who is at risk of developing POCD?

The problem with studies on POCD is that it is difficult to measure with certainty the types of mental function that are affected. This list shows who is probably more likely to be affected, although many people with these risk factors go through surgery without developing POCD:

- People having major surgery (which does not include eye surgery) in particular open heart surgery, or who need to have repeat operations before they leave hospital
- People over the age of 60, although some studies show it can also occur in younger people
- People having long operations (i.e. last several hours), which is uncommon in eye surgery
- People who have a serious infection or breathing difficulty after surgery
- People with a lower level of education

Confusion after an operation – can I do anything to help?

If you have decided to have an operation, then you are accepting the risk that you may develop delirium

and/or POCD, or both. The risk of both is low, however, and in general should perhaps not put you off having important life-saving or life-altering surgery.

Here are some things that you can do which may help prevent becoming confused.

- Before the operation, try to improve your health as much as possible. Eat a good diet and take a sensible amount of exercise. It is a good idea to give up smoking and lose weight if you are overweight.
- Ask your anaesthetist if there are any alternatives to a general anaesthetic. This will not guarantee that you will not suffer from delirium, but may help. You can find out more on the Royal College of Anaesthetists website: www.rcoa.ac.uk/patientinfo.
- If you are having a minor or moderate operation and have someone at home to look after you, you may be able to go home on the same day. This reduces the risk of becoming confused.
- Make sure that you have your glasses and hearing aids with you, and that spare batteries are available if needed.
- Make sure that you bring all of your medications into hospital with you so that your doctors know what you are taking, and so that they can be continued.

- If you drink a lot of alcohol you should take advice on how to cut down safely. Your GP or practice nurse will be able to help you with this. You should also tell your doctors in hospital how much you drink.
- It can help if friends and family understand that you may become confused afterwards. Remember that some degree of confusion is very common and most people make a good recovery.

- Sometimes your heart rate will become faster
- Some patients, especially older people, become confused – this is usually temporary and is likely to improve as the chest infection gets better

Appendix 9 – Chest infection

What is a chest infection and why can it happen after surgery?

Chest infections are caused by bacteria or a virus. General anaesthetics affect the normal way that phlegm (sputum) is moved out of the lungs. As a result, phlegm can build up in the lungs. Within the phlegm an infection can develop. Pneumonia is a type of chest infection and you may also hear the name lower respiratory tract infection or LRTI.

How will I know if I get a chest infection?

- You may feel very unwell and tired
- You may have a high temperature
- You may have a cough that brings up thick yellow or green sputum (phlegm)
- It will become harder to breathe, and your breathing may be quite fast
- Chest pain can be a sign of a chest infection

Who is most likely to get a post-operative chest infection?

The following factors make a post-operative chest infection more likely:

- Increased age (over 50)
- Having a long-term medical condition – for example, diabetes, kidney disease, asthma or chronic obstructive pulmonary disease
- Having an ongoing upper respiratory tract infection (URTI) such as a cold, sore throat or flu
- Being very overweight
- Being a smoker
- Having a weakened immune system. This makes a person less able to fight off bacterial or virus infections. This includes people who have a long-term disease of the immune system or who are on medications at home that suppress their immune system, such as steroids
- Being immobile after surgery and unable to get out of bed due to a pre-existing problem with moving about

How likely am I to get a chest infection?

The risk is very variable depending on all the factors listed above. However



people with none of the risks above are very unlikely to get an infection.

How serious is it if I get a chest infection?

If you were previously healthy, you are very likely to recover fully from a post-operative chest infection. However, rarely, people who were well before their surgery die from pneumonia afterwards. If you were not previously healthy and had longstanding lung disease or another longstanding illness, then you are more likely to have a serious life-threatening post-operative chest infection. However, many people with previous lung disease recover after a post-operative chest infection. Your anaesthetist will be able to talk to you about the risks that apply to you.

What can I do to prevent a chest infection?

Smokers are more likely to get a chest infection after an operation. Giving up smoking, even a few days or weeks before coming into hospital, will allow the damaged linings of your airways to begin to repair. This reduces your risk of getting an infection. However you will gain the most if you can give up smoking at least two months before your operation.

If your risk of getting a chest infection is thought to be too high, you may be advised to avoid a general anaesthetic and have surgery under local anaesthesia (provided this is possible for your type of surgery). Your anaesthetist and surgeon will be able to

advise you on this. If a general anaesthetic is unavoidable, your anaesthetist will do everything possible to help prevent a chest infection.

What is the treatment for a post-operative chest infection?

If you develop any of the above symptoms after your operation then you must visit your GP for advice and treatment. If you develop any severe problems with your breathing while you are in Moorfields Eye Hospital you will be transferred by ambulance to another hospital with more extensive facilities.

Appendix 10 – Awareness during anaesthesia

What is awareness?

Awareness means becoming conscious during some part of your operation under general anaesthetic when you are supposed to be asleep, i.e. “waking up in the middle of your operation”. The majority of patients who suffer awareness do not feel any pain, but may have memories of events in the operating theatre. Dreaming around the time of an operation is very common (six in 100) but this is not the same as awareness. Similarly, some patients recall events from the recovery room as they are ‘coming round’ from their operation and may interpret this as memories of the surgery. You will be awake (as intended) during an operation under local anaesthetic and/or with sedation.

How and why does it happen?

Your anaesthetist is present throughout the whole operation and he/she





monitors you continuously to ensure that you are receiving enough anaesthetic to keep you fully unconscious, but not so much that you suffer serious side effects. Anaesthetics have side effects that increase as more anaesthetic is given. These include falling blood pressure and reduced breathing.

Awareness can occur if you are not receiving enough anaesthetic to keep you unconscious, or if the equipment that delivers the anaesthetic to your body malfunctions. This is why the 'depth of anaesthesia' is continually monitored, and all equipment contains alarms to alert the anaesthetist immediately to any problems with the equipment.

How common is it?

Most studies of 'accidental awareness under general anaesthesia', which include interviews with many thousands of patients, show that the chance is very rare. Roughly one patient out of every 10,000 to 20,000 patients experience some kind of awareness under anaesthetic. Only one third of these people feel pain, although the experience can still be very distressing.

Most cases have happened to people who had certain risk factors. Where no risk factor was present, the risk was one in 42,000 anaesthetics.

Awareness is slightly more likely if you are having open heart surgery, caesarean section (an operation to deliver a baby) or surgery after a major

accident. A recent survey of anaesthetists in the UK estimates that around one person per 15,000 patients reports awareness.

Awareness may be explicit or implicit. 'Explicit awareness' refers to the conscious recollection of events, either spontaneously or as a result of direct questioning. With 'implicit awareness' patients have memories they may not be able to recall, but which can still affect their emotions or behaviour.

Are there any long-term effects?

Some people who have been aware during a general anaesthetic suffer long-term effects. These include anxiety, fear of anaesthesia, sleep disturbances, nightmares, flashbacks and in some cases post-traumatic stress disorder.

If I think I have been aware, what should I do?

You should tell one of the staff looking after you as soon as possible. You can tell your nurses or doctors or, if you are already at home, your GP. They will contact your anaesthetist, who will arrange to talk to you about your experience, and discuss with you exactly what you remember. He/she will try to work out if you have been aware, or if what you remember are dreams or relate to things that happened while you were waking up after your operation. Establishing exactly what you remember may help clarify any problems during your operation.





Talking about your experience and understanding how it might have happened may help also you process what happened to you.

If you or the team looking after you feel that psychological support, counselling or cognitive therapy might be helpful, a referral can be made to your GP for this to be arranged.

Can awareness be avoided?

We take every possible precaution to minimize the risk of awareness.

Firstly, the anaesthetic equipment is checked every day to make sure it's working properly. If any faults are discovered, they will be fixed (or a working replacement found) before any further anaesthetics take place in that operating theatre. Secondly, all anaesthetists are trained to spot equipment problems, and to act promptly in the event of sudden equipment failure or failure of anaesthetic delivery for any other reason. Thirdly, you will also be continuously and fully monitored throughout any operation under general anaesthesia. This includes monitors which show the amount of anaesthetic in your body, and/or your 'depth of anaesthesia' based on electrical signals from your brain.

These measures all help to minimize the possibility of accidental awareness. However, it is very important you tell your anaesthetist about any previous episodes of awareness.

Are there any circumstances where awareness is more likely?

If you take certain medications you will require more anaesthetic. These include alcohol (prolonged, heavy use), some types of sleeping tablets and morphine-like drugs. It is very important that you inform the anaesthetist of all your regular medications.

Appendix 11 – Serious allergy or anaphylaxis

What is anaphylaxis?

Anaphylaxis is a severe, life-threatening allergic reaction. Allergic reactions can occur in response to many things – pollen, dust, bee stings, nuts and antibiotics are common causes. These are called allergens. Rarely, anaphylaxis can happen during an anaesthetic, either caused by one of the anaesthetic drugs or by other substances used during surgery.

We meet thousands of allergens in everyday life and they usually do us no harm whatsoever. Sometimes, for reasons we don't fully understand, the body makes substances called antibodies (normally made to fight infection or eliminate harmful substances in the body) against allergens which are not normally harmful.

Each antibody is a unique match for its own allergen, and will be produced rapidly if the allergen appears in the body in the future. This is known as sensitisation. If they meet the same, or a very similar, allergen again at a later date, the antibody-allergen combination



may cause the release of histamine and other chemicals. These chemical substances that are released are called mediators and they can cause the symptoms of allergy. If only small amounts of mediators are released, the symptoms are minor – for example, hay fever or skin rashes. If large amounts of mediators are released, this creates a severe allergic reaction called anaphylaxis.

How do I know if I'm having an anaphylactic reaction?

There may be severe difficulty with breathing (wheezing), low blood pressure or swelling inside the throat, tongue and lips. Severe anaphylaxis is life threatening but, with prompt treatment, death from anaphylaxis is very rare.

There are some reactions that cause similar symptoms, but are not due to antibody production. It can be more difficult to identify the exact cause of these reactions.

How is anaphylaxis treated?

Any medicine that might have caused the reaction should be stopped immediately. If the pulse is weak, the affected person should be laid flat on their back and their legs should be raised. This is the quickest way to improve the blood pressure.

Adrenaline is the most effective drug treatment and is given as a series of injections. In hospitals, oxygen and an intravenous drip are also used.

Antihistamines, steroids and asthma treatments might be needed. Usually the symptoms will settle down quite quickly, but continued observation will be required, often necessitating an overnight stay in hospital. If this happens while you are being treated at Moorfields Eye Hospital, we will transfer you to a hospital that has an Intensive Care Unit (ICU). If the operation has not already started, surgery will almost certainly be postponed unless it is very urgent.

All anaesthetists are trained in how to treat anaphylaxis. Adrenaline is immediately available in every operating theatre. It is extremely important that any episode of anaphylaxis is investigated in detail, so that the drug or other substance responsible can be identified and avoided in the future. Investigations include blood tests taken at the time of the reaction and skin testing at a later date.

How frequently do anaesthetics cause anaphylaxis?

Nobody knows exactly. At the moment, the best estimate is that a life-threatening anaphylactic reaction (anaphylaxis) happens during one in every 10,000 to 20,000 anaesthetics.

Most people make a full recovery from anaphylaxis. We do not know how many anaphylactic reactions during anaesthesia lead to death or permanent disability. A recent nationwide audit found that 96% of patients with life-threatening anaphylaxis survived, but





around one third of them suffered some form of harm (the commonest of which was anxiety about future anaesthetics).

What can cause anaphylaxis during an anaesthetic?

During any operation and anaesthetic, it is normal to have contact with a wide range of potential allergens (unfamiliar substances). Many of these could potentially cause an allergic reaction, but some are more likely to do so than others. Anaphylaxis is more likely when drugs are given intravenously.

The three most common causes of anaphylaxis during anaesthesia are:

1. Antibiotics – these are often needed during surgery
2. Drugs to prevent movement during surgery (muscle relaxants)
3. Chlorhexidine (a skin antiseptic often used before surgery)

Your anaesthetist will choose drugs for your anaesthetic, taking into account many different factors, in particular the type of operation, your physical condition and whether you are allergic to anything. All drugs, including anaesthetic drugs, are carefully tested before they are licensed for general use. In the UK every serious reaction should be reported to the Medicines Control Agency and the Association of Anaesthetists of Great Britain and Ireland’s National Anaesthetic Anaphylaxis Database. If

you were to suffer an anaphylactic reaction, your anaesthetist will make sure that this is done.

What factors could make anaphylaxis more likely?

Anaphylactic reactions during anaesthesia occur more often in women than men. Latex allergy is more common in people with allergies to certain fruits and nuts (particularly bananas, avocados and chestnuts), and in people who have frequent exposure to latex, such as hospital workers and those who have had several surgical operations. Some people who have multiple allergies or allergic asthma may be more likely to experience anaphylaxis than people who have no known allergies. Most severe reactions are unpredictable.

Is allergy to anaesthetics hereditary?

No – if you are allergic to an anaesthetic drug, your children are no more likely to have the same allergy than any other person. Some very rare non-allergic problems with anaesthetic drugs can occur in families, for example suxamethonium apnoea, where some muscle-relaxant drugs can last longer than usual, and malignant hyperthermia, where the body can become very hot. These are not allergic conditions.

Is there anything I can do to help avoid serious allergy?

You may already know that you are allergic to certain medicines or substances. When you come into hospital, you will be asked several



time if you are allergic to anything. It is very important that you pass on this information to the health professionals looking after you. You will also be given a red ID bracelet to remind all staff that you have an allergy.

Can I be tested for anaphylaxis before I have my anaesthetic?

Routine skin testing is not currently recommended, except for some people who have had a serious allergic reaction during an anaesthetic in the past.

There are two reasons why routine skin testing is not currently recommended before surgery. The most important reason is that a negative skin test to a particular drug does not guarantee that you will not experience an anaphylactic reaction to the same drug in the future. Skin tests are only a guide because the response of the skin to a tiny amount of the drug is not necessarily the same as giving a much larger dose of the drug directly into a vein during the anaesthetic.

The second reason is that it is possible to become sensitised to some anaesthetic drugs without ever having received the drug previously. Some common chemicals are similar to certain anaesthetic drugs. It is possible to become sensitised to these anaesthetic drugs in everyday life after the skin test has been done.

An important exception is latex allergy. If you have any symptoms of latex allergy – for example, itching or a rash

after exposure to latex rubber in children's balloons, rubber gloves or condoms – then you should be tested for latex allergy before your surgical operation. There are two types of test – a skin test and a blood test. Which of the tests you have will depend on their availability in your locality. If you believe you may be allergic to latex you should tell your GP well in advance of going into hospital for surgery; it is possible for the GP to send a blood sample for latex testing. It usually takes a week or two for the result to come back.

If I am allergic to an anaesthetic drug, are alternative drugs available?

Yes, there are many different anaesthetic drugs and alternatives can almost always be given. Occasionally a person is allergic to several muscle-relaxant drugs and we advise the avoidance of all drugs of this type. If a person is allergic to an antibiotic or a skin antiseptic, safe alternatives are available.

What should I do if I think I have had an allergic reaction during an operation in the past?

If you think you might have had an allergic reaction during or after previous surgery, it is important to try to find out whether it was an allergic reaction and what caused it. It may be possible for your GP to find out what caused the problem from your hospital consultant. If your GP thinks it is appropriate, you may be referred to an allergy clinic to help to find the cause.



Where can I get more information about anaphylaxis?

- Your GP or your anaesthetist
- 'Suspected Anaphylactic Reactions associated with Anaesthesia', published by the Association of Anaesthetists of Great Britain and Ireland, and the British Society of Allergy and Clinical Immunology
- 'National Audit Project 6: Perioperative Anaphylaxis (2018)', published by the National Institute of Academic Anaesthesia <https://www.nationalauditprojects.org.uk/NAP6home>
- Allergy UK (www.allergyuk.org)

Where can I get more information about other unwanted effects of anaesthetic drugs?

British Malignant Hyperthermia Association (www.bmha.co.uk)

Appendix 12 – Death and brain damage

Why do deaths occur during general anaesthesia?

It is extremely rare for death to occur during anaesthetic. Most deaths occur around the time of surgery and are not directly caused by the anaesthetic.

There are four main reasons:

1. There may be things about your health or the type of operation you are having that increase the risk of dying during a general anaesthetic.
For example, death is more likely if:

- You are elderly and/or have several longstanding medical conditions.
- You need major surgery on your heart or lungs, brain, major blood vessels or bowels.
- You need emergency surgery, including surgery for major trauma.
- You are very unwell before your operation.

2. There may be an unexpected allergic reaction to the anaesthetic drugs given. Life-threatening allergic reactions are rare. They occur in less than one in 10,000 general anaesthetics, and 96% of patients survive.

3. You are undergoing high risk surgery (eye surgery is not considered high risk)

4. The anaesthetist may make a misjudgment or an error, perhaps by giving too much of a drug or the wrong drug. However, modern anaesthetic techniques, training, monitoring and equipment mean that deaths caused by anaesthetic errors are very rare, occurring in about one in 185,000 general anaesthetics given in the United Kingdom.

What is the risk of dying during a general anaesthetic?

Exact figures are not available. Some facts and figures are given below. If you are a healthy patient who is having non-

is monitored before the anaesthetic starts, during the anaesthetic and afterwards into the recovery period. The anaesthetist chooses the appropriate doses of drugs according to the information obtained from the monitors, and his/her experience and clinical judgment. There is continuing research aimed at making the drugs and techniques used by anaesthetists ever more safe for patients.

Is there anything I can do to prevent the risk of death or brain damage?

If you are having non-emergency surgery, then there are several things you can do to improve your physical condition that will reduce the risks associated with anaesthesia. This includes:

- Losing weight (if you are overweight)
- Giving up smoking
- Eating well to improve your nutritional state
- Taking regular exercise
- Ensuring any long-term medical condition (such as asthma, diabetes or high blood pressure) is well-controlled before your operation

Further information can be found in the patient information leaflets on the Royal College of Anaesthetists website: <https://www.rcoa.ac.uk/patientinfo>

Summary

- Most deaths that occur around the time of surgery are not directly caused by the anaesthetic
- For healthy patients undergoing

surgery which is not major and not an emergency, dying or suffering brain damage from a general anaesthetic is very rare.

- The risk of death or brain damage under general anaesthetic increases if you are older, are having major or emergency surgery, or if you were severely ill or injured before the operation.
- These risks vary greatly depending on your individual circumstances.
- However, most eye surgery is generally minor, and rarely an emergency.

Your surgeon and anaesthetist will be able to tell you more about your individual risks and then you can decide whether you want to go ahead with the operation.

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Phone: 020 7253 3411
www.moorfields.nhs.uk

Moorfields Direct telephone helpline
Phone: 020 7566 2345
Monday-Friday, 8.30am-9pm
Saturday, 9am-5pm
Information and advice on eye conditions and treatments from experienced ophthalmic-trained nurses.



Patient advice and liaison service (PALS)

Phone: 020 7566 2324/ 020 7566 2325

Email: moorfields.pals@nhs.net

Moorfields' PALS team provides confidential advice and support to help you with any concerns you may have about the care we provide, guiding you through the different services available at Moorfields. The PALS team can also advise you on how to make a complaint.

Your right to treatment within 18 weeks

Under the NHS constitution, all patients have the right to begin consultant-led treatment within 18 weeks of being referred by their GP. Moorfields is committed to fulfilling this right, but if you feel that we have failed to do so, please contact our patient advice and liaison service (PALS) who will be able to advise you further (see above). For more information about your rights under the NHS constitution, visit www.nhs.uk/choiceinthenhs

