Risks associated with your anaesthetic

Section 14: Death or brain damage

This article provides information about the risk of dying or getting significant brain damage during an anaesthetic.

It can be difficult to separate the risks of surgery and the risks of the anaesthetic when considering what happens during an operation. This article therefore includes some information about surgical risks too. However, your surgeon will be able to tell you more about the specific risks of your operation.

Why do deaths occur during general anaesthesia?

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 older
   - you need major surgery on your heart or lungs, your brain, your major blood vessels, or your 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 that are given. Life-threatening allergic reactions occur in less than 1 in 10,000 general anaesthetics, and many are followed by a full recovery. More information can be found about serious allergies during an anaesthetic in Section 9 in this series.

3 The surgeon may find that the surgery is very difficult to achieve without damage or he/she may make an error during the operation. Specific risks of your operation should be explained to you before you sign your consent form. After the risks have been explained to you, you can decide whether you want to go ahead with the operation.

4 The anaesthetist may make a misjudgment or an error, perhaps by giving too much of a drug or giving the wrong drug. Modern anaesthetic techniques, training, monitoring and equipment mean that deaths caused by anaesthetic errors are very rare, occurring in about 1 in 185,000 general anaesthetics given in the United Kingdom.[1]

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-emergency surgery, the short answer is that death is very rare. An exact figure is not known, but is around 1 death per 100,000 general anaesthetics.[2]
- If you are having surgery as a day-case patient (going home the same day), the risk of death from general anaesthesia is even lower. This is because if you have been accepted for day-case surgery you will be reasonably healthy and you will not be having major surgery.
- As already stated, the risk increases:
  - if you are older
  - if you are having major or emergency surgery

- if you have previous problems with your health, especially heart or lung disease
- if you were ill or injured before the operation.

However, the risk of dying is still usually low. An exact figure is difficult to quote, but your anaesthetist will be able to talk to you about it.

- For every 100,000 Caesarean sections, one death happens which is said to be due to the anaesthetic alone. The rate is higher for emergency Caesarean section performed under a general anaesthetic compared to elective (planned) Caesarean section performed under a regional anaesthetic (a spinal or epidural anaesthetic). The overall death rate from all causes associated with Caesarean section in England and Wales is approximately 17 in 100,000 Caesarean sections.[4]
- The risk of a child dying from a general anaesthetic is quoted as roughly 1 in 40,000. However, if the child is healthy and having non-emergency surgery, their risk of dying is approximately 1 in 100,000 general anaesthetics.

What is the risk of getting brain damage due to a general anaesthetic?

Dizziness, drowsiness, headache and confusion are relatively common shortly after general anaesthesia, and in a small number of patients may persist for days, weeks or even months. However, this does not mean that brain damage has occurred. More information about these symptoms can be found in Section 7 in this series.

If you are a healthy patient having non-emergency surgery, severe brain damage is very rare. Exact figures for this risk do not exist. It can lead to permanent damage to the brain which can cause inability to think, feel or move normally.

However, the risk of having a stroke that causes brain damage during general anaesthesia increases:

- for those who are elderly
- for anyone who has had a previous stroke
- for those having surgery to the brain or head and neck, carotid artery surgery or heart surgery.[2]

Most strokes occurring around the time of surgery are not directly related to the general anaesthetic. Most strokes occur two to ten days after surgery and are due to the combined after-effects of the surgery and the anaesthetic together with the condition of the patient before the operation.

What precautions are used to prevent death and brain damage from occurring?

Drugs used by anaesthetists have effects not only on the brain (causing unconsciousness) but also on other body organs. They affect the heart, the blood pressure, breathing and lung function and other organs such as the kidney. It is usually these other effects that increase the risk of death or brain damage during the anaesthetic.

Anaesthetists are trained to use anaesthetic drugs with care, taking into account all relevant factors. Your anaesthetist will assess your condition before the operation to make sure that the drugs and techniques used are as safe as possible for you. He/she stays beside you throughout the whole anaesthetic and can adjust the anaesthetic and other treatments to keep you safe and healthy.

To help the anaesthetist, a number of monitors are used to measure heart and lung function, and the amount of

anaesthetic given. Your physical state 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 judgement.

There is continuing research aimed at making the drugs 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 require emergency surgery, the short answer is: not much.

However, if you are having non-emergency surgery, then anything that you can do to improve your physical condition will reduce the risks associated with anaesthesia. Further information can be found in the booklet 'Anaesthesia Explained' on the Royal College of Anaesthetists website (**www.rcoa.ac.uk**).

Summary

For healthy patients undergoing non-emergency, non-major surgery, dying or getting brain damage from a general anaesthetic is very rare.

The risk of dying or getting brain damage from a general anaesthetic increases if you are older, if you are having major or emergency surgery, or if you were ill or injured before the operation, but it usually remains low.

More than 90% of the deaths that do occur around the time of surgery are not directly caused by the anaesthetic.[5]

These risks vary greatly depending on your individual circumstances. 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.

Author

Dr Stuart White, FRCA
Consultant Anaesthetist
Brighton

Editors

Professor David K Menon, MD PhD FRCP FRCA FMedSci
Head, Division of Anaesthesia, University of Cambridge
Consultant, Neurosciences Critical Care Unit
BOC Professor, Royal College of Anaesthetists
Professorial Fellow, Queens' College, Cambridge
Senior Investigator, National Institute for Health Research

Professor David Spiegelhalter,
Winton Professor for the Public Understanding of Risk
Cambridge University

References

1 Buck N, Devlin HB, Lunn JN (Eds). The Report of the Confidential Enquiry into Perioperative Deaths 1987. *The Nuffield Provincial Hospitals Trust/King's Fund*, London 1987.

2 Jenkins K, Baker AB. Consent and anaesthetic risk. *Anaesthesia* 2003;**58**:962–984.

3 Adams AM, Smith AF. Risk perception and communication: recent developments and implications for anaesthesia. *Anaesthesia* 2001;**56**:745–755.

4 4Confidential enquiry into Maternal and Child health: Saving Mothers' Lives. Reviewing maternal deaths to make motherhood safer: 2003–2005. Seventh Report of the Confidential enquiries into Maternal Deaths in the Unitied Kingdom. *CEMACH* London 2007 (www.cemach.org).

5 Department of Health. NHS performance indicators, February 2002. (www.performance.doh.gov.uk/nhsperformanceindicators/2002/index.html).

The Royal College of Anaesthetists

The Royal College of Anaesthetists
Revised edition 2009

The Royal College of Anaesthetists
website: www.rcoa.ac.uk
email: standards@rcoa.ac.uk

This leaflet will be reviewed three years from the date of publication.