

Risks associated with anaesthesia

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Abstract

Anaesthesia is a necessary part of any operation and it carries with it certain risks to the patient. While every effort can be made to avoid errors secondary to human and system failures, complications can arise, whether they are idiosyncratic reactions, common side effects or unpredictable problems. For the anaesthetist to be able to adequately consent the patient for anaesthesia they must be aware of the risks.

This article outlines the risks associated with the conduct of anaesthesia, from preparation and induction to emergence and postoperatively. We look at both general and regional anaesthesia and have given incidence data where they are available. It is not possible to list every possible complication that could occur during an anaesthetic, so we have focused on those that are common and those that are serious (in terms of potential outcome for the patient) and some other relevant procedural issues.

Keywords Anaphylaxis; aspiration; awareness; cardiac risk; consent; death; general anaesthesia; neurological complications; regional anaesthesia; risk

Airway management

Ventilation and intubation

Failure of bag-mask ventilation and intubation is, fortunately, rarely encountered during the course of anaesthesia but is extremely serious; hypoxia leading to brain damage and death can ensue. Difficult intubation (Cormack and Lehane laryngoscopy view of 3 or 4) occurs in 2–8% of attempted intubations. Failed intubation occurs more rarely, in 0.13–0.35% of cases. The rate is higher in obstetric patients (1:250–300).¹

Bronchial or oesophageal intubation, oesophageal perforation, tracheobronchial damage and direct vocal cord injury are other potential complications of the intubation process.

Aspiration

Aspiration of the gastrointestinal contents occurs in 1:3000 general anaesthetics (GAs) with a mortality of 1:50,000. The risk factors are given in Table 1.

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Learning objectives

After reading this article, you should be able to:

- list the common and serious risks that occur during the conduct of regional and general anaesthesia
- provide the patient with the incidence of each relevant complication (where available)
- appreciate those risks that involve human error as a factor and take any necessary steps to avoid them in your working practice.

The complications of anaesthesia and their associated risk factors are given in Table 1.

Oral injury

Dental damage is rare (1:4500 GAs). Lip and tongue lacerations or abrasions are common (5%). Sore throat occurs in 50% of patients who have an endotracheal tube (ETT) and 20% with laryngeal mask airways (LMA).²

Respiratory risk

Atelectasis occurs commonly during anaesthesia. Lower respiratory tract infection (RTI) can develop as a consequence.

Laryngospasm and bronchospasm are potentially fatal. The risk increases with:

- pre-existing respiratory disease
- paediatric patients
- recent upper or lower RTI
- airway manipulation and light anaesthesia.

Postoperative respiratory depression

Respiratory depression is common in the recovery period. There are many anaesthetic causes which are listed in Table 1. Respiratory depression and airway issues postoperatively are a common cause of cardiac arrest and therefore must be identified and managed appropriately to prevent these catastrophic outcomes.

Cardiovascular problems

Hypotension is common; those with pre-existing end-organ pathology, hypertension and atherosclerosis are at increased risk of developing complications if it is prolonged.

The incidence of myocardial infarction (MI) and cardiac ischaemia increases with certain risk factors (see Table 2). The aetiology of perioperative myocardial infarction is multi-factorial and may involve alterations in coronary plaque morphology and in myocardial oxygen supply-demand balance. Cardiac arrest has an incidence of 0.12–1.4:10,000 with a death rate of 0.06–0.6:10,000.

Neurological complications

Peripheral nerve damage occurs most commonly in the ulnar and common peroneal nerves and the brachial and lumbosacral plexi.³ Nerve injury occurs through many mechanisms but those relevant to anaesthesia are:

Complications of general anaesthesia and their risk factors (not including death and risks posed by the theatre environment)

Complication		Risk factors
Airway management	Difficulty with intubation and/or ventilation	Congenital and acquired facial and oral deformities (e.g. micrognathia, burn injuries, obesity, pregnancy); restricted neck movement (e.g. rheumatoid arthritis, cervical spine injury); oral, pharyngeal, laryngeal or tracheal tumours
	Oesophageal, tracheal or bronchial injury Vocal cord injury Aspiration	Pre-existing pathology (e.g. tumour); intubation injury (e.g. use of stylet, gum elastic bougie) Passage of oral ETT Emergency surgery (due to inadequate starvation period, pain and opioids reducing gastric emptying) Pregnancy (increased gastric acid production, reduced gastro-oesophageal junction tone, increased intra-abdominal contents) Intra-abdominal pathology (increased intra-abdominal pressure) Hiatus hernia and/or gastro-oesophageal reflux disease
Respiratory risks	Oral injury Atelectasis	Use of ETT and LMA; presence of loose, capped or crowned teeth Prolonged anaesthesia; failure to use PEEP; laparoscopic or abdominal procedures
	Laryngospasm and bronchospasm	Pre-existing bronchial hyperreactivity (e.g. in asthma); paediatric patients; recent RTI (within 4 weeks); induction, intubation, positioning and emergence; light anaesthesia and stimulation during surgery
	Postoperative respiratory depression	Pre-existing medical conditions (e.g. respiratory disease, dementia, cardiac failure) Postoperative sedation (drug-related) Inadequate reversal of neuromuscular blockade Airway obstruction (e.g. retained secretions, failure of patient to maintain own airway)
	Pneumonia and postoperative pulmonary complications	Respiratory narcosis (secondary to elevated carbon dioxide levels) Age >60 years; COPD; ASA grade of >1; functional dependency; congestive cardiac failure; prolonged surgery, surgery type (aneurysm, thoracic, head and neck, vascular, emergency); general anaesthesia; hypoalbuminaemia
Cardiac complications	Hypotension	Drug-related (e.g. relative overdose of induction agent); hypovolaemia; regional anaesthesia; TIVA; purposeful anaesthetic technique ('hypotensive anaesthesia')
	Myocardial infarction and ischaemia Cardiac arrest	See Table 2 Includes risks as in Table 2 , and respiratory complications (causing hypoxaemia)
Neurological complications	Peripheral and central axial nerve damage	Surgical positioning (see main text); use of tourniquets, BP cuffs, arm supports, etc.; conditions causing reduced perfusion of nerve tissue (e.g. diabetes, atherosclerosis); emaciated and obese patients; hypotensive anaesthesia; direct injury (due to chemical injection, needle injury, compression)
	Stroke and brain damage	Previous history of stroke; increasing age; surgery type (head, neck and cardiac); hypoxaemia; hypotension
	Headaches	Caffeine withdrawal; drug-related (e.g. vasodilators, or withdrawal of opioids); dehydration/hypovolaemia
	Confusion	Increasing age; pre-existing neurological conditions (e.g. previous stroke, dementia); pre-existing respiratory or cardiac conditions; high levels of preoperative alcohol consumption; poorly sighted or hard of hearing individuals (as they will find it difficult to orientate themselves); prolonged surgery; surgery type (cardiac surgery in particular)

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