



Investigation of Surgical and Anaesthetic Deaths: A Medico-Legal Perspective

Presented by-

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Introduction

- Anesthetic and surgical deaths are fatalities occurring during or after medical procedures, caused by factors like the patient's underlying condition, surgical complications, or anesthetic errors, which can range from overdose to adverse drug reactions. While overall risks are low due to stringent protocols and monitoring, deaths can also result from errors, complications like bleeding or infection, or the severity of the patient's illness.

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- Investigating these deaths often involves collaboration between forensic pathologists, surgeons, and anesthesiologists, utilizing autopsies and detailed records to determine contributing factors, like an anesthetic overdose or a surgical complications.

Incidence of Surgical and Anesthetic Deaths: Definitions and Global Estimates

- Deaths during surgery or within 24–48 hours post-procedure
- Intraoperative (on-table) deaths
- Immediate postoperative complications
- Not always due to error
- Can be natural, disease-related, or multifactorial
- Estimated **1 in 10,000 to 1 in 100,000** anesthetics result in death
- Varies by region, patient risk, and healthcare quality

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- Surgical Mortality Rate: Varies widely by procedure
- (e.g., 0.1% for low-risk surgeries like appendectomy, up to 5–10% for high-risk procedures like cardiac or trauma surgery)
- In Bangladesh, reports of anesthetic accidents are not generally published for lack of any forum that could discuss it or lack of legal protection or otherwise, it becomes public knowledge. There is no database, no useful feedback from the Govt. commissions that investigates such accidents.

Risk Factors in Investigating Surgical and Anesthetic Deaths

Patient-Related Risks

Age:

Elderly (>65) or neonates
higher risk

Comorbidities:

Heart disease, diabetes,
obesity

ASA Score:

Higher scores (3-5) predict
complications

Procedure-Related Risks

Emergency vs. elective:

Emergencies riskier

Complexity:

Major surgeries
(e.g., cardiac) increase
mortality

Duration: Longer
operations raise
complications

Anesthetic Risks

Drug reactions:

Allergies, overdoses

Airway issues:

Intubation failure,
aspiration

Monitoring lapses:

Undetected hypoxia

Classifications in Investigating Surgical and Anesthetic Deaths

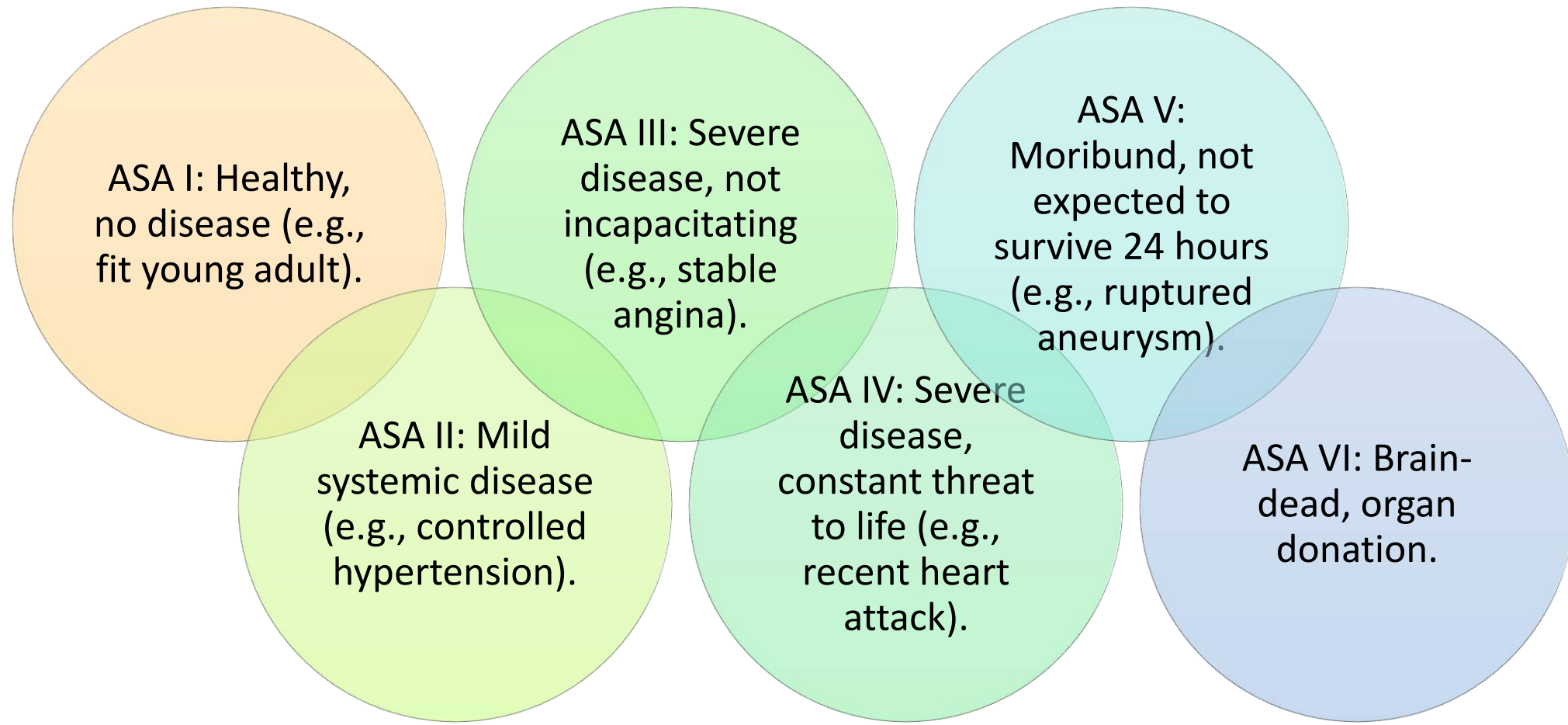
- Natural: Pre-existing condition (e.g., heart failure)
- Iatrogenic: Treatment-related (e.g., surgical error)
- Mixed: Combination of patient and procedure factor

Ref: CEPOD (Confidential Enquiry into Perioperative Deaths & NCEPOD (National Confidential Enquiry into Patient Outcome and Death

American Society of Anesthesiologists. (2020)

Physical Status Classification & Medico-Legal Investigations

Grades patient health pre-surgery (ASA I to VI)
Predicts risks of complications, including death



Role in Investigations

- Guides autopsy: Links patient condition to death cause
- Assesses negligence: Was risk underestimated?
- Informs legal outcomes: Context for standard of care
- Higher ASA scores signal need for extra scrutiny in death probes

Common Causes of Anesthetic Deaths

- Airway issues: Aspiration, intubation failure
- Drug errors: Overdose, allergic reactions
- Monitoring lapses: Hypoxia undetected
- Rare now: <1% of cases due to tech advances like pulse oximetry



Common Causes of Surgical Deaths

- Surgical errors: Wrong site, bleeding, infection
- Patient factors: Pre-existing heart/lung disease
- Complications: Embolism, organ failure post-op
- Multifactorial: 70% involve combined issues



Investigation of Surgical vs Anesthetic Deaths

Surgical Death:

Caused by the **surgery itself**

e.g., bleeding, organ damage, infection

Surgical Death (Autopsy may show):

- Internal bleeding
(e.g., vascular injury)
- Organ damage
(e.g., bowel, liver, heart)
- Postoperative infection
(abscess, sepsis)

Anesthetic Death:

Caused by the **anesthesia process**

e.g., drug reaction, airway problems, overdose

Anesthetic Death (Autopsy may show):

- Airway obstruction or aspiration
- Drug toxicity
(e.g., high blood levels of anesthetic agents)
- Anaphylaxis
(may show swollen airway, shock signs)

Caused Sometimes overlap – deaths can be **multifactorial**

Histology & Toxicology help confirm cause

Context & clinical history are essential

Role of the Autopsy Doctor

- Examines body for cause/manner of death
- Differentiates natural vs. iatrogenic (treatment-caused)
- Collects samples: Tissues, fluids for analysis
- Collaborates: With surgeons/anesthetists ,police for case context

Submits report to magistrate for legal proceedings for context

Autopsy Procedures for Surgical & Anesthetic Deaths: Bangladesh

- Required for unnatural/suspicious deaths (e.g., negligence suspected); reported to police under Criminal Procedure Code
- Steps: External exam (incisions, IV sites), internal organ dissection (trauma, clots), chemical analysis for anesthetics; within 24-72 hrs
- Performed by autopsy Doctor at district hospital/medical college morgue

During autopsy precautions should be taken incase of anaesthetic & Surgical death

Careful and meticulous dissection

Surgical and anesthetic devices introduced into patient should not removed
prior to autopsy

Position of endo-tracheal tube must be checked by pre autopsy radiograph

Presence of clinician concerned should be contemplated

Care must be taken or detect any surgical emphysema, pneumothorax, or air
embolism

Nursing records

Toxicological Analysis

- Tests blood/urine for anesthetic drugs, levels
- Detects overdoses, interactions (e.g., opioids + sedatives)
- Rules out external factors: Alcohol, illicit drugs
- Key tool: Gas chromatography for precision

Toxicological analysis

Both the lungs

2 gram of fat from mesentery

10 gram of skeletal muscle

100 gram of brain

100 gram of liver

100 gram of kidney

Blood for serology

Blood for culture

Urine

Blood

Gases from body cavities

CSF

Injection site and control

Histopathology– heart brain

Alveolar air collected with a needle and syringe under water by pulmonary puncture before chest opened

Scene and Record Review

- Multidisciplinary: Team (Bangladesh: Autopsy Doctor, surgeon, anesthesiologist, magistrate
- There should be an anesthetist and a surgeon [from a different hospital] in the investigating team to assist in the investigation.
- In case of special surgical death, eg obstetric, neurosurgical, pediatric deaths etc, a specialist from the concerned specialty should be included.

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Other countries: Adds toxicologist, medical lawyer, risk manager)

- Operating room: Equipment logs, witness statements
- Medical charts: Pre-op assessments, consents

Consent and Ethical Issues

- Informed consent: Must cover risks, including death
- Separate for anesthesia vs. surgery
- Ethical duty: Truth-telling to families post-death
- Dilemmas: Withholding info vs. litigation fears

Case Study 1 - Intraoperative Death

- Scenario: 65yo with heart disease; sudden cardiac arrest during hernia repair
- Findings: Autopsy shows embolism from surgery
- Outcome: Ruled natural complication, no negligence
- Lesson: Pre-op cardiac evaluation

Case Study 2 - Anesthetic Overdose

- Scenario: 40 years; intubation error leads to hypoxia
- Findings: Toxicological analysis revealed high levels of anesthetic agents, along with evidence of brain damage.
- Outcome: Negligence found; settlement paid
- Lesson: Monitoring tech prevents this (e.g., capnography, pulse oximetry, video laryngoscopy) to detect and prevent hypoxia early; mandatory training and checklists reduce human error.

Surgical Safety Checklist



World Health
Organization

Patient Safety
A World Alliance for Safer Health Care

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?

☐ Yes

Is the site marked?

☐ Yes

☐ Not applicable

Is the anaesthesia machine and medication check complete?

☐ Yes

Is the pulse oximeter on the patient and functioning?

☐ Yes

Does the patient have a:

Known allergy?

☐ No

☐ Yes

Difficult airway or aspiration risk?

☐ No

☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?

☐ No

☐ Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

☐ **Confirm all team members have introduced themselves by name and role.**

☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?

☐ Yes

☐ Not applicable

Anticipated Critical Events

To Surgeon:

☐ What are the critical or non-routine steps?

☐ How long will the case take?

☐ What is the anticipated blood loss?

To Anaesthetist:

☐ Are there any patient-specific concerns?

To Nursing Team:

☐ Has sterility (including indicator results) been confirmed?

☐ Are there equipment issues or any concerns?

Is essential imaging displayed?

☐ Yes

☐ Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:

☐ The name of the procedure

☐ Completion of instrument, sponge and needle counts

☐ Specimen labelling (read specimen labels aloud, including patient name)

☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:

☐ What are the key concerns for recovery and management of this patient?

Medicolegal Considerations

All deaths occurring during the course of anaesthesia and surgery or within reasonable time afterwards should be reported to the police (CrPC 1973 Section 39). They cannot be regarded as natural deaths. There is a usual tendency on the part of the relatives and/or their counsels to raise a finger of accusation towards the doctor because of death being so closely related in time to the intervention. Hence, the public and private interest would be best served by displaying independence and reporting the issue to the police.

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- Failing of which doctor can be punished under section 202 PC, Bangladesh for intentional omission to give information of offence to police by the person who is bound to inform.

Medicolegal Considerations

- অ্যানেস্থেশিয়া ও সার্জারির সময় বা এর কিছু সময়ের মধ্যেই যেকোনো মৃত্যু পুলিশকে রিপোর্ট করা উচিত (CrPC 1973 এর ধারা ৩৯ অনুযায়ী)। এসব মৃত্যু প্রাকৃতিক (natural) হিসেবে ধরা যায় না।
- মৃত্যু অপ্রোপচারের খুব কাছাকাছি সময়ে হওয়ায়, স্বজন বা তাদের আইনজীবীরা প্রায়ই চিকিৎসকের বিরুদ্ধে অভিযোগ তোলার চেষ্টা করেন। এ অবস্থায়, সরকারি এবং ব্যক্তিগত স্বার্থ রক্ষা পাবে যদি চিকিৎসক বা হাসপাতাল কর্তৃপক্ষ নিজে থেকেই পুলিশকে ঘটনা জানায় এবং নিরপেক্ষতা দেখায়।
- যদি কেউ এ তথ্য গোপন করেন বা পুলিশকে না জানান, তবে তিনি দণ্ডবিধির ২০২ ধারার আওতায় শাস্তিযোগ্য অপরাধে অভিযুক্ত হতে পারেন। এই ধারা অনুযায়ী, যে ব্যক্তি আইন অনুযায়ী অপরাধের তথ্য জানানোর বাধ্যবাধকতায় রয়েছেন কিন্তু ইচ্ছাকৃতভাবে তা জানাননি, তিনি শাস্তির মুখোমুখি হতে পারেন।

Surgical or Anesthetic death punishment according to The penal code 1860

- If death arises from **negligence or rash act** (for example, failure to monitor vital signs, equipment malfunction from careless maintenance, drug dosage errors without malice), then **Section 304A** is the likely provision. Punishment: up to **5 years** in prison, or fine, or both.

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- If death happens with a **higher degree of fault** — e.g., if the healthcare provider intended harm, or at least intended to cause bodily injury likely to cause death, or had knowledge that the act was likely to cause death — then **Section 304** would apply (culpable homicide not amounting to murder), punishable by up to **10 years** imprisonment (or life if the intent was severe) plus fine.

Preventive Measures for Surgical & Anesthetic Deaths (Medico-Legal Context)

Pre-Operative Measures

- Full risk assessment: ASA score, comorbidities checked
- Informed consent: Clear risks, including death

Intra-Operative Measures

- WHO Surgical Safety Checklist (2009): Sign-In, Time-Out, Sign-Out
- Double-checks: Equipment, drug doses, site marking

Post-Operative Measures

- Close monitoring: Vitals, complications (e.g., clots, infections)
- Protocols: Early intervention for hypoxia, bleeding

Medico-Legal Role

- Compliance records: Evidence against negligence claims
- Training: Reduces errors, supports Bolam defense

Key Message

- In Bangladesh, not all deaths are automatically reported unless unnatural, sudden, or suspicious.
- Bangladesh Context: In resource-limited settings like Bangladesh, investigations face challenges (e.g., limited forensic labs), but preventive measures like checklists are universally effective.
- In developed countries, any perioperative death without a clear natural cause is usually reviewed by an independent legal authority (e.g., coroner).
- Anesthetic deaths are often scrutinized closely in both systems due to the technical nature and rapid onset.

THANK YOU.