CHAPTER 3

Preoperative Checkup

Neha Garg

Introduction (AS3.1)

Anesthetizing a patient without a preoperative check is like traveling in an airplane without a pilot. Preoperative assessment is the cornerstone of perioperative care by anesthesiologists. Relevant history, including comorbidities, the medications, and past surgical history with associated anesthetic complications, can be obtained during preoperative evaluation. This information can be supplemented with the findings of physical examination and necessary investigations to formulate an optimal anesthetic plan. Also, preoperative checkup helps anesthetists to build rapport and gain the confidence of the patients. The preoperative checkup includes the following steps:

- Preoperative assessment.
- Premedication and instruction.
- Assessment of airway and plan for anticipated difficult airway.

Preoperative Assessment

It is done for the following:

- Know about the patient's comorbidities and their functional status, which can significantly impact anesthetic care.
- To optimize the patients for their comorbid illness before an elective surgery.
- To formulate an anesthesia plan by deciding the drugs to be used and the type of anesthesia.
- Stratify the patient.
- Take consent.

It involves a thorough history taking and examination of the patient.

History (AS3.2)

History-taking during the preoperative period is required to obtain information about the patient's medical, surgical, and medication details, which guide the anesthetic management during the perioperative period. The history-taking should focus on:

- Demographic details including the age, weight, and body mass index (BMI).
- Comorbid illnesses such as diabetes mellitus, hypertension, thyroid disorders, seizure disorder, and coronary artery disease.
- Medication history (types and duration of each drug the patient is taking).
- Personal history (smoking, alcoholism).
- History of allergy (including allergy to any food items or any medication).
- History of previous surgery (regional anesthesia [RA] or general anesthesia [GA], complications, etc.) is taken.
- Family history: The unexpected death of a first-degree relative under GA makes the probability of malignant hyperthermia high.

Examination (AS3.3)

Head-to-toe examination of the patient is done, with an emphasis on the cardiorespiratory system. Abnormal findings in any organ system should be properly evaluated and optimized before taking the patient for elective surgery. The important head-to-toe findings that require further evaluation are as follows:

- Central nervous system:
  - Altered sensorium and behavior.

- ► Sensory and or motor deficit.
- ► Abnormal gait and cranial nerve palsy.

- Cardiovascular system:
  - ► Irregular heart rate (except for sinus arrhythmia).
  - ► The difference in blood pressure of two limbs.
  - ► Presence of carotid bruit and murmurs on auscultation.
- Abdomen:
  - ► Any lump or swelling.
  - ► Presence of tenderness.
- Musculoskeletal system:
  - ► Limitation of movement at any joint may complicate patient positioning during transfer and under anesthesia.
  - ► Limitation of movement at the cervical spine makes laryngoscopy and intubation difficult.
- Respiratory system:
  - ► Altered thoracic spine curvature suggests scoliosis.
  - ► Presence of wheeze/crepitation (may be due to lower respiratory tract infection).

Breath-holding time is commonly done to assess the cardiorespiratory reserve of the patients. The patients are instructed to hold breath after deep inspiration and the time is noted (till the patients are able to hold the breath) in the following manner:

- ≥25 seconds: Good reserve.
- 25 to 15 seconds: Borderline.
- <15 seconds: Poor reserve.

The detailed examination of upper respiratory tract along with its clinical implication has been described later on in this chapter.

After history-taking and physical examination, risk stratification is done, based on the American Society of Anesthesiologists (ASA) classification system. Patients are classified under increased risk of morbidity and mortality by this classification (**Table 3.1**).

Premedication and Preoperative Instruction (AS3.5, AS3.6)

The premedication and preoperative instructions include the following:

- Consent.
- Nil per oral (NPO): 8 hours for solid, 6 hours for liquid, 2 hours for clear fluid like water, and nonpulpy juices like Appy. In infants, 6 hours for formula feed and 4 hours for breast milk.
- Antianxiety medication: Tablet alprazolam at bedtime and in the morning in only highly anxious patients, hypertensive patients with a history of arrhythmia, etc.
- Most of the time, reassurance and counseling the patient reduces anxiety, and drugs are not needed.
- In children, syrup midazolam, clonidine, dexmedetomidine may be used.
- Antiaspiration prophylaxis: H2 receptor blockers or proton pump inhibitors (PPI) at bedtime and in the morning in high-risk cases like obesity and intra-abdominal tumors. Other drugs like metoclopramide and antacids like sodium citrate can also be used.
- Others: Antisecretory medications like glycopyrrolate in difficult airway cases where fiberoptic intubation is planned, nebulization with salbutamol for asthmatic patients.

Patients with comorbid illnesses are on a variety of medications which undergo myriad interactions with anesthetic agents and can adversely affect patient's outcome. It is imperative to acquaint with pharmacology as well as their interaction with anesthetic agents. **Table 3.2** highlights important medications and their timings with surgery.

Table 3.1 ASA physical status classification

ASA class[a]	Definition	Examples
I	A normal healthy patient	Healthy, nonsmoking, no or minimal alcohol use
II	A patient with mild systemic disease	• The mild disease only without substantive functional limitations • Examples include (but not limited to): ○ Current smoker ○ Social alcohol drinker ○ Pregnancy ○ Obesity (30 < BMI < 40) ○ Well-controlled DM/HTN ○ Mild lung disease
III	A patient with severe systemic disease	• Substantive functional limitations • Examples include: ○ Poorly controlled DM/HTN/COPD ○ Morbid obesity (BMI > 40) ○ Active hepatitis ○ Alcohol abuse or dependence ○ Implanted pacemaker ○ Premature infant (PCA < 60 weeks) ○ ESRD on regular dialysis ○ History of: CAD/MI/CVA > 3 months
IV	A patient with severe systemic disease that is a constant threat to life	Examples include: • History of: CAD/MI/CVA < 3 months • ESRD not on regular dialysis • Ongoing cardiac ischemia or severe valvular dysfunction • Sepsis, DIC
V	A moribund patient who is not expected to survive without the operation	Examples: • Ruptured abdominal/thoracic aneurysm • Massive trauma • Intracranial bleed with mass effect
VI	A declared brain-dead patient whose organs are being removed for the purpose of the donation	

Abbreviations: ASA, American Society of Anesthesiologists; BMI, body mass index; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; CVA, cerebrovascular accident; DIC, disseminated intravascular coagulation; DM, diabetes mellitus; ESRD, end-stage renal disease; HTN, hypertension; MI, myocardial infarction; PCA, postconceptional age.
Note: [a]The addition of "E" denotes emergency surgery: An emergency is defined as existing when a delay in treatment of the patient would lead to a significant increase in the threat to life or body part.

Investigations (AS3.4)

Investigation before surgery is not mandatory in all patients. It needs to be tailored based on patient's needs as well as surgical factors. The investigations may include blood (complete blood count [CBC]), serum electrolytes, kidney function test (KFT), liver function test (LFT), coagulation studies, ECG, and chest X-ray; more advanced testing may be warranted in a specific group of patients.

The investigations are done on an individual basis. Hemoglobin level estimation is important in anemic patients. Similarly, CBC, serum electrolytes, renal function test, and coagulation profile are valuable for patients afflicted with

Table 3.2 Preoperative medications

Medication	Instructions
Antihypertensive	Continue on the day of surgery except for ACEIs and ARBSs
Beta-blockers, digoxin	Continue
Thyroid medications	Continue
Opioids	Continue
Oral contraceptive pills	Continue
Eye drops	Continue
Anticonvulsants	Continue
Asthma medications	Continue
Corticosteroids (oral/inhaled)	Continue
Statins	Continue
Aspirin	Continue in patients with prior PCI, high-grade ischemic heart disease, and significant CVD. Otherwise, discontinue 3 days before surgery
P2Y12 inhibitors (clopidogrel, ticlopidine, ticagrelor, prasugrel)	*No need to stop in patients undergoing cataract surgery (topical or GA)* For other cases: • Clopidogrel/ticagrelor: 5–7 days before surgery • Prasugrel: 7–10 days before surgery • Ticlopidine: 10 days before surgery
Insulin	For all patients, discontinue all short-acting insulin on the day of surgery (except insulin administered by continuous pump): • *Type 2 DM*: None to half of long-acting or combination insulin on the day of surgery • *Type 1 DM*: One-third of long-acting insulin on the day of surgery
Oral hypoglycemic agents	[a] Discontinue on the day of surgery (exception: SGLT2 inhibitors should be discontinued 24 h before surgery) [a] *The drugs which do not cause an increase in insulin level (e.g., metformin) can be continued even on the day of surgery*
Diuretics	Discontinue on the day of surgery *except for thiazides*
Sildenafil	Discontinue 24 h before surgery
COX-2 inhibitors	Continue on the day of surgery unless the surgeon is concerned about bone healing
NSAIDs	Discontinue 48 h before surgery
Warfarin	Discontinue 5 days before surgery
Antidepressants, anxiolytics	Continue
MAO inhibitors	[b] Continue (but avoid meperidine and ephedrine during the perioperative period)

Abbreviations: ACEIs, angiotensin converting enzyme inhibitors; ARBs, angiotensin II receptor blockers; CVD, cardiovascular disease; DM, diabetes mellitus; GA, general anesthesia; MAO, monoamine oxidase inhibitors; NSAIDs, nonsteroidal anti-inflammatory drugs; PCI, percutaneous intervention; SGLT2, sodium glucose transport protein 2.

Notes: [a] The drugs which do not cause an increase in insulin level (e.g., metformin) can be continued even on the day of surgery. [b] MAO inhibitors used to be stopped 3 weeks before surgery but discontinuing them for such long duration increases patient's morbidity.

chronic kidney disease. Fasting blood sugar is the most important diagnostic as well as monitoring parameter for diabetic patients. ECG is done when there is a history of chest pain and palpitations. Advanced investigations such as echocardiography and pulmonary function tests may also be done when needed.

Airway Assessment (AS3.4)

The evaluation of the airway is the most important and vital skill which every anesthetist must acquire. With repeated assessment of patients, anesthetists should be able to anticipate the level of difficulty in the airway and learn the skills to manage them. Improper evaluation and planning of the airway can endanger a patient's life.

The normal intubation position is sniffing the morning air position. In a sniffing position, *there is an extension at the atlantoaxial joint and flexion at the lower cervical joint.* This position brings the oral, pharyngeal, and laryngeal axis in line to ease intubation.

The evaluation of the airway by anesthetists should follow a proper sequence, so as not to miss any component of the airway, which can, later on, complicate airway management. This can be achieved in the following ways:

Assess the factors for difficult bag and mask ventilation:

- Look for the presence of facial hair, obesity, being edentulous, advanced age, and history of snoring.
- Dentition should be assessed, and dentures should be removed before intubation. However, dentures may be left in place for noninvasive airway management.

Assess mouth opening: Ask the patient to open their mouth completely. Normal mouth opening is 3 to 4 fingerbreadths (patient's own fingerbreadth).

Mallampati (MMP) grading: It is used to assess the size of the oropharyngeal cavity, with respect to tongue size, and predict the ease of endotracheal intubation (**Fig. 3.1**).

Neck movement (flexion and extension): This testing method is also known as Delikan test. Ask the patient to flex and extend the neck. It can be graded in the following manner:

- Chin above the occiput in extension: Normal.

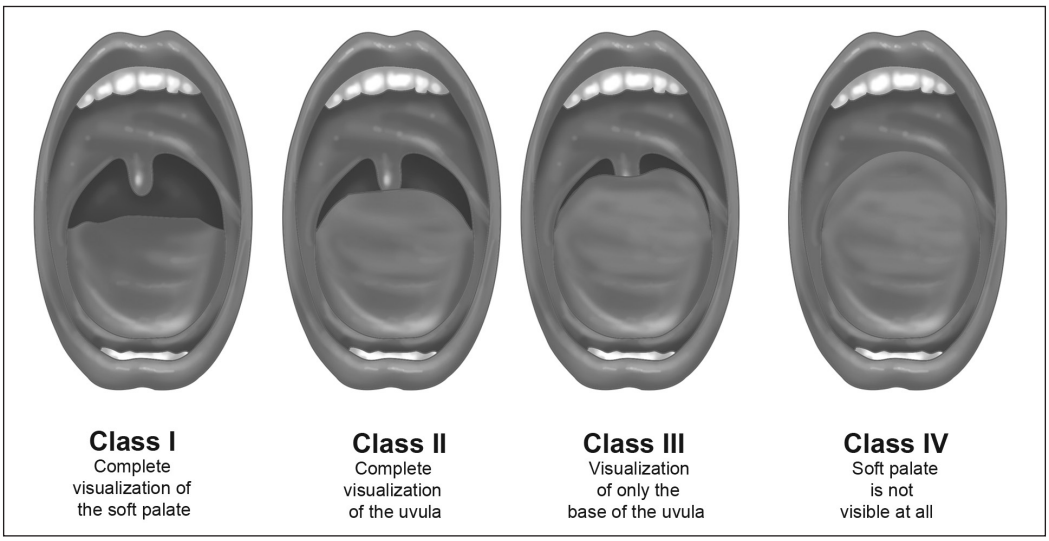


Fig. 3.1 Mallampati classification.

Notes: Intubation becomes difficult as grade increases and is not possible in grade 4 MMP. Another grading defined is 0 in which even the epiglottis is visible. However, intubation is difficult in this case.

- Chin at the level of occiput: Mildly restricted.
- Chin below the occiput: Severely restricted.

Assess thyromental distance: The distance between thyroid notch and mental prominence in neck extension.

- ≥6.5 cm: Easy laryngoscopy.
- 6.5 to 6 cm: Laryngoscopy may be difficult.
- ≤6 cm: Difficult laryngoscopy.

Assess neck circumference: The intubation becomes difficult if it is ≥ 42 cm for males and ≥ 39 cm for females.

- **Cormack–Lehane (CL) grading:** For laryngeal view by direct laryngoscopy (**Table 3.3**).

Causes of Difficult Airway

Unanticipated as well as anticipated difficult airways often make anesthetists sweat because of the fear of losing the airway in case of failure. Proper evaluation to assess the level of difficulty and corresponding preparation avoid such situations.

Difficult mask ventilation: It can be remembered by the mnemonic "BONES."

- *B*—beard.
- *O*—obese.
- *N*—no teeth.
- *E*—elderly.
- *S*—snorers.

Table 3.3 CL grades

CL grade	Findings
1	Full glottis visible
2a	Partial glottis visible
2b	Only arytenoids seen
3a	Epiglottis liftable
3b	Epiglottis not liftable
4	Epiglottis not seen

Abbreviation: CL, Cormack-Lehane.

Difficult supraglottic airway: It can occur due to restricted mouth opening, restricted upper airway, and stiff lungs with poor compliance.

Difficult intubation: It can happen in case of limited mouth opening, thyromental distance less than 6 cm, retrognathia, micrognathia, cleft palate, thyroid swelling, submandibular abscess or hematoma, obesity, protruded incisors, and cervical spine injury.

Difficult surgical airway: It can happen due to coagulation abnormality, agitated patient, flexion deformity of the neck, and vascular lesion at the site intended for tracheostomy.

Plan for Anticipated Difficult Airway

A good history taking and proper airway evaluation make the chances of missing a difficult airway negligible. Once a difficult airway is encountered during preoperative evaluation, a structured plan with the involvement of an experienced anesthetist is a must. Patients should be explained about the level of difficulty, and the airway management plan should be discussed to make the patient cooperative (especially for awake procedure). *The standard practice for an anticipated difficult airway is awake fiberoptic intubation.* However, the practice may differ based on the available expertise and the infrastructure.

The following structured plan recommended by ASA is acceptable in most situations:

1. **Assess the level of difficulty**:
   - Patient consent/cooperation.
   - Mask ventilation.
   - Supraglottic airway device insertion.
   - Intubation.
   - Surgical airway access.
2. **Provide supplemental oxygen throughout the procedure of difficult airway management.**

3. **Consider the merits and feasibility of available choices**:
   - Awake intubation versus intubation after induction of GA.
   - Noninvasive technique versus invasive technique as the first choice.
   - Preservation versus abolition of spontaneous respiration.
   - Video-assisted laryngoscopy as an initial approach to intubation.
4. **Formulate primary and alternative plans:**
   - Plan for awake intubation (**Flowchart 3.1**).
   - Intubation after induction of GA: The plan for intubation after induction of GA is shown in **Flowchart 3.2**.

Plan for Unanticipated Difficult Airway

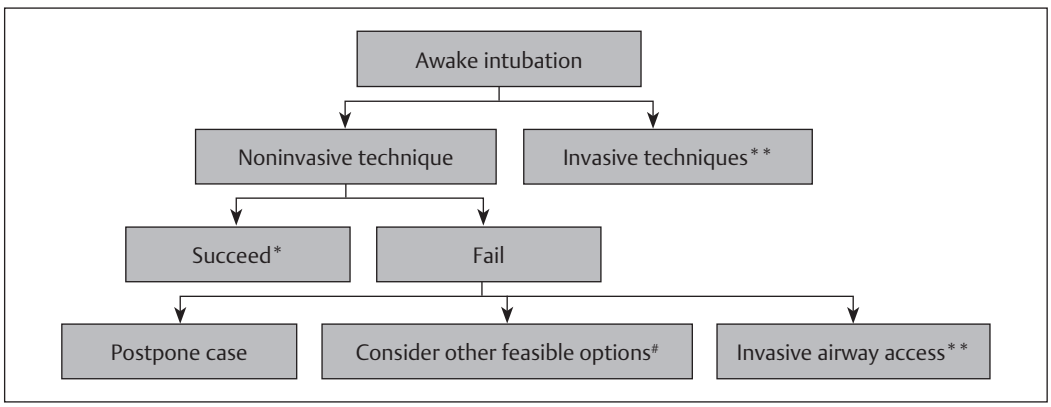
Many a time, a normal-appearing airway is found to be difficult during laryngoscopy and intubation. The approach suggested by Difficult Airway Society (DAS) guidelines is quite simple and handy. The difficult airway trolley is the cornerstone of difficult airway management, and it contains airway equipment in the sequence the planned airway handling is done. An organized, difficult airway trolley is as follows:

- It should have a top surface and four to five drawers.
- Mobile and robust.
- Airway equipment stocked in a logical sequence.
- Clearly labeled.
- Easily cleanable.
- Attached documents (DAS/modified local guidelines, a checklist for restocking, and logbook for daily checking).

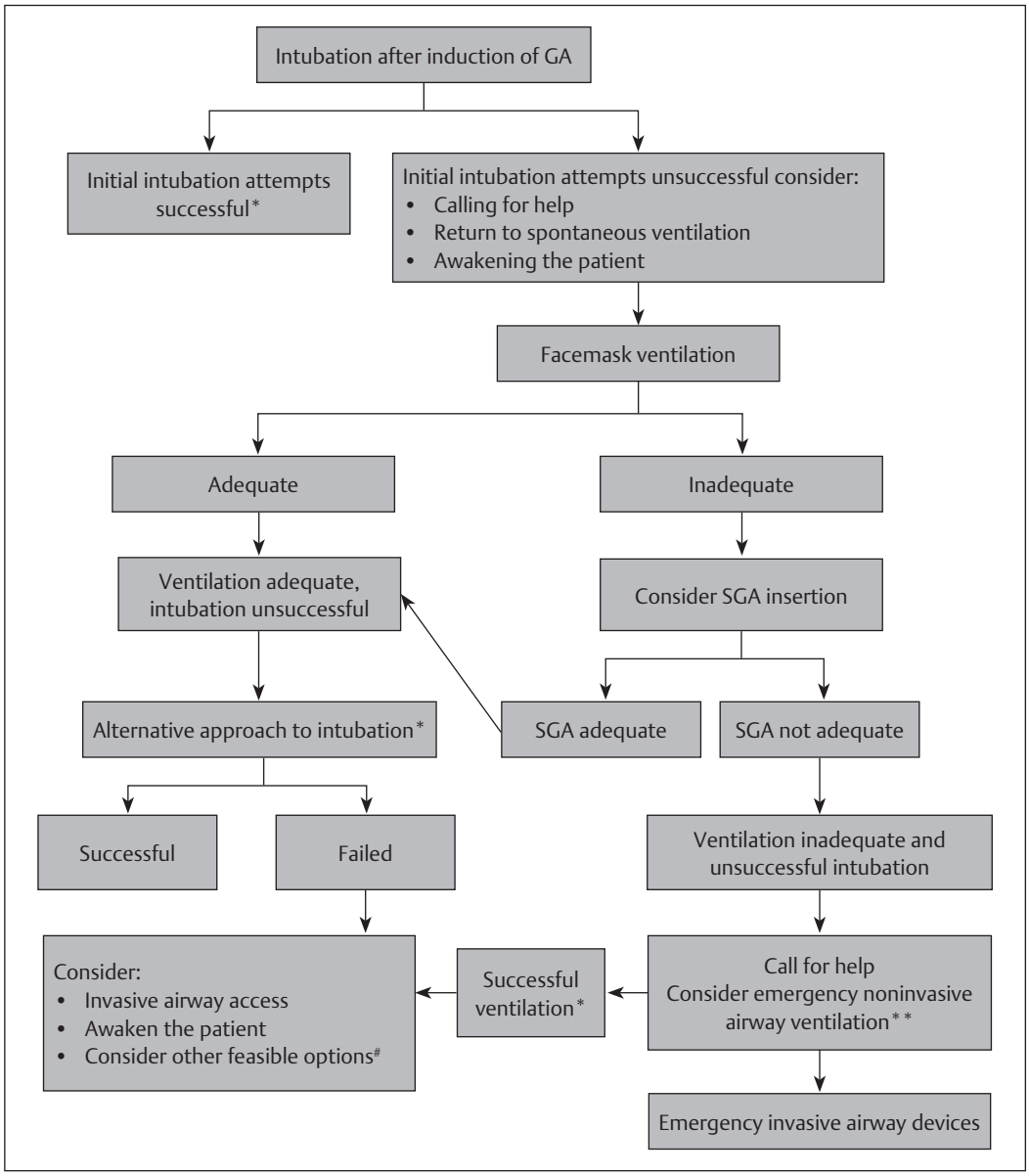
The arrangement of a difficult airway trolley is shown in **Table 3.4**.

The algorithm for adult airway management for difficult airway (unanticipated) is shown in **Flowchart 3.3**.

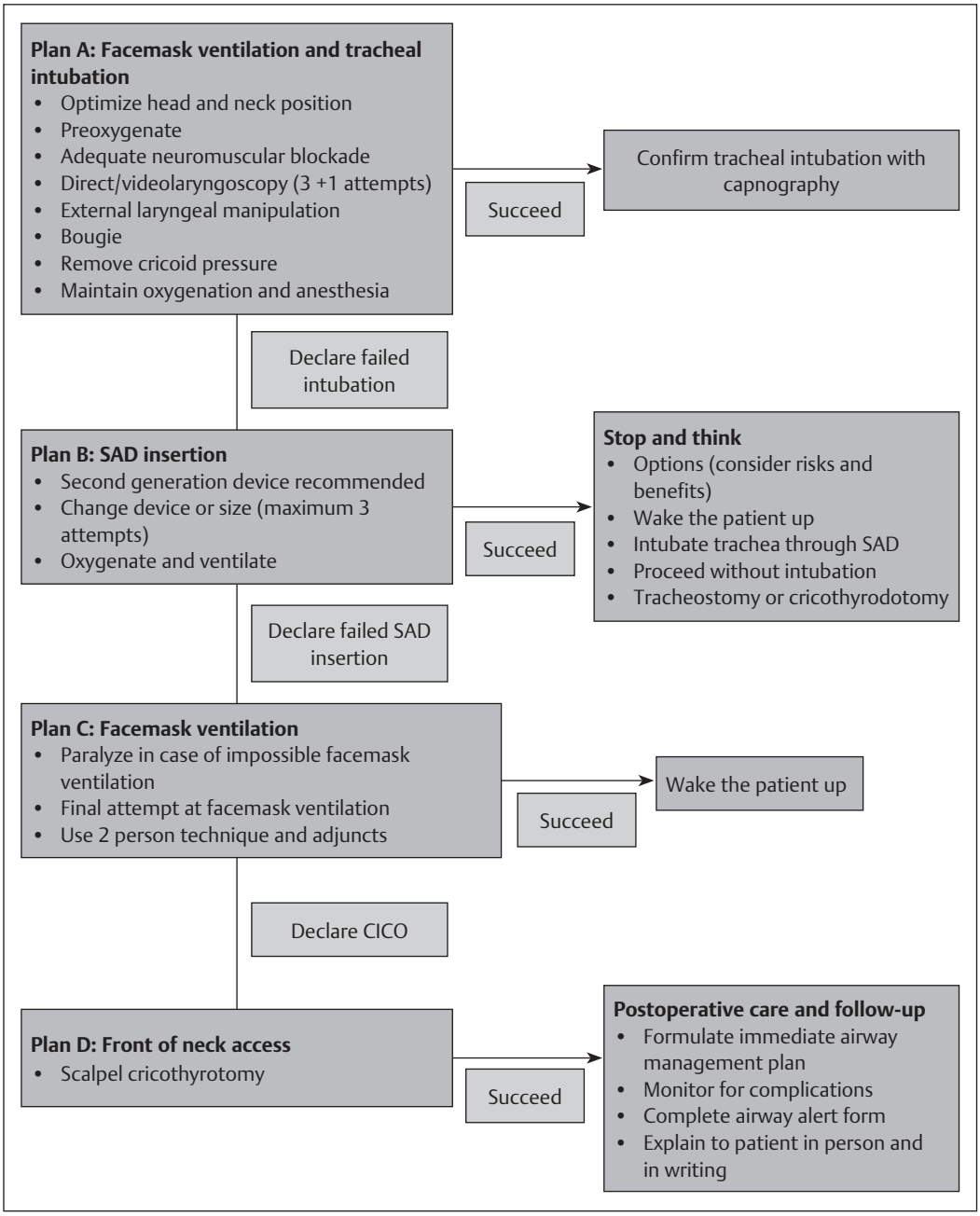
The discussion concerning the management of the unanticipated difficult airway in children and pregnancy is beyond the scope of this book. The readers are requested to refer to the latest guidelines for further knowledge.



Flowchart 3.1 Algorithm explaining the awake intubation plan. Notes: *Confirm ventilation, intubation, and supraglottic airway (SGA) placement with exhaled CO_2; **Invasive airway device include surgical or percutaneous airway, jet ventilation, and retrograde intubation; # Other feasible options are surgery utilizing facemask or SGA, local anesthesia infiltration, or regional blocks.



Flowchart 3.2 Algorithm explaining the airway management plan after the induction of general anesthesia (GA). Notes: * Alternative approaches include video-assisted laryngoscopy, supraglottic airway (SGA), awake fiberoptic, intubating stylet, light wand, blind oral or nasal intubation; ** emergency noninvasive airway ventilation include an SGA; # other feasible options are: Surgery utilizing facemask or SGA, local anesthesia infiltration, or regional blocks.



Flowchart 3.3 Unanticipated difficult airway in adults (Difficult Airway Society [DAS] guidelines). Abbreviations: CICO, cannot intubate cannot oxygenate; SAD, supraglottic airway device.

Table 3.4 Difficult airway trolley

Compartment of trolley	Contents
Top of trolley	Flexible intubating fiberscopes
Side of the trolley	• Bougie • Aintree intubating catheter • Airway exchange catheter
Drawer 1 (plan A)	• Bougie, short handle laryngoscope • Straight blade/McCoy blade • Video laryngoscope
Drawer 2 (plan B)	• LMA size: 3, 4, 5 • Intubating LMA (size: 3, 4, 5), Aintree intubating catheter • Fiberoptic adjuvants (Berman/Ovasappian airways, mucosal atomization devices, nasal sponge, 4 and 10% lignocaine)
Drawer 3 (plan C)	• Facemask: Various sizes • Oropharyngeal airways: Various sizes • Nasopharyngeal airways: Various sizes • LMA/ProSeal LMA: various sizes (3, 4, 5)
Drawer 4 (plan D)	Cricothyroidotomy set

Abbreviation: LMA, laryngeal mask airway.

Conclusion

Before surgery, preoperative evaluation of the patient provides an optimal window to formulate an appropriate anesthetic plan based on demography, comorbidities, medications, and airway assessment. It also provides a platform to help patients reduce their anxiety and anesthetists gaining the patient's confidence. It is the most important skill that every anesthetist should master with time.