

### Preoperative care including the high-risk surgical patient

#### Learning objectives

- ❖ To be able to organize the preoperative care and the operating list
- ❖ To understand preoperative preparation for surgery:
  - Surgical, medical and anaesthetic aspects of assessment
  - How to optimize the patient's condition
  - How to identify and optimize the patient at higher risk
  - Importance of critical care in management
  - How to take consent
  - How to organize an operating list

The stress of major surgery can lead to increased oxygen demand by about 40% and to many physiological change. The purpose of careful preoperative planning is to minimize the unwanted effects of these physiological changes.

#### Preoperative plan for the best patient outcomes

- Gather and record all relevant information
- Optimize patient condition
- Choose surgery that offers minimal risk and maximum benefit
- Anticipate and plan for adverse events
- Adequate hydration, nutrition and exercise are advised

#### ❖ PATIENT ASSESSMENT

Evidence suggests that correction of anaemia, better diabetes control, preoperative exercises and better nutrition leads to better patient outcomes and fewer postoperative complications.

#### History taking

Each organ system problem should be noted with dates, etiology and treatment delivered (Table 1).

Screening questions will reveal 'fitness' for surgery and anaesthesia. Patients with recent chest infections should be assessed for anaesthetic risks and postoperative surgical infection. Increasing severity of symptoms generally indicates worsening of the condition and possible need for a change in medication.

Some factors leading to these findings may be amenable to treatment preoperatively such as anaemia, angina, palpitations or obesity. The history of past surgery and anaesthesia can reveal the problems one may face during current hospitalization.

**TABLE 1** Key topics in past medical history.

**Cardiovascular**

- Ischaemic heart disease – angina, **myocardial infarction**
- **Hypertension**
- Heart failure
- Dysrhythmia
- Peripheral vascular disease
- Deep vein thrombosis and pulmonary embolism

**Respiratory**

- Chronic obstructive pulmonary disease
- Asthma
- Respiratory infections

**Gastrointestinal**

- Peptic ulcer disease and gastro-oesophageal reflux
- Liver disease

**Genitourinary tract**

- Urinary tract infection
- Renal dysfunction

**Neurological**

- Epilepsy
- Cerebrovascular accidents and transient ischaemic attacks
- Psychiatric disorders
- Cognitive function

**Endocrine/metabolic**

- Diabetes
- Thyroid dysfunction
- Pheochromocytoma
- Porphyria

**Locomotor system**

- Osteoarthritis
- Inflammatory arthropathy such as rheumatoid arthritis

**Other**

- Human immunodeficiency virus
- Hepatitis
- Tuberculosis
- Malignancy
- Allergy

**Previous surgery**

- **Problems encountered**
- Family history of problems with anaesthesia

Entries in bold need to be recorded even when negative.

## Examination

Patients should have medical examination as seen in the table 2 below:

General	Anaemia, jaundice, cyanosis, nutritional status, sources of infection (teeth, feet, leg ulcers)
Cardiovascular	Pulse, blood pressure, heart sounds, bruits, peripheral oedema
Respiratory	Respiratory rate and effort, chest expansion and percussion note, breath sounds, oxygen saturation
Gastrointestinal	Abdominal masses, ascites, bowel sounds, hernia, genitalia
Neurological	Consciousness level, cognitive function, sensation, muscle power, tone and reflexes
Airway assessment	

These examination is summarized in the following categorize:

- **General.** Positive findings even if not related to the proposed procedure should be explored further
- **Surgery related.** Type and site of surgery, complications occurred due to underlying pathology
- **Systemic.** Comorbidities and extent of limitation of each organ function
- **Specific.** For example, suitability for positioning during surgery

## Investigations

The National Institute of Health and Care Excellence, UK (NICE) guidelines lay out the investigations needed for various categories of surgery.

### ❖ **Investigations needed are depend on:**

- **Type of surgery.** Major surgery can lead to organ system dysfunction needing most investigations
- **Patient.** For example, sickle cell test for patients of AfroCaribbean origin with family history of sickle cell disease
- **Comorbidities.** For example, peak flow rates for severe asthmatics

### ❖ **These investigations include**

- **Full blood count (FBC):** is needed for major operations, in the elderly and in those with anaemia or pathology with ongoing blood loss and chronic disease.
- **Urea and electrolytes:** Are needed before all major operations, in most patients over 65 years of age especially with cardiovascular, renal and endocrine disease, or if significant blood loss is anticipated.

It is also needed in those on medications that affect electrolyte levels, e.g. steroids, diuretics, digoxin, non-steroidal anti-inflammatory drugs, intravenous fluid or nutrition therapy and endocrine problems.

- **Electrocardiography (ECG)** is required for those patients over 65 years of age and symptomatic patients with a history of rheumatic fever, diabetes, cardiovascular, renal and cerebrovascular disease, with and without severe respiratory problems. It will also depend on surgery if it is minor/intermediate or major.
- **Chest radiograph.** Cost-effectiveness and risks of radiation exposure mean that chest radiographs should be restricted to specific patients, such as those with cardiac failure, severe chronic obstructive pulmonary disease (COPD), acute respiratory symptoms, pulmonary cancer, metastasis or effusions or those who are deemed to be at risk of active pulmonary tuberculosis.
- **Clotting screen.** If a patient has a history suggestive of a bleeding diathesis, liver disease, eclampsia, cholestasis or has a family history of bleeding disorder, or is on antithrombotic or anticoagulant agents then coagulation screening will be needed. However, the effects of antiplatelet agents, low molecular weight heparins and newer agents affecting factor Xa cannot be measured by routine laboratory tests.
- **Urinalysis.** Dipstick testing of urine should be performed on all patients to detect urinary infection, biliuria, glycosuria and inappropriate osmolality.
- **Blood glucose and HbA1c.** Poor control of diabetes can lead to perioperative infection and slow recovery in patients with diabetes mellitus and endocrine problems. HbA1C indicates how well diabetes has been controlled over a longer duration. Early mobilisation, oral intake and return to routine medication should be the goals in management of diabetes.
- **Arterial blood gases.** A low-cost tool that can give quick and vital information in acute or chronic severe respiratory conditions, acid–base disturbances and conditions where there is changing milieu, e.g. immediately before kidney transplant.
- **Liver function tests.** These are indicated in patients with jaundice, known or suspected hepatitis, cirrhosis, malignancy or in patients with poor nutritional status.
- **Other investigations.** Specialist radiological views and recent imaging are sometimes required.

## ❖ SPECIFIC PREOPERATIVE PROBLEMS AND MANAGEMENT

Specific medical problems encountered during preoperative assessment should be corrected to the best possible level.

Many patients with severe disease will need to be **referred to specialists**; the referral letter should include all the details including history, examination and investigation results.

### Preoperative management of patients with systemic disease

- **Capacity.** Baseline organ function capacity should be assessed
- **Optimisation.** Medication, lifestyle changes, specialist referral will improve organ capacity
- **Alternative.** Minimally impacting procedure, appropriate postoperative care will improve outcomes
- **Theatre preparations.** Timing, teamwork, special instruments and equipment.

## ➤ Cardiovascular disease

Preoperative assessment it is important to identify the patients who have a high perioperative risk of major adverse cardiovascular events (MACE) including myocardial infarction (MI), and make appropriate arrangements to reduce this risk.

### ✓ **Hypertension, ischaemic heart disease (IHD) and coronary stents**

Prior to elective surgery blood pressure should be controlled to near 160/100 mmHg. Patients with angina, that is not well controlled, should be investigated further by a cardiologist. After a proven myocardial infarction (e.g. by **ECG**), elective surgery should be postponed for 3–6 months to reduce the risk of perioperative reinfarction.

The risk of stent thrombosis with consequences of MI and death is reduced if elective surgery is delayed until after dual antiplatelet therapy is no longer needed (about 6 weeks after bare metal and 12 months after drug-eluting stent insertion).

### ✓ **Dysrhythmias**

In patients with atrial fibrillation,  $\beta$ -blockers, digoxin or calcium channel blockers should be started preoperatively (or continued if the patient is already on such medication) in order to control rate and possibly rhythm.

Warfarin in patients with atrial fibrillation (AF) should be stopped 5 days preoperatively to achieve an international normalised ratio (INR) of 1.5 or less, which is safe for most surgery.

### ✓ **Implanted pacemakers and cardiac defibrillators**

Checks and appropriate reprogramming should be done preoperatively by specialists. Monopolar diathermy activity during surgery may be sensed by the pacemaker as ventricular fibrillation. Bipolar diathermy should be made available at surgery.

### ✓ **Valvular heart disease**

While anaesthetic management is altered to achieve haemodynamic stability in moderate valvular diseases, the patients with severe aortic and mitral stenosis may benefit from valvuloplasty before elective non-cardiac surgery. Appropriate referral to anaesthetist and cardiologist should be made.

## ➤ Anaemia and blood transfusion

Patients found to be anaemic at preoperative assessment should be investigated for the cause of their anaemia. They should be treated with iron and vitamin supplements.

Chronic anaemia is well tolerated in the perioperative period; however, if the patient is undergoing a major procedure preoperative transfusion may be considered. If excessive bleeding is expected, then a preoperative ‘group and save’ should be performed and an appropriate number of units of blood crossmatched.

## ➤ Respiratory disease

Postoperative respiratory complications, such as pneumonia, are a major cause of morbidity and mortality especially after major abdominal and thoracic surgery.

## ➤ Gastrointestinal disease

### ✓ *Nil by mouth (NBM) and regular medications*

Patients are advised not to take solids within 6 hours and clear fluids (isotonic drinks and water) within 2 hours before anaesthesia to avoid the risk of acid aspiration syndrome. These restrictions are further reduced in infants.

### ✓ *Regurgitation risk*

Patients with hiatus hernia, obesity, pregnancy and diabetes are at high risk of pulmonary aspiration, even if they have been NBM before elective surgery. Clear antacids, H<sub>2</sub>-receptor blockers, e.g. ranitidine, or proton pump inhibitors, e.g. omeprazole, may be given at an appropriate time in the preoperative period.

## ➤ Liver disease

In patients with liver disease, the cause of the disease needs to be known, as well as any evidence of clotting problems, renal involvement and encephalopathy.

## ➤ Genitourinary disease

### ✓ *Renal disease*

Underlying conditions leading to chronic renal failure such as diabetes mellitus, hypertension and ischaemic heart disease, should be stabilised before elective surgery.

### ✓ *Urinary tract infection*

These infections should be treated before embarking on elective surgery where infection carries dire consequences, e.g. joint replacement. For emergency procedures, antibiotics should be started and care taken to ensure that the patient maintains a good urine output before, during and after surgery.

## ➤ Endocrine and metabolic disorders

### ✓ *Malnutrition*

Body mass index (BMI) is weight in kilograms divided by height in metres squared. A BMI of less than 18.5 indicates nutritional impairment and a BMI below 15 is associated with significant hospital mortality. Nutritional support for a minimum of 2 weeks before surgery is required to have any impact on subsequent morbidity.

### ✓ *Obesity*

Morbid obesity can be defined as BMI of more than 35 and is associated with increased risk of postoperative complications.

If possible surgery should be delayed until the patient is more active and has lost weight. If this fails, prophylactic measures need to be taken (such as preventative measures for acid aspiration and DVT).

### ✓ *Diabetes mellitus*

Diabetes and associated cardiovascular and renal complications should be controlled to as near normal level as possible before embarking on elective surgery. Any history of hyper- and hypoglycaemic episodes, and hospital admissions, should be noted. HbA<sub>1c</sub> levels should be checked. For elective surgery, HbA<sub>1c</sub> of <69 mmol/mol is recommended.

✓ *Adrenocortical suppression*

Patients receiving oral adrenocortical steroids should be asked about the dose and duration of the medication in view of supplementation with extra doses of steroids perioperatively, to avoid an **Addisonian crisis**.

➤ Coagulation disorders

✓ *Thrombophilia*

Patients with a strong family history or previous personal history of thrombosis should be identified (table 3). They will need thromboprophylaxis in the perioperative period.

**Table 3** Risk factors for thrombosis.

- Age >60 years
- Obesity BMI >30 kg/m<sup>2</sup>
- Trauma or surgery (especially of the abdomen, pelvis and lower limbs), anaesthesia >90 minutes
- Reduced mobility for more than 3 days
- Pregnancy/puerperium
- Varicose veins with phlebitis
- Drugs, e.g. oestrogen contraceptive, HRT, smoking
- Known active cancer or on treatment, significant medical comorbidities, critical care admission
- Family/personal history of thrombosis, e.g. deficiencies in antithrombin III, protein S and C

➤ Neurological and psychiatric disorders

In patients with a history of stroke, pre-existing neurological deficit should be recorded. These patients may be on anti- platelet agents or anticoagulants. The anaesthetist should be informed if patients are on psychiatric medications as these may interact with anaesthetic drugs.

➤ Musculoskeletal disorders

Rheumatoid arthritis can lead to an unstable cervical spine with the possibility of spinal cord injury during intubation. Assessment of the severity of renal, cardiac valvular and pericardial involvement as well as restrictive lung disease, should be carried out and consultation to the Rheumatologists advise on steroids and disease-modifying drugs.

With certain types of orthopaedic operations, such as joint replacement, antibiotic prophylaxis will be required.

➤ Airway assessment

The ability to intubate the trachea and oxygenate the patient are basic and crucial skills of the anaesthetist. The ease or difficulty encountered when performing airway manoeuvres can be predicted by simple examination findings of full mouth opening (**modified Mallampati class**) (table 4), jaw protrusion, neck movement and thyromental distance.

**Table 4** Airway assessment (Samsoon and Young modified Mallampati test).

● Fauces, pillars, soft palate and uvula seen	Grade 1
● Fauces, soft palate with some part of uvula seen	Grade 2
● Soft palate seen	Grade 3
● Hard palate only seen	Grade 4

### ❖ Preoperative assessment for emergency surgery

In urgent or emergency surgery, the principles of preoperative assessment should be the same as in elective surgery, except that the opportunity to optimise the condition is limited by time constraints. Medical assessment and treatments should be started (e.g. as per Advanced Trauma Life Support guidelines) even if there is no time to complete them before the start of the surgical procedure (table 5).

**Table 5**

#### Preoperative assessment for emergency surgery

- Start. Similar principles to that for elective surgery
- Constraints. Time, facilities available
- Consent. May not be possible in life-saving emergencies
- Organisational efforts. For example, local/national algorithms for treatment of the patient with multiple injuries

### ❖ High risk patients

Patients who have a predicted mortality  $\geq 5\%$  should be considered as 'high risk' (table 6).

**Table 6** Patient factors that predispose to high risk of morbidity and mortality.

Previous severe cardiorespiratory illness, e.g. acute myocardial infarction, COPD or stroke  
 Late stage vascular disease involving aorta  
 Age >70 years with limited physiological reserve in one or more vital organs  
 Extensive surgery for carcinoma  
 Acute abdominal catastrophe with haemodynamic instability (e.g. peritonitis)  
 Acute massive blood loss >8 units  
 Septicaemia  
 Positive blood culture or septic focus  
 Respiratory failure: PaO<sub>2</sub> <8 kPa or FIO<sub>2</sub> >0.4 or mechanical ventilation >48 h  
 Acute renal failure: urea >20 mmol or creatinine >260 mmol/L

### A practical approach to the care for the high-risk patient

- ✓ **Identify** the high-risk patient.
- ✓ Assess the **level of risk**.
- ✓ Detailed **preoperative assessment**.
- ✓ Adequate **resuscitation**.
- ✓ Optimise **medical management**.
- ✓ **Investigation** to define the underlying surgical problem.
- ✓ **Immediate and definitive treatment** of underlying problems.
- ✓ Consider **admission to a critical care** facility postoperatively.

## ❖ CONSENT

Consent should be both voluntary and informed.

The guidance outlines the **key principles of consent** and how the discussion should:

- ✓ Give the patient the information required to make a decision;
- ✓ Be tailored to the individual patient;
- ✓ Explain all reasonable treatment options;
- ✓ Discuss all material risks.
- ✓ Should be written and recorded on a form;
- ✓ The key points of the discussion should be recorded in the case notes.

## ❖ ARRANGING THEATRE LIST

The date, place and time of operation should be matched with availability of personnel. Appropriate equipment and instruments should be made available. The operating list should be distributed as early as possible to all staff who are involved in making the list run smoothly. Prioritise patients, e.g. children and diabetic patients should be placed at the beginning of the list; life- and limb-threatening surgery should take priority; cancer patients need to be treated early.