5 Pre op Evaluation of Cancer Patients Undergoing Surgeries

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5.1 Introduction

Anaesthesiology is unique specialty where the anaesthesiologists routinely expose the patient to risk to facilitate a desired surgical outcome in a holistic manner. Since the demonstration of first anaesthesia, its administration is considered hazardous for the patients. It is important to understand the type and the extent of the risks involved. The patients should have access to truthful knowledge on the possibility of specific complications in the perioperative period, to facilitate informed decision making related to anaesthesia and surgery.

In National Confidential Enquiry into Patient Outcomes and Death (NCEPOD) report observed perioperative mortality of 1.6% and gaps in perioperative management were identified as the single most important factor. The Australian Incident Monitoring Study (AIMS) database has also identified inadequate preoperative evaluation as an important reason for 3% of the adverse events in perioperative period. A comprehensive evaluation and optimisation of comorbid conditions can significantly help in reducing perioperative morbidity and mortality.

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Preanaesthetic evaluation involves assessment for comorbidities before giving anaesthesia for surgical procedures. It is important to ensure that the intended surgical intervention with minimum increase in problems due to existing disorders, avoid new illnesses and ensure speedy recovery after the procedure. Medical comorbidities are a major source of adverse perioperative morbidity and this can be reduced by a properly conducted preanaesthesia check-up. With the increase in longevity more and more patients are presenting to us with multiple comorbidities for surgery. Preoperative screening is required to approximate the associate risk and optimises the patient without causing undue delay in surgery. It provides a patient posted for surgical procedure should be thoroughly screened for any major coexisting diseases that may affect the postoperative morbidity and mortality. We have clear cut guidelines for some of the common diseases like cardiac abnormalities that need to be followed. The preoperative evaluation will help in formulating the anaesthetic plan and if inadequate may lead to anaesthetic complications.

Goals of preanaesthesia evaluation are to:

1. To educate patient and families about anaesthesia and postoperative results.
2. To obtain informed consent.
3. Allay patients anxiety regarding the anaesthesia and surgery.
4. Assess and optimise the patient's medical conditions before surgery.

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5. Reduce the perioperative morbidity and overall hospital stay after surgery.
6. Reduce delays and case cancellations due to unoptimised medical conditions.

A good preoperative optimisation leads to a reduced ordering of laboratory tests, reduced specialist referrals and overall health care costs, decreased patients' anxiety, increased acceptance of alternative techniques of anaesthesia by the patients like regional anaesthesia, decreased hospitalisation and reduced overall costs.

5.2 Risk Assessment

The main aim of a preanaesthesia check-up is to assess the anaesthetic and surgical risk and best optimise it before the procedure.

1. Sources of Anaesthetic Risk.
   (a) Anaesthetic drugs and interventions.
   (b) Mechanical and operator error.
2. Systemic illness that may affect aesthetic technique (patient factors).
   (a) Cardiac: many anaesthesia induction agents and inhalational agents are myocardial depressants. Unoptimised patients with cardiac disease may have accentuated hypotensive response to induction of anaesthesia.
   (b) Autonomic neuropathies, like diabetes mellitus heighten the hypotension following induction of anaesthesia.
   (c) Pulmonary: induction of anaesthesia decreases vital capacity, functional residual capacity and mucociliary clearance. In addition response to hypoxia and hypercarbia is depressed. The patients with preoperative respiratory dysfunction may have postoperative respiratory morbidity like pneumonia, etc.

Though perioperative risk is multifactorial, the patient comorbidities have been found to be major contributor to 30-day mortality. The

Table 5.1 ASA Classification (this is well accepted risk score and should be included)

Class	Systemic Disturbance	Mortality*
1	Healthy patient with no comorbidity except the surgical process	<0.03%
2	Mild-to-moderate systemic disease due to the surgical condition or by other pathologic processes	0.2%
3	Severe disease process that limits activity but is not disabling	1.2%
4	Severe disabling disease that is a constant threat to life	8%
5	Moribund patient not expected to survive 24 hours with or without an operation	34%
E	Suffix to indicate an emergency surgery for any class	Increased

American society of anaesthesiology (ASA) has classified relative risk to conscious sedation and anaesthesia (Table 5.1). This is widely practised and simple reproducible and has been correlated with postoperative morbidity and mortality. ASA status is not based on systemic analysis but on subjective physician assessment of the patient's comorbid conditions. It does not consider the risk due to surgical procedure, e.g. the ASA physical status for a patient with cataract surgery and gastrectomy will be the same if patients have similar heath. Despite its limitations it is still practised in most part of the world.

3. *Surgical risk:* John Hopkins risk classification score categorises the patients into 5 based on severity of surgery and degree of blood loss (Table 5.2). But it is not comprehensive model and tends to ignore patient factors and anaesthetic risk (Fig. 5.1).

- There is no comprehensive risk score that is widely used today. A simple, readily usable and comprehensive risk score is required for better risk assessment.

The *components of a through preanaesthesia examination* should include:

Table 5.2 John Hopkins risk classification system

Category	Type of surgical procedure
1	Minimally invasive procedure; minimal BL*. Minimal patient risk independent of anaesthesia
2	Minimal—Moderate invasive. BL < 500 ml. Slight patient risk independent of anaesthesia
3	Moderate to significant invasive. BL 500–1500 ml. Moderate patient risk independent of anaesthesia
4	Highly invasive. BL > 1500 ml. Major patient risk independent of anaesthesia
5	Highly invasive. BL > 1500 ml. Critical patient risk independent of anaesthesia. Postoperative ICU stay with invasive monitoring

BL: blood loss

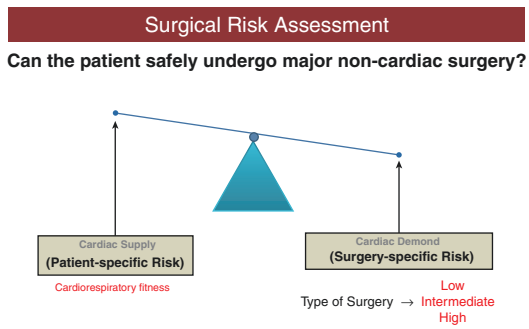

Fig. 5.1 Risk assessment

History and Physical Examination A detailed medical record and examination is mainstay of a good preanaesthetic check-up. Patients posted for elective surgery should undergo a detailed and relevant evaluation of the cardiac and pulmonary function, kidney disease, endocrine, musculoskeletal and other relevant to anaesthesia care. Various societies including ASA periodically publish and update guidelines for preoperative assessment of patients. The focus of the assessment should be to detect comorbidities and formulate strategies to optimise them before the surgery. The criteria to optimise will also depend upon the need of surgery.

The history and examination should be done as a routine with special emphasis on:

- Detailed history to include major systemic illness,
- A detailed record of all drugs taken by the patient,
- history of any allergies to drug or other substances,
- any untoward reaction to previous anaesthetic,
- previous surgery and hospitalisation,
- any difficulties faced during previous anaesthetic (like difficult airway, tracheostomy, difficult intravenous cannulation, etc.).

The patients come in contact with the surgical speciality before anaesthesia personnel. So, they have a better rapport with the patient and a through history related to preanaesthesia check-up should be taken at the initial contact with the patient. Nowadays several questionnaires have been designed for preoperative screening of the patients that may help in finding any associated diseases. Questionnaire may help to find significant medical issues while screening. Another advantage of the questionnaire is that they can point towards a systemic disease so the advanced testing and consultations can be advised in the first visit itself to reduce the delay in surgery. In case the patient is illiterate then they can take help of their relatives a staff nurse may help them to do so (Table 5.3).

The patients are often unaware when they visit the preanaesthesia clinic regarding what will be done during the visit. All patients should receive instructions from treating surgeon to visit the preanaesthesia clinic (PAC) with details of the drug prescription that patient is taking. He should always come to PAC after normal meal and after taking all medications advised to him. It is often seen that patients omit morning dose of antihypertensives and are found hypertensive on their PAC visit. This may make it difficult for the

Table 5.3 A suggested pre-screening questionnaire (the form is not exhaustive but indicative of a model form, needs to be customised as per the set up)

Have you ever felt any of the following? (if 'yes', please tick and give details)
• Have you ever experienced severe pain or pressure around the chest lasting for 30 min or more?
• Do you have puffiness in your feet or ankles sometimes?
• Do you have breathlessness while routine activity or exercise or sleeping at night?
• Do you sometimes get calf pains while walking?
• Pain in chest, palpitations or blackouts
• Any H/o high blood pressure
• Any H/o prolonged fever with joint pains
• Do you hear any wheezy or whistling sound from your chest?
• Have you been told that you snore during sleep?
• Do you cold, cough or any other respiratory symptoms in past 6 weeks?
• Any H/O of diabetes or thyroid problem?
• Any H/O convulsions or fits
• Have you or anyone in family had any bleeding through vagina, rectum or minor injuries etc.?
• Are you taking blood thinners like aspirin recently (last 2 weeks)?
• Are you anaemic or taking iron pills?
• History of dyspepsia or heartburn
• Do you smoke, or drink alcohol or abuse any other drug? (if 'yes' how many a day?)
• Do you have loose teeth?
• Do you have any implants or pacemaker?
• Women; are you pregnant?
• Are you or any medicines? (like inhalers, eye drops, herbal remedies, etc.). Please give details
• Please provide details of previous anaesthetics
• Any previous chemotherapy or radiation therapy?
• Do you need the services of an interpreter?
• Signature of the patient: Signature of the doctor
This form to be filled by the patient with the help of a doctor, before coming to PAC clinic. It will help us to plan the perioperative care

anaesthesiologists to opine for surgical scheduling. The PAC should be scheduled within 72 h to 30 days of scheduling the procedure.

Laboratory Testing The preoperative tests should be ordered selectively to guide perioperative care. The indications for additional tests should be mentioned clearly based on information available and surgical risk. Also, test should be done if it will affect the management. In case the patient does not have any medical history other than the disease per se, he should be advised minimal laboratory investigations necessary depending on his/her age and surgery planned. Recent studies have suggested that up to 60% of regularly requested tests may not be indicated clinically. An abnormal test may be present despite any disease in the patient (false positive). This may add to confusion and delay the treatment of the patient. A false-positive result may distract the physician from clinically more significant problem, cause a delay and may eventually harm the patient. So, we should be cautious in ordering medical test and have our own guidelines for preoperative medical testing in the patients. The surgical risk of the patient will govern any laboratory testing (Table 5.4). An ASA I patient undergoing a simple mastectomy is dif-

Table 5.4 Common laboratory tests suggested for patients undergoing surgery (all tests should be after last chemotherapy and/or radiotherapy if the patient is receiving such treatment)

S. No	TEST	Target group
1	ECG	> 40 years, major severity at ≥3; any cardiovascular or severe renal disease.
2	CXR	> 30 years, CVS, respiratory, renal disease
3	Hemogram	All ages (Hb), major surgery, ASA gr > II
4	KFT	Older than 50 years, major systemic illness
5	Electrolytes	Diabetic patient, patient with a history of excessive fluid and electrolyte loss, e.g. diarrhoea, diuretics, vomiting, colostomy, etc.
6	Pregnancy test	Women who may be pregnant
7	LFT	Liver disease, age > 60
8	Blood sugar	DM, age > 40 years (routine)
9	HB1AC	Diabetic patient
10	PT/PTTK	h/o of coagulation or liver disease, major surgery, anticoagulant drugs
11	ABG, PFT	Associated cardiac or pulmonary disease
12	Viral markers	All major surgeries should be tested for viral markers (HIV, hepatitis B, hepatitis C)

ferent form that undergoing a pneumonectomy. So, additional testing may be required in patients with major surgeries and long duration surgeries. The surgeon and anaesthesiologist as a team should agree and decide to make their own protocols for preoperative testing to avoid any delays and confusion. The patients should be referred for preoperative assessment only after the preoperative testing based as per need to minimise the delay.

5.3 Cardiovascular Issues

The American College of Cardiology/American Heart Association and from the European Society of Cardiology regularly come up with guidelines and update on preoperative optimisation of patients with cardiac disease for surgery. The patients planned for noncardiac surgery should be assessed for perioperative cardiac event risk based on detailed perioperative examination. In absence of any clinical findings the indications for cardiovascular testing to diagnose coronary artery disease are the same as in any other patient. In patients with suspected heart disease additional cardiac evaluation (echocardiography or 24-hour ambulatory monitoring) should be performed only if additional testing will help in establishing the diagnosis and treatment plan for cardiac optimisation before the surgery.

Many risk assessment tools have been developed to grade cardiac risk. The commonly used tools today are revised cardiac risk index (RCRI) and Gupta's index. Risk indices should be customised according to the setup to quantitate preoperative risk.

RCRI is a tool used to estimate a patient's risk of perioperative cardiac complications. It includes the surgical risk, history of ischemic heart disease or congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin and preoperative serum creatinine level higher than 2.0 mg/dL.

The frequency of major cardiac complications (nonfatal MI, nonfatal cardiac arrest, death, etc.) increases if the number of risk factors is more. The patients with no risk factors have 0.4% incidence of major cardiac event, whereas patients with three or more factors have a risk of 5.4%.

Gupta and colleagues have used data collected by the NSQIP (National Surgical Quality Improvement Program risk) based on type of surgery, dependent functional status, abnormal creatinine level, ASA physical status, and increasing age.

5.4 Pulmonary Issues

Perioperative pulmonary problems are quite common in the postoperative period. Post op pulmonary complications contribute significantly to peri operative morbidity and mortality 25% deaths within 6 days of surgery are because of respiratory complications. American College of Physicians has suggested that additional preoperative and postoperative interventions may be required to avoid complications in patients with:

- increased age (> 60 years),
- chronic obstructive lung disease,
- heart failure,
- significantly reduced exercise tolerance,
- functional dependence.

Other risk factors associated with increased pulmonary morbidity include:

- Smoking (current and > 40 pack-year),
- Neck, thoracic, upper abdominal, aortic or neurologic surgery,
- Long procedures (>2 hrs),
- General anaesthesia,
- Albumin <3 gm/dl,
- Exercise capacity <2 blocks or one flight of stairs,
- BMI >30.

Simple measures like smoking cessation and incentive spirometry in the perioperative period, nutritional build-up of the patient, antibiotic to cure respiratory infection and bronchodilataion for better pulmonary toileting will help in reducing postoperative pulmonary morbidity.

5.4.1 Preoperative Preparation for Thoracic Surgeries

The respiratory function needs to be evaluated objectively before planning lung resection surgery. Spirometry is the commonly available test and should be done in all such patients (Fig. 5.2).

FEV1 is primary value to determine resectability and predicts pulmonary reserve. It is a strong predictor of pulmonary complications. A minimum FEV1 > 2 Lt is acceptable for pneumonectomy and a FEV1 > = 1.5Lt acceptable for lobectomy . For FEV1 values less than these cutoff, the preoperative management needs to be individualised, additional testing of the respiratory system and cardio respiratory reserve needs to done in consultation with respiratory physician.

Spirometry tests only respiratory mechanical function (delivery of oxygen to distal airways). But adequate delivery does not ensure the exchange at the alveolar level. So additional testing is required to ascertain optimal functioning lung parenchymal function. Traditionally arterial blood gas analysis has been used to ascertain lung resectability (PaO2 > 60 mm Hg and Pa CO_2 < 45 mm Hg). Diffusion capacity of lung carbon dioxide is the most useful test to detect the gas exchange at lung.

5.5 DLCO Good Predictor of Mortality and Morbidity

- DLCO<60%- mortality rate – 24%.
- DLCO<40%- higher mortality and morbidity.

Estimated Postoperative FEV1 and DLCO values less than 40% (predicted postoperative function = Pre op func ×[% of function contributed by the lung that will remain postoperative period]) leads to an augmented risk of respiratory complications postoperatively.

The cardiopulmonary interaction is important in preoperative assessment. Nowadays Cardio pulmonary exercise testing (CPET) is done and tests the cardiopulmonary reserves before planned surgery. Maximal oxygen consumption (VO2max) is the most useful predictor of postoperative pulmonary complication. A VO2max of

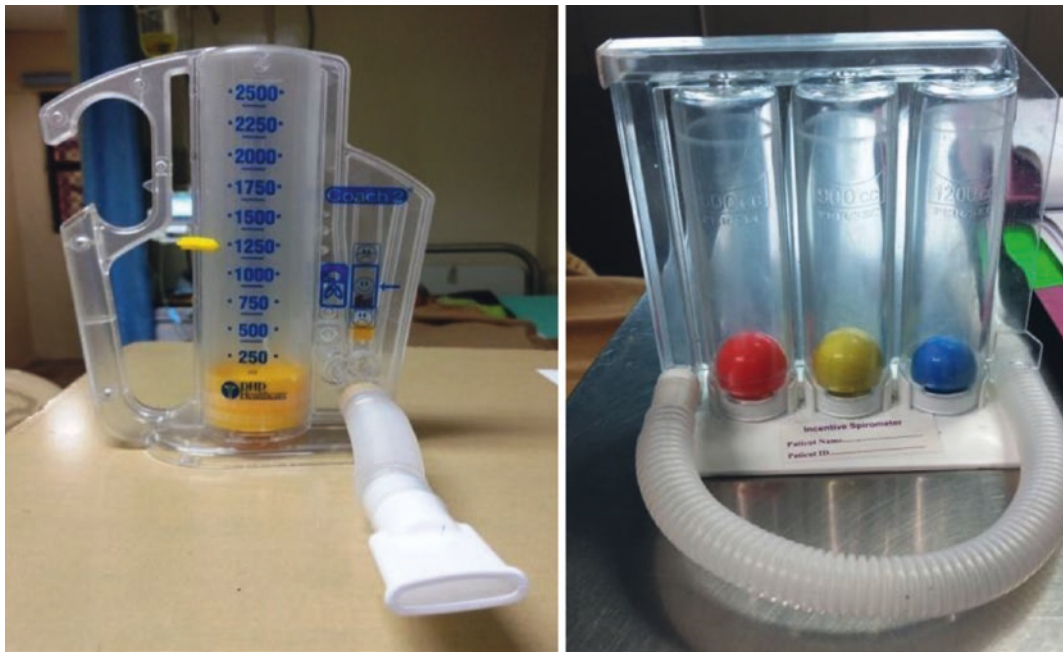

Fig. 5.2 Spirometer

less than 10 ml/kg/min increases the risk of morbidity and mortality and a value of >20 ml/kg/min is associated with minimum complications. This has not gained widespread popularity because of the cost concerns. A number of other tests like 6 minute walk test and ability to climb five flights of stairs (V02max 20 ml/kg/min) have a reasonable good estimate of cardio pulmonary reserves and can be used as surrogate markers in case of non-availability of CPET machine. CPET can also be used to objectively guide preconditioning of patients to improve their cardio respiratory reserve before surgery.

The patient risk for postoperative pulmonary complications should be considered in tandem with the procedure related risk factors for planning optimisation before surgery.

Preanaesthetic evaluation in patients of haematological disorder: Three most common clinical situations seen include anaemia, bleeding risk, and oral anticoagulation management.

Anaemia Anaemia is the most common defect seen in preoperative patients. It is an important modifiable risk factor affecting perioperative morbidity and often asymptomatic. The patients may complain dyspnoea, or palpitations, loss of energy. The preoperative evaluation should be able to identify the aetiology and duration of anaemia along with related symptoms and therapy. Additional investigations like complete blood count, serum iron studies vitamin B_{12}, and folate levels may be needed classify anaemia. The patient's cardiorespiratory reserve and amount of blood loss expected should also be considered before planning for surgery and transfusion in the preoperative period. Patients with normovolemia anaemia without considerable cardiac risk or expected surgical blood loss can be safely managed without transfusion. Perioperative transfusion is rarely required if the haemoglobin concentration is >10 g/dL.

5.6 Coagulopathies

- Coagulopathies may result due to inherited or acquired disorders of platelet and clotting factors. It may also be due to organ dysfunction or medications.
- The bleeding time and clotting time are not routinely done for every preoperative patient and history of the patient for bleeding disorders is more reliable.
- A detailed history of easy bruising, bleeding with minor procedures, need to be taken. The patient's medications should also be reviewed, and the use of anticoagulants and antiplatelet drugs should be noted.
- Any history suggestive of coagulopathies should prompt detailed coagulation studies before surgery.
- Patients with coagulation abnormalities may need a consultation with a haematologist. (Fig. 5.3).

Anticoagulants It is common to find the patients on anticoagulants requiring surgical intervention electively or on urgent basis. The risk of arterial or venous thromboembolism in case the drug is discontinued should be balanced against the risk of bleeding due to drugs. In addition, residual effect of anticoagulants may be catastrophic because it may cause haematoma following neuraxial blockade and lead to paraplegia.

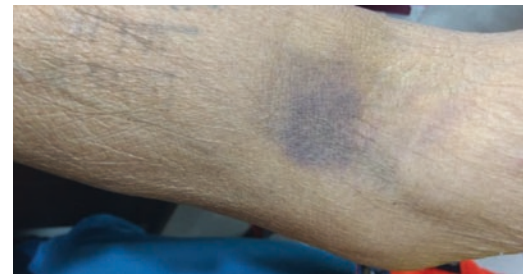

Fig. 5.3 Echymosis

Low dose aspirin is considered safe in the perioperative period. Warfarin should be stopped to allow the INR to fall to the range of 1.5 or less.

Recently many patients are receiving newer oral anticoagulants which are direct, selective, and reversible inhibitors of factor Xa or factor IIa. The drugs should be stopped for duration equivalent to two half-lives before planned surgery.

In patients with higher thrombosis risk, bridging therapy with heparin may be considered.

In case of any doubt regarding the perioperative status of the anticoagulants a specialist consultation with the haematologist and/or a cardiologist should be taken to further evaluate the patient.

Gastrointestinal Issues Aspiration of gastric substances is potentially disastrous pulmonary complication of surgical anaesthesia. We should have policies according to our setup regarding preoperative fasting status of the patients. Most current guidelines support fasting from solids (and non-human milk) for a period of 6 h or more and clear liquids are allowed up to 2 h before anaesthesia, irrespective of type of anaesthesia. There is no benefit in limiting fluid intake (of any kind or any amount) more than 2 h before induction of anaesthesia in fit patients. A maltodextrin-based liquid in the preoperative period to reduce preoperative fasting has been suggested to reduce the surgical stress response and improve outcomes. Routine usage of stimulants to decrease the risk of aspiration is not recommended. Some of the patients may have symptoms of GERD and are at increased risk of aspiration. Such patients should receive non-particulate antacids like sodium citrate and gastric motility stimulating agents like metoclopramide to reduce the chances of aspiration.

Liver Disease It is common for liver disease patients to undergo surgery. Moreover, asymptomatic patients may also undergo surgery and they have a heightened risk of morbidity and mortality. These are the questions which need to be addressed.

What are the risks of anaesthesia in patient with acute liver disease for emergency surgery?

What are the risks of anaesthesia in patient with chronic liver function impairment?

How can these risks be minimised?

The increased risk of surgery and anaesthesia in patients with liver disease is due to the numerous synthetic and metabolic liver functions. Deficiency of any of these functions increases perioperative risk of surgery. We need to identify such patients, stratify the risk, and optimise them as far as possible. Appropriate perioperative management of these patients is vital for case selection for surgical management to improve outcomes (Table 5.5).

A thorough history and physical examination including earlier blood transfusions, excessive alcohol or illicit drug use, history of jaundice, or hereditary liver disease, or previous reactions to anaesthesia should be taken to rule out liver disease. Associated cardiovascular symptoms (like poor exercise tolerance, oedema, and orthopnoea), respiratory symptoms (dyspnoea, ascites, pleural taps), and gastrointestinal symptoms (bleeding, haematemesis, melaena, piles Sepsis / urine output) may also point towards liver disease.

The physical examination should be done to identify signs of liver disease like jaundice, ascites, palmar erythema, etc. Muscle mass, cyanosis, clubbing, temperature. Cardiovascular

Table 5.5 Evaluation of Liver function tests

1. Cell damage: Aspartate aminotransferase (AST), alanine aminotransferase (ALT)—However, no correlation between levels and damage.
2. Biliary tract conjugated hyper bilirubinaemia, gamma-glutamine transaminases, alkaline phosphatase.
3. Impaired synthetic function.
• Albumin (half-life >20 days).
• Pre-albumin (half-life ~1.5 days).
• Clotting factors V, VII, (half-life ~1.5 days).
• Prothrombin time increases.
4. Imaging: Ultrasound abdominal (portal flow, pressure, ascites) and cardiac (myocard wall movement, pericardial effusion), upper GI endoscopy, endoscopic retrograde cholangiography and computed tomography.

system: pulse rate, venous pressure, BP, oedema Respiratory System: rate, effusions, sputum. Unconscious patient: Venous access (existing + potential). Various biochemical tests may be required to further evaluate liver disease. The routine liver function assessment is not recommended if history and examination is not suggestive of a liver disease. If there is inexplicable elevations of aspartate aminotransferase and alanine aminotransferase levels to more than three times normal or with any rise of total bilirubin concentration, a thorough investigation should be done.

Based on the history, examination and laboratory tests the surgical risk can be graded by using indices such as the Child Turcotte Pugh score or Model for End-stage Liver Disease score. Mortality rates for patients undergoing surgery increases with increase in Child class and varies from 10 (Child Class A) to 82% (Child class C) cirrhosis.

Kidney Disease *Renal* damage with proteinuria or a GFR less than 60 ml/min/1.73m^2 for 3 or more months is considered as kidney disease (Table 5.6).

Table 5.6 Stages of Chronic Kidney diseases

Stage	Description	GFR, mL/min per 1.73 m^2	Action
1	Injury to kidneys with normal or decrease in GFR	>90	Manage comorbidities, decrease progression
2	Injury to kidneys with mild decrease in GFR	60–89	Estimate progression
3	Moderate decrease in GFR	30–59	Evaluate and treat complications
4	Severe decrease in GFR	15–29	Prepare for renal replacement therapy
5	Renal failure	<15 (or dialysis)	Kidney transplant

Patients with renal disease have multi systemic involvement. These patients should be screened for:

1. *Cardiac disease:* Patients with CKD may have hypertension and CAD leading to presence of angina, MI. Exercise tolerance and METS needs to be evaluated preoperatively. Renal impairment (S. Creatinine >2 mg/dL) is a clinical cardiac risk factor for surgery as per AHA guidelines 2007. Also, heart failure may be present and patients may have presenting as shortness of breath, orthopnoea, PND, pedal oedema. A thorough evaluation is warranted for same.
2. *Anaemia may be present d*ue to decreased erythropoietin production, bone marrow fibrosis secondary to hyperparathyroidism, and increased haemolysis. Always look for pallor, tachycardia and systolic murmur.
3. *Platelet Dysfunction:* Due to decrease platelet adhesiveness and aggregation. Also, Heparin used during dialysis can cause heparin induced thrombocytopenia. Also, patients may have thrombasthenia with normal PTT and platelet count.
4. *Gastrointestinal Involvement:* common symptoms include anorexia, nausea, vomiting, diarrhoea, and hiccups. Also patients may associated malnutrition, liver dysfunction (due to chronic venous congestion), viral hepatitis (due to dialysis), and muscle ulceration.
5. *Neurological involvement (Uremic Neuropathy):* patients with chronic renal failure may have polyneuropathy, decreased mental ability, central nervous symptoms (like myoclonus, confusion, seizures, coma), and autonomic dysfunction.
6. *Pulmonary involvement* in renal patients includes pulmonary oedema and pleural effusion with decrease in lung compliance and increased VQ mismatch leading to hypoxia.
7. Depending on the history and examination additional investigations and nephrologist's opinion should be sought for best possible optimisation before the surgery.

5.7 Preoperative Optimisation

1. *Patient with Chronic Renal disease treated conservatively.*
   - Dialysis not needed for euvolemic patients who respond to diuretics and do not have significant electrolyte imbalance or bleeding problems.
   - Those with congestive heart failure or pulmonary congestion should be evaluated to rule out cardiovascular disease.
2. *Patients already on dialysis:*
   - Patients on haemodialysis should have dialysis within 24 hours before surgery. One should avoid elective surgery on the same day of haemodialysis because possible rapid fluid shifts, electrolyte abnormality, and disequilibrium. However, surgery should not be delayed more than 48 hrs after dialysis due to possibility of fluid overload and acidosis.

In a patient on dialysis the following should be recorded:

- Weight (pre-dialysis and post dialysis).
- Last dialysis session.
- Volume of fluid normally removed (Pre-dialysis—Post-dialysis weight).
- Electrolytes.
- Blood urea and creatinine levels pre-dialysis.
- Daily fluid intake and amount of urine output.
- Sites of current or old AV Fistula.
- Presence of peritoneal dialysis catheter.

5.7.1 Preoperative Evaluation for Endocrinal Disorders

Patients with endocrinal system problems may present for endocrinal surgery. Also, patient for endocrine system disorder may present for non-incidental non-endocrinal surgery. Moreover, many endocrine disorders often occur in concert with another to produce recognised syndromes of endocrinopathies such as MEN syndrome. The common endocrine diseases (thyroid disorder and diabetes mellitus) and preoperative considerations are discussed here.

5.7.2 Diabetes Mellitus

Preoperatively, it is important to differentiate between hyperglycaemia as a marker of acute illness and its potential as a reversible, treatable, and independent variable of outcome.

Currently, a target HbA1c of <7% for patients with DM. Lower level of HbA1c is related with reduced microvascular complications and neuropathy. An elevated HbA1c is related with a greater risk of cardiovascular events, an increase in postoperative infectious complications, an increase in gastric fluid volumes. Chronic hyperglycaemia—stiff joint syndrome, reducing joint mobility (cervical, atlanto-occipital), and contributing to a difficult laryngoscopy. Peripheral neuropathy with preexisting sensory deficits may complicate attempts to assess the adequacy of a regional anaesthetic. Additional tests may be needed depending upon involvement of the other systems. At present there is no data to suggest a cut off value of blood glucose to cancel an elective procedure because the association between preoperative blood glucose (BG) values and postoperative complications after surgery is not established clearly. In general, preoperative BG levels above 200 mg dl^{-1} [is] lead to an increased risk of cardiovascular morbidity and overall 30 day mortality. A single morning glucose value or even multiple readings taken only after an overnight fast do not adequately reflect a diabetic patient's long-term glucose control. An estimation of glycaemic control can be obtained through an examination of blood glucoses at different times of the day over a course of weeks or an HbA1c. (Table 5.7) Moreover if the patient comes for elective surgery and is diagnosed as a diabetic on the workup should be evaluated thoroughly for the systemic involvement instead of taking a call on biochemical values only.

Table 5.7 Preoperative evaluation of the patient with diabetes

System	Common Symptoms	Additional tests
Cardiovascular	MI, silent Other risk factors for CAD BP, HR, orthostatic hypotension Peripheral pulses (monitoring)	Provides information about ischemic cardiac disease and serves as a baseline for comparison should hemodynamic complications develop.
Neurologic	History of stroke, peripheral neuropathy, autonomic dysfunction Motor, sensory neurologic examination	
Gastrointestinal	Gastroparesis Gastroesophageal reflux	
Renal	Renal dysfunction Diuretic and/or dialysis dependence Volume status, skin turgor, mucus membranes, neck veins	Kidney function tests (urea, creatinine, electrolytes) provide information about volume, osmolarity, and acid-base status.
Endocrine	Glucose control, history of diabetic ketoacidosis or hyperosmolar coma, presence of other endocrine disorder (MEN syndrome)	Blood glucose provides information about glucose control and serves as a marker of illness. Hb1Ac information about long-term glucose control and associated complications.

Table 5.8 Recommended standard for BS control for patients with diabetes mellitus (BS in mg/dl)

Index	Good	Acceptable	Fair	Poor
Fasting BS	≤ 100	≤ 120	≤ 170	>200
Post prandial BS	≤ 120	≤ 150	≤ 200	> 235
Glycosylated Hb	≤ 6%	≤ 8%	≤ 10%	> 10%

Diagnostic Testing A single morning glucose value or even multiple readings taken only after an overnight fast do not adequately reflect a diabetic patient's long-term glucose control. An estimation of glycaemic control can be obtained through an examination of blood glucoses at different times of the day over a course of weeks or an HbA1c (Table 5.8).

5.7.3 Implications for Perioperative and Anaesthetic Management

The anaesthesiologist should know which type of insulin the patient is taking. In order to simplify perioperative glucose control, the anaesthesiologist should consider discontinuing all oral agents on the day of surgery and use insulin therapy for glucose management. The medical regimen is designed in consultation with physician or endocrinologist.

Suggestions/ recommendations for patients with DM scheduled for surgery:

- Surgery of DM patients should be planned as the first case.
- Pre, intra-, and postoperative blood glucose levels should be determined.
- Up until day of surgery—continue all insulin regimens as scheduled.
- *In Type I diabetics take one-third to one half of daily morning insulin should be given in morning.*
- *Type 2 diabetics take none or up to half dose of long acting or combination (70/30 preoperations) insulins on the day of surgery.*
- *In patients with an insulin pump basal infusion rate should be continued.*
- Discontinue all rapid and short acting insulins on the day of surgery.
- Long acting sulfonylureas such as chlorpropamide may be discontinued several days before surgery, especially if prolonged fasting is anticipated.
- Shorter acting oral agents should be discontinued on the day of surgery.
- Metformin should be discontinued on the day of surgery.

Prolonged fasting—supplement glucose containing solutions to meet the basal need of glucose in perioperative period.

Thyroid Disorders In general, successful management of overt thyroid dysfunction has been correlated with an improved survival. In patients with severe thyroid dysfunction myxoedema coma or thyroid storm may occur due to surgical stress (Table 5.9).

Patients with thyroid disease should be assessed for the systemic effects of hyperthyroidism or hypothyroidism (Table 5.10). A recent thyroid function test post alteration in treatment is necessary to ascertain the level of control. Patients should be as close as possible to clinical and biochemical euthyroid before going to surgery.

Table 5.9 Preoperative evaluation of the patient with Hyperthyroidism

General	Hyperkinesis, warm moist skin, carpal tunnel syndrome, tremor
CVS	Palpitations, tachycardia, atrial fibrillation, systolic HTN
Neurologic	Fatigue, weakness, nervousness, tremor, proximal muscle weakness
Gastrointestinal	Change in appetite or bowel movement frequency, weight loss despite increased appetite
Endocrine	Increased perspiration, irregular menses
HEENT	Eyes signs, tracheal deviation, goiter, dysphagia, chronic cough, dyspnoea, orthopnoea, hoarseness

Table 5.10 Preoperative evaluation of the patient with Hypothyroidism

General	Slow movements, slow speech, dry sallow skin, nonpitting oedema, cold intolerance
CVS	Bradycardia, diastolic hypertension, low voltage ECG, enlarged cardiac silhouette on chest radiograph
Pulmonary	Hypoventilation
Neurologic	Fatigue, sleepiness, depression, paresthesis, delayed DTR
Gastrointestinal	Weight gain, constipation
Endocrine	Irregular menses, menorrhagia

TSH levels monitor thyroid function but can mislead like in patients with thyrotoxicosis or pituitary disease. Several drugs and pathologies affect protein binding so values of free hormone concentrations (free T3 and free T4) should be done.

Thyroid function tests may be less useful in some situations such as nonthyroidal illness, previously known as 'euthyroid sick syndrome', subclinical hyperthyroidism, altered protein binding, and medications like dopamine and glucocorticoids. Clinical and end organ measures like ECG and Electrolyte levels may be helpful in these conditions. In the preoperative period, hyperthyroid patients have a risk of thyroid storm and hypothyroid patients may have a decreased cardiac output. So, an endocrinology consult should be taken for non-euthyroid patients who require urgent or emergent surgery.

Perioperative Medical Consultation After thorough preoperative check-up specialist medical consultations may be required for optimisation of the patients. The perioperative team should balance the risk of doing the surgery against the risks of delay. The preoperative consultations are not taken for getting the patient 'cleared' for surgery but to stratify the risk involved for the proposed procedure. Consultant-to-consultant communication between anaesthetists, surgeons, and specialist physician is essential, particularly the benefits of surgery may be outweighed by the risks to the patient.

The general goals of these consultations are to identify unknown comorbidities and risk of medical complications and optimise medical condition as far as possible. The perioperative team should clearly state the need for consult, treatment goals, benefits of the intended procedure and urgency, the possible risks and other treatment options available.

Based on the assessment and analysis of the specialist, the final decision should be taken by the perioperative team in consultation with the patient. The additional advantage with perioperative consultation is that, the specialist who has seen the patient in the preoperative period and in

case of a complication the patient can be consulted for management.

Key Points

- Preoperative assessment is an important component of surgical management of patients.
- It should be done comprehensively and needs a team effort.
- A preoperative questionnaire may help to detect the comorbid conditions early and help in reducing unnecessary visits to the hospital for PAC.

Safe anaesthesia and surgery require an optimal balance between comorbidities management and surgical management. A balanced approach should be taken to prevent unnecessary delays, and safe conduct of surgery.

Further Reading

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