Preoperative Evaluation

Preoperative Medication Management

- The patient's comorbidities and planned procedure must inform medication management during the perioperative period.
- Some medications have beneficial effects during surgical procedures, whereas others may be detrimental.
- In some cases, abrupt *withdrawal* of medications can have a negative effect.

BOX 31.15 Preoperative Management of Medications

- Instruct patients to take these medications with a small sip of water, even if fasting.
- 1. **Antihypertensive medications**
- Continue on the day of surgery, except for ACEIs and ARBs
- 2. **Cardiac medications (e.g., β-blockers, digoxin)**
- Continue on the day of surgery.
- 3. **Antidepressants, anxiolytics, and other psychiatric medications**
- Continue on the day of surgery.
- 4. **Thyroid medications**
- Continue on the day of surgery.

BOX 31.15 Preoperative Management of Medications

- 5. **Oral contraceptive pills**
- Continue on the day of surgery.
- 6. **Eye drops**
- Continue on the day of surgery.
- 7. **Heartburn or reflux medications**
- Continue on the day of surgery.
- 8. **Opioid medications**
- Continue on the day of surgery.

BOX 31.15 Preoperative Management of Medications

- 9. **Anticonvulsant medications**
- Continue on the day of surgery.
- 10. **Asthma medications**
- Continue on the day of surgery.
- 11. **Corticosteroids (oral and inhaled)**
- Continue on the day of surgery.
- 12. **Statins**
- Continue on the day of surgery.

BOX 31.15 Preoperative Management of Medications

- 13. **Aspirin**
- Continue aspirin in patients with:
- prior percutaneous coronary intervention,
- high-grade IHD, and
- significant CVD.
- Otherwise, discontinue aspirin 3 days before surgery.

BOX 31.15 Preoperative Management of Medications

- 14. **P2Y12 inhibitors (e.g., clopidogrel, ticagrelor, prasugrel, ticlopidine)**
- Patients having cataract surgery with topical or general anesthesia do not need to stop taking thienopyridines.
- If reversal of platelet inhibition is necessary, the time interval for discontinuing these medications before surgery is 5–7 days for clopidogrel, 5–7 days for ticagrelor, 7–10 days for prasugrel, and 10 days for ticlopidine.
- Do not discontinue P2Y12 inhibitors in patients who have drug-eluting stents until they have completed 6 mo of dual antiplatelet therapy, unless patients, surgeons, and cardiologists have discussed the risks of discontinuation.
- The same applies to patients with bare metal stents until they have completed 1 month of dual antiplatelet therapy.

BOX 31.15 Preoperative Management of Medications

- 15. **Insulin**
- For all patients, discontinue all short-acting (e.g., regular) insulin on the day of surgery (unless insulin is administered by continuous pump).
- Patients with type 2 diabetes should take none, or up to one half of their dose of long-acting or combination (e.g., 70/30 preparations) insulin, on the day of surgery.
- Patients with type 1 diabetes should take a small amount (usually one third) of their usual morning long-acting insulin dose on the day of surgery.
- Patients with an insulin pump should continue their basal rate only.

BOX 31.15 Preoperative Management of Medications

- 16. **Topical medications (e.g., creams and ointments)**
- Discontinue on the day of surgery.
- 17. **Non-insulin antidiabetic medications**
- Discontinue on the day of surgery (exception: SGLT2 inhibitors should be discontinued 24 hours before elective surgery)
- 18. **Diuretics**
- Discontinue on the day of surgery (exception: thiazide diuretics taken for hypertension, which should be continued on the day of surgery).
- 19. **Sildenafil (Viagra) or similar drugs**
- Discontinue 24 h before surgery

BOX 31.15 Preoperative Management of Medications

- 20. **COX-2 inhibitors**
- Continue on the day of surgery unless the surgeon is concerned about bone healing.
- 21. **Nonsteroidal antiinflammatory drugs**
- Discontinue 48 hours before the day of surgery.
- 22. **Warfarin (Coumadin)**
- Discontinue 5 days before surgery, except for patients having cataract surgery without a bulbar block.
- 23. **Monoamine oxidase inhibitors**
- Continue these medications and adjust the anesthesia plan accordingly.

Preoperative medication management

- ✓ داروهای ضد فشار خون ← ادامه یابند.
- ✓ بیمارانی که نمی‌توانند HOTN را تحمل کنند ← ۲۴-۱۲ ساعت قبل از عمل ACEIS و ARB را باید قطع کنند. (box 31.15)
- ✓ دیورتیک‌ها ← قطع شوند به جز دیورتیک‌های تیازیدی اگر برای HTN مصرف می‌شوند.
- ✓ لوپ دیورتیک‌ها که سبب از دست رفتن حجم و هیپوکالمی می‌شوند در روز عمل نباید مصرف شوند.
- ✓ در بیمارانی که Volume overload قابل توجه، HF شدید یا آسیت دارند و بخصوص اگر پروسیجر جراحی مفید می‌باشد، دیورتیک‌های لوپ بهتر است ادامه یابند.
- ✓ به نظر نمی‌رسد که مصرف NSAIDs ریسک هماتوم اسپاینال را در تکنیک‌های نورآگزیال افزایش دهد.
- ✓ قطع مصرف NSAIDs قبل از عمل ممکن است در بیمارانی که در ریسک AKI حوالی عمل هستند مفید باشد. این داروها ۲۴ تا ۷۲ ساعت قبل از عمل قطع می‌شوند.

- ✓ مهار کننده‌های COX-2 می‌توانند حوالی عمل ادامه یابند.
- ✓ در بیماران با دیابت تیپ ۱ یا ۲ ← قطع مصرف انسولین کوتاه اثر در هنگام NPO، استثناء در ایر مورد بیماران دریافت کننده پمپ‌های انفوزیون انسولین زیر جلدی مداوم هست که این بیماران انفوزیور را در حد کمترین میزان دوز آن ادامه می‌دهند.
- ✓ در روز عمل جراحی بیماران با دیابت تیپ ۱ باید $\frac{1}{3}$ تا $\frac{1}{2}$ دوز معمول روزانه انسولین متوسط‌الاثر ؛ طولانی اثر خود را جهت جلوگیری از کتواسیدوز دریافت کنند.
- ✓ بیماران با دیابت تیپ ۲ ← نیاز به انسولین نداشته یا می‌توانند $\frac{1}{2}$ دوز روزانه انسولین متوسط‌الاثر ؛ طولانی اثر معمول خود یا ترکیبی از آنها (به نسبت 70/30) را دریافت کنند (در صبح روز عمل)
- ✓ مت‌فورمین به صورت روتین نباید در صبح روز عمل قطع شود. یک ریسک بسیار کم اسیدوز لاکتیک در بیمارانی که نارسایی کلیه یا کبد دارند، وجود دارد بنابراین قطع مت‌فورمین روز قبل از عمل د مورد بیمارانی انجام شود که پروسیجر مدنظر ریسک بالای آسیب کلیوی یا کبدی را به همراه داشت باشد (مثلاً مواجهه با مواد کنتراست داخل وریدی).

در کل تمام داروهای خوراکی ضد قند خون عموماً در روز عمل جراحی قطع می‌شوند به جز در مواردی که عمل جراحی Minor یا سرپایی باشد.

✓ درمان جایگزینی هورمون بعد از یائسگی که حاوی استروژن می‌باشد، ریسک حوادث ترومبوآمبولیک را افزایش می‌دهد ← قطع این داروها قبل از عمل صورت می‌گیرد.

استروژن ← تقریباً یک ماه قبل از عمل جراحی باید قطع شود.

✓ داروهای OCP ← ادامه یابند.

✓ داروهای سایکولوژیک ← ادامه یابند.

Preoperative Medication Management

- NSAIDs once the drugs have been eliminated, platelet function returns to normal.
- Preoperative discontinuation of NSAIDs may be of value in patients at risk for perioperative AKI.
- Typically, NSAIDs are discontinued 24 to 72 hours preoperatively.
- Earlier discontinuation does not increase safety

Preoperative Medication Management

- COX-2 inhibitors (e.g., celecoxib) have minimal effect on platelet function and can usually be continued in the perioperative period.
- the long-term COX-2 inhibitor use in the nonoperative setting does increase the risk of cardiac events, in comparison with placebo or naproxen.
- Conversely, COX-2 inhibitors have a cardiac risk profile similar to that of ibuprofen or diclofenac.
- In general, no clear evidence indicates increased cardiac risk from *short-term* perioperative administration of COX-2 inhibitors.
- The exception is valdecoxib (now withdrawn from the market), which caused an excess of cardiac events in patients undergoing cardiac surgery

Preoperative Medication Management

- Postmenopausal hormone replacement therapies that contain estrogen increase the risk of thromboembolic events.
- Estrogens must be stopped approximately 4 weeks preoperatively for coagulation function to return to baseline.
- these medications are still associated with some elevation in thrombotic risk.

Preoperative Medication Management

- Since the risk of unanticipated pregnancy may outweigh the benefits of discontinuing oral contraceptives preoperatively, it is reasonable to continue oral contraceptives in most patients during the perioperative period.
- In patients who are deemed to be a high risk for postoperative VTE consideration may be given to stopping oral contraceptives 4 weeks before surgery.

Preoperative Medication Management

- Most medications for psychiatric and psychological problems should be continued into the preoperative period.
- Thus, most antidepressants, antipsychotics, and benzodiazepines are best maintained to avoid exacerbations of symptoms.
- Historically, monoamine oxidase inhibitor (MAOI) antidepressants were discontinued preoperatively at least 3 weeks before surgery.
- Some newer agents, such as moclobemide, cause reversible enzyme inhibition and have effects lasting less than 24 hours.
- Preoperative withdrawal of these drugs has potential risks.

Preoperative Medication Management

- Patients receiving tricyclic antidepressants require a preoperative ECG, given the potential for a prolonged QT interval.
- Because tricyclic antidepressants block the reuptake of norepinephrine and serotonin, high doses may also result in augmented responses to vasopressor drugs, with the potential for exaggerated hemodynamic changes.
- Patients taking lithium require evaluation of electrolyte and creatinine concentrations.

Preoperative Medication Management

- Continued perioperative use of selective serotonin reuptake inhibitors (SSRIs) are associated with increased surgical bleeding,whereas abrupt discontinuation of SSRIs can also cause dizziness, chills, muscle aches, and anxiety.
- Overall, it is still reasonable to continue SSRI perioperatively in most patients, aside from those undergoing procedures where bleeding could have significant postoperative sequalae (e.g., intracranial surgery).

Preoperative Medication Management

- Complementary and alternative medications may interact with anesthetic drugs, alter effects of prescription medications, and increase bleeding
- In addition, many patients do not consider these drugs “medications,” and may not list them among their medications unless specifically asked

Preoperative Laboratory and Diagnostic Studies

- ❑Routine preoperative testing in asymptomatic healthy patients has very poor diagnostic yield,
- provides little to no additional prognostic information, and
- has not shown any beneficial effect on outcomes.
- ❑Unnecessary testing is also expensive, and may lead to costly valuation of borderline or false-positive test abnormalities.
- ❑Aside from potentially causing operating room delays or cancellations

Preoperative Laboratory and Diagnostic Studies

- Preoperative diagnostic tests should be selectively ordered based on:
  - the patient's medical history,
  - planned surgery, and
  - expected degree of intraoperative blood loss.
- Thus, anesthesiologists can expedite patient care, reduce healthcare and improve the delivery of perioperative medicine

Preoperative Laboratory and Diagnostic Studies

- In general, testing does not have to be repeated during the preoperative evaluation of healthy patients (i.e., ASA-PS class 1 or 2) if similar testing has already been performed within the 2 months preceding surgery and there has been no major interval change in the patient's medical status (e.g., recent chemotherapy).

Preoperative Laboratory and Diagnostic Studies

- the NICE in the United Kingdom published updated 2016 guidelines , surgical procedures are graded as:

1. minor (e.g., skin lesion excision),
2. intermediate (e.g., inguinal hernia repair, varicose vein excision, tonsillectomy, knee arthroscopy), and
3. major (e.g., total abdominal hysterectomy, transurethral prostate resection, lumbar spine discectomy, thyroidectomy, total joint replacement, lung operations, colon resection, radical neck dissection).

COMPLETE BLOOD COUNT, HEMOGLOBIN, AND HEMATOCRIT

- Typical clinical indications include:
- a history of increased bleeding,
- hematologic disorders,
- CKD,
- chronic liver disease,
- recent chemotherapy or radiation treatment,
- corticosteroid therapy,
- anticoagulant therapy, and
- poor nutritional status.

COMPLETE BLOOD COUNT, HEMOGLOBIN, AND HEMATOCRIT

- The NICE guidelines recommend routine CBC testing only in

1. “ASA-PS class 3 or 4 patients undergoing intermediate grade procedures, and
2. all patients undergoing major procedures.

RENAL FUNCTION TESTING

❑Primary clinical indications include :

- diabetes mellitus,
- hypertension,
- cardiac disease,
- potential dehydration (e.g., vomiting, diarrhea),
- anorexia,
- bulimia,
- fluid overload states (e.g., heart rate, ascites),
- known renal disease, liver disease, relevant recent chemotherapy (e.g., cisplatin, carboplatin),
- renal transplantation.

RENAL FUNCTION TESTING

- The NICE guidelines recommend routine renal function testing in :
  - ASA-PS class 3or 4 patients undergoing intermediate procedures, and
  - ASA-PS class 2, 3, or 4 patients undergoing major procedures
- If patients are deemed to be at risk for perioperative AKI, testing may also be considered in :
  - ASA-PS class 3 or 4 patients undergoing minor procedures, and
  - ASA-PS class 2 patients undergoing intermediate procedures.

LIVER FUNCTION TESTING

❑Primary clinical indications include :

- a history of hepatitis (viral, alcohol, drug-induced, autoimmune),
- jaundice,
- cirrhosis,
- portal hypertension,
- biliary disease,
- gallbladder disease,
- hepatotoxic drug exposure,
- tumor involvement of the liver, and
- bleeding disorders.

COAGULATION TESTING

- Routine preoperative coagulation testing is not indicated (even in patients undergoing regional procedures) unless a known or suspected coagulopathy is identified.

❑Primary clinical indications for testing include :

- a known bleeding disorder,
- hepatic disease, and
- anticoagulant use

COAGULATION TESTING

- The 2016 NICE guidelines state that coagulation testing should only be considered in patients who are :

(1) ASA-PS class 3 or 4;

(2) undergoing intermediate, major, or complex surgical procedures; and

(3) known to take anticoagulant medications or have chronic liver disease

URINALYSIS

- There is no indication for routine preoperative urinalysis.
- Primary clinical indications include :

• a suspected urinary tract infection and

• unexplained fever or chills.

PREGNANCY TEST

- Pregnancy testing is often determined by hospital-specific protocols.
- The 2012 ASA “Practice Advisory for Preanesthesia Evaluation” suggests offering pregnancy testing to female patients of childbearing age.
- The NICE guidelines recommend that all women of childbearing potential be asked whether there is any possibility they could be pregnant, and that any women who could possibly be pregnant be made aware of the risks of anesthesia and surgery to a fetus.

ELECTROCARDIOGRAM

- the preoperative ECG may not provide additional prognostic information to identify individuals at risk for postoperative cardiac complications.
- Primary clinical indications for preoperative ECGs include a history of IHD, hypertension, diabetes mellitus, heart failure, chest pain, palpitations, abnormal valvular murmurs, peripheral edema, syncope, dizziness, dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, and CVD.

ELECTROCARDIOGRAM

- The 2014 ESC/ESA guidelines suggest preoperative ECGs in patients with risk factors for IHD or suspicious symptoms, especially if they are undergoing intermediate-risk or high-risk surgery.
- The guidelines also recommend against routine preoperative ECGs, especially in asymptomatic patients without known cardiovascular disease risk factors.
- The NICE guidelines recommend routine preoperative ECGs in

- ASA-PS class 3 or 4 patients undergoing intermediate grade procedures, and
- ASA-PS class 2, 3, or patients undergoing major procedures.

CHEST RADIOGRAPH

- Routine preoperative chest radiographs do not provide prognostically important information for assessing perioperative risk.
- Preoperative chest radiographs should therefore not be ordered routinely
- These indications include advanced COPD, bullous lung disease, suspected pulmonary edema, suspected pneumonia, suspected mediastinal masses, and suspicious findings on physical examination (e.g., rales, tracheal deviation).

ROLE OF SPECIALIZED TESTING IN PREOPERATIVE RISK ASSESSMENT

- Based on an initial preoperative clinical evaluation, anesthesiologists may order subsequent specialized tests to determine perioperative risk more accurately.

❑Examples of such tests include:

- noninvasive cardiac stress tests,
- coronary angiography”,
- echocardiography,
- CPET, and
- PFTs.

ROLE OF SPECIALIZED TESTING IN PREOPERATIVE RISK ASSESSMENT

- Current guidelines largely recommend preoperative echocardiography to assess dyspnea of unknown origin or recent altered clinical status in an individual with known heart failure.
- In addition, repeat echocardiography is reasonable in clinically stable patients with known ventricular dysfunction who have not been tested in the previous year.
- Conversely, routine preoperative echocardiography is discouraged

ROLE OF SPECIALIZED TESTING IN PREOPERATIVE RISK ASSESSMENT

- CPET is a noninvasive global assessment of exercise capacity; it involves a patient exercising on a bicycle or treadmill for 8 to 12 minutes
- Poor exercise capacity during CPET, based on either a low peak oxygen consumption or a low anaerobic threshold, is associated with increased risks of postoperative morbidity.
- Thus, the test can help improve the accuracy of preoperative risk stratification.

ROLE OF SPECIALIZED TESTING IN PREOPERATIVE RISK ASSESSMENT

- The PFTs tests have an established and important role for assessing perioperative risk in lung resection surgery
- the *prognostic* value of preoperative PFTs is limited.
- Practice guidelines from the American College of Physicians recommend against routine preoperative spirometry for estimating risks for pulmonary complications after noncardiothoracic surgery.
- Furthermore, there does not seem to be a critical PFT threshold below which patients should not be offered surgery.

TABLE 31.18 Framework for Preoperative Diagnostic Testing Based on Patients' Medical History

Preoperative Diagnosis	ECG	CXR	CBC	Electrolytes	Creatinine	Glucose	Coagulation	LFTs	Drug Levels	Ca
Cardiac disease										
IHD	X		X	±						
HF	X	±								
HTN	X	±		X*	X					
Chronic atrial fibrillation	X								X†	
PAD	X									
Valvular heart disease	X	±								
Pulmonary disease										
COPD	X	±	X						X‡	
Asthma§										
Diabetes mellitus	X			±	X	X				

Preoperative Diagnosis	ECG	CXR	CBC	Electrolytes	Creatinine	Glucose	Coagulation	LFTs	Drug Levels	Ca
Liver disease										
Infectious hepatitis							X	X		
Alcohol/drug induced							X	X		
Tumor infiltration							X	X		
Renal disease			X	X	X					
Hematologic disorders			X							
Coagulopathies			X				X			
CNS Disorders										
Stroke	X		X	X		X			X	
Seizures	X		X	X		X			X	
Tumor	X		X							
Vascular/aneurysms	X		X							

Preoperative Diagnosis	ECG	CXR	CBC	Electrolytes	Creatinine	Glucose	Coagulation	LFTs	Drug Levels	Ca
Malignancy			X							
Hyperthyroidism	X		X	X						X
Hypothyroidism	X		X	X						
Cushing disease			X	X		X				
Addison disease			X	X		X				
Hyperparathyroidism	X		X	X						X
Hypoparathyroidism	X			X						X
Morbid obesity	X	±				X				
Malabsorption/poor nutrition	X		X	X	X	X				

Preoperative Diagnosis	ECG	CXR	CBC	Electrolytes	Creatinine	Glucose	Coagulation	LFTs	Drug Levels	Ca
Digoxin	X			±					X	
Anticoagulants			X				X			
Phenytoin									X	
Phenobarbital									X	
Diuretics				X	X					
Corticosteroids			X			X				
Chemotherapy			X		±					
Aspirin/NSAID										
Theophylline									X	

IHD

- Patients with risk factors for IHD or suspicious symptoms may require an ECG, especially before intermediate-risk or high-risk surgical procedures.
- Routine preoperative ECGs are not indicated especially in asymptomatic patients without known cardiovascular disease or risk factors.
- If a previous ECG is available from the previous 3 months and there has been no intervening change in clinical status, a repeat ECG is likely not needed.[7]

IHD

- A baseline ECG is unlikely to be helpful in an individual at very low risk for postoperative cardiac events.
- Other typical preoperative laboratory tests that may be considered for patients with known or suspected IHD include creatinine and hemoglobin concentrations.
- In addition, anemia can modify the effects of β-adrenergic blockade in surgical patients

BOX 31.2 **Recommendations forPreoperative Resting 12-Lead Electrocardiogram**

- **Class IIa Recommendation: It Is Reasonable to Perform the Procedure**
- Preoperative resting 12-lead ECG is reasonable for patients with known IHD, significant arrhythmia, PAD, CVD, or other significant structural heart disease (except if undergoing low-risk surgical procedures).
- **Class IIb Recommendation: The Procedure May Be Considered**
- Preoperative resting 12-lead ECG may be considered for asymptomatic patients without known coronary heart disease, except for those undergoing low-risk surgical procedures.
- **Class III Recommendation: The Procedure Should Not Be Performed Because It Is Not Helpful**
- Routine preoperative resting 12-lead ECG is not useful for asymptomatic patients undergoing low-risk surgical procedures.

Asthma

- Arterial blood gases are not necessary unless the patient is having a severe acute exacerbation.
- Patients taking oral corticosteroids should have their blood glucose checked.
- Chest radiography is needed only if an infection or pneumothorax is suspected.
- Bronchodilators, corticosteroids (inhaled and oral), and any antibiotics must be continued on the day of surgery

Chronic Obstructive Pulmonary Disease

- A chest radiograph is useful only if infection or bullous disease is suspected.
- A key goal in the preoperative preparation of a patient with COPD is optimizing pulmonary function before any elective surgery.
- In a patient with suggestive symptoms or history of associated Restrictive Pulmonary diseases, a chest radiograph and PFTs can help establish the diagnosis

Pulmonary Hypertension

- An ECG and echocardiogram are useful in patients with suspected pulmonary hypertension, and those with moderate-to-severe known disease.
- Other useful laboratory tests include :

- complete blood count,
- electrolyte concentrations,
- creatinine concentrations, and
- liver function tests (i.e., liver congestion or drug-related side effects).

HEPATIC DISORDERS

- Baseline testing includes an ECG and blood sampling for CBC, electrolyte concentration, creatinine concentration, liver function tests, albumin concentration, and INR.
- Patients suspected of having hepatitis may require screening for the hepatitis A immunoglobulin M (IgM) antibody, the hepatitis B surface and core antigens, the hepatitis B surface antibody, and the hepatitis C antibody.
- A chest radiograph can help identify any suspected effusions.

Cirrhosis

- Elevated AST or ALT concentrations should prompt hepatitis screening with hepatitis A IgM antibody, hepatitis B antigens (surface and core), hepatitis B surface antibody, and hepatitis C antibody.
- Elevated concentrations of ALP or bilirubin, especially in association with normal or mild to moderate increased transaminase levels, may indicate obstruction in the biliary system.
- In these cases, abdominal ultrasound, computed tomography scans, or endoscopic retrograde cholangiopancreatography may establish a diagnosis.

KIDNEY DISEASE

- Patients with CKD need an ECG and blood sampling to measure electrolyte, calcium, glucose, albumin, and creatinine concentrations
- A chest radiograph (infection, volume overload), echocardiogram (murmurs, heart failure), and cardiology evaluation may be necessary in some cases.

Coagulopathies

- Diagnostic testing may include a CBC (including platelet count), INR, and aPTT;
- *routine* preoperative screening for coagulopathies is not indicated.
- Clinical indications include a known bleeding disorder, hepatic disease, and anticoagulant use.
- National guidelines in the United Kingdom also recommend coagulation testing only in patients who are
- (1) ASA physical status class III or IV;
- (2) undergoing intermediate, major, or complex surgical procedures; and
- (3) known to take anticoagulant medications or have chronic liver disease

Coagulopathies

- In patients without a history of vitamin K antagonist use, the most common causes of a prolonged INR are laboratory error, liver disease, and malnutrition.
- Consequently, the test should initially be repeated.
- If the repeat test result remains abnormal, both liver function tests and a hepatitis panel are warranted, with possible referral to a hematologist.

Thrombocytopenia

- Thrombocytopenia is defined as a platelet count less than 150,000/mm_3
- If a patient has an unexpectedly low platelet count, the initial steps are to repeat the test, examine the peripheral smear, and collect blood for the platelet count

Polycythemia

- It can be defined based on hematocrit (>48% in females and >49% in males) and hemoglobin concentration (>160 g/L in females and > 165 g/L in males).
- Useful laboratory tests include an ECG, arterial blood gases, and chest radiograph.
- An unexpected finding of polycythemia should prompt an investigation for possible causes, which if not readily apparent, should raise the possibility of polycythemia vera.

Sickle Cell Disease

- ❑the anesthesiologist should evaluate the degree of pulmonary, cardiac, renal, and central nervous system damage.
- ❑Useful tests include:
- an ECG,
- chest radiograph, and
- blood sampling for CBC and creatinine concentration.
- ❑Additional testing (e.g., echocardiogram, arterial blood gases) may be needed.

SICKLE CELL TEST

- Even in at-risk populations, routine preoperative screening for sickle cell disease has a very low yield
- NICE guidelines recommend against routine preoperative testing for sickle cell disease or sickle cell trait.
- These indicators include patient-related and surgery-related (e.g., deliberate hypothermia, cardiopulmonary bypass, intrathoracic procedures, intraabdominal procedures, orthopedic procedures with tourniquet use) factors.

Aneurysms and Arteriovenous Malformations

- Typical testing includes an ECG and blood sampling to measure electrolyte, glucose, and creatinine concentrations.
- Chest radiography, echocardiography, and neurologic imaging (e.g., computed tomography scan) are also often needed.
- the ECG changes seen following a rupture, which often include ST-segment and T-wave changes, mimic those seen with myocardial ischemia

Seizure Disorder

- The anesthesiologist should document the anticonvulsant dosing regimen and adequacy of seizure control.
- Routine measurement of serum drug levels of anticonvulsants is not indicated unless there are concerns about drug toxicity or ongoing breakthrough seizures.
- The most commonly ordered tests are CBC and electrolyte concentrations

Parkinson Disease

- Evidence of significant pulmonary symptoms or possible infection requires chest radiography, pulmonary consultation, and possible delay of the procedure for improvement.
- All associated medications should be continued.
- Abrupt withdrawal of levodopa may exacerbate symptoms or precipitate neuroleptic malignant syndrome.

Central Nervous System Tumors

- Preoperative testing may include an ECG and blood sampling for electrolyte concentration, glucose concentration, and thyroid function tests.
- TSH increases production of thyroid hormones (T_3 and T_4) by the thyroid gland

❑Muscular Dystrophies and Myopathies

- The preoperative evaluation should focus on the cardiovascular (e.g., palpitations, dyspnea, chest pain, syncope, orthopnea, dependent edema) and pulmonary (e.g., aspiration, pneumonia) systems

Multiple Sclerosis

- Patients with stable minor disease require no special testing.
- The preoperative evaluation should document the history and pattern of disease, especially symptoms and physical deficits affecting the respiratory system (including oxygen saturation).
- Testing is generally directed toward associated disturbances (e.g., chest radiography and CBC if pulmonary infection is suspected) and any medication side effects.

Rheumatoid Arthritis

- Indications for preoperative cervical spine radiographs include neurologic findings, long-standing severely deforming disease, or procedures requiring prone positioning or manipulation of the cervical spine
- New or worsening pulmonary symptoms should prompt further evaluation with pulse oximetry, chest radiographs, PFTs, or possibly a pulmonary consultation.
- Other preoperative tests include blood sampling for CBC and creatinine concentrations

Ankylosing Spondylitis

- The patient’s preoperative evaluation should focus on the cardiovascular, pulmonary, and musculoskeletal systems, with the physical examination including measurement of oxygen saturation on room air.
- The presence of a murmur on physical examination warrants an echocardiogram.
- If ventilatory compromise is suspected or present, a chest radiograph and PFTs are necessary

Systemic Lupus Erythematosus

- The preoperative physical examination concentrates on the pulmonary, cardiac, and nervous systems.
- Helpful preoperative tests include an ECG and blood sampling for CBC, electrolyte concentrations, glucose concentrations, creatinine concentrations, and aPTT (unless the patient has a known antiphospholipid syndrome)

Thyroid Disease

- If additional preoperative testing is clinically indicated, thyroid-stimulating hormone (TSH) assays are best to evaluate for hypothyroidism, while free triiodothyronine (T_3), free thyroxine (T_4), and TSH levels are useful in hyperthyroid patients.
- Other potentially useful tests include chest radiography or computed tomography scans to evaluate tracheal or mediastinal involvement by a goiter.

Hyperthyroidism

- the preanesthetic examination should include vital signs (i.e., arterial blood pressure, heart rate, respiratory rate, oxygen saturation), height, and weight.
- Patients with suspected hyperthyroidism will require thyroid function tests.

❑Diabetes Mellitus

- Informative preoperative laboratory tests include an ECG and blood sampling for electrolyte, creatinine, and blood glucose concentrations