British Society of Interventional Radiology
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Percutaneous Transhepatic Cholangiography

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The commonly used term "PTC" stands for the historic procedure percutaneous transhepatic cholangiography, which is simply the production of an image of the biliary tree by injection of radiological contrast through a needle. This diagnostic procedure has been completely superseded by CT and MRI scanning. However, the term is still in common usage as shorthand for the more complex percutaneous biliary procedures performed today.

Percutaneous biliary procedures encompass a wide range of varying complexity, duration and potential for discomfort. The most common scenario is the re-establishment of an effective biliary drainage channel into the bowel in patients with malignant bile duct obstruction. These cases are often palliative and a completely internalised solution using stents is the aim.

Natural orifice procedures are generally preferred over the percutaneous approach, so it is possible that the patient will have already had an ERCP procedure which did not achieve the desired aim. However, in some scenarios a percutaneous approach is preferable from the start, either because of unfavourable biliary anatomy or because ERCP is impossible due to previous gastric surgery.

More complex cases may involve revision of failed existing stent arrangements, or surgical biliary anastomoses which have developed strictures. Generally speaking, the management of benign biliary obstruction presents more challenges and involves more complexity than malignant causes. In cases of presumed malignant obstruction, brushings and biopsies may be taken from the stricture.

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Operator Considerations

Indications: Benign or malignant biliary obstruction.

Contraindications: Specific contraindications include large volume ascites and therapeutic futility, the latter clearly a very individual discussion point.

Planning: The route of access (left lobe vs right lobe), ideal outcome, and bail-out outcomes should all have been determined by the radiologist on the basis of diagnostic imaging and discussion with the clinical team and the patient.

Preparation: Anticoagulation and antiplatelets should be stopped preoperatively. INR should be less than 1.5 and platelet count greater than 50,000 mm^3. Treatment with vitamin K or fresh frozen plasma may be required.

Duration: The potential range of procedural variants is very broad. Procedure time may range from 30 minutes to (rarely) two or more hours, but is typically around one hour.

Position: Supine

Access: Percutaneous access may be via the left or the right lobe of the liver, with the radiologist, assistant, and their trolley on the corresponding side of the patient. The C-arm may be on either side of the patient.

Technique: Initial percutaneous access into the biliary tree may be guided by ultrasound, particularly for procedures via left lobe access. Subsequent manoeuvres are all undertaken using fluoroscopic guidance. The radiologist can generally anticipate when they will be doing something which causes pain, such as dilating a stricture. It is helpful if the radiologist tells the anaesthetist that they are about to do something which will likely stimulate the patient.

Complications: Post-procedural pain is common but typically settles within 24 hours. Haemorrhage and systemic sepsis are uncommon but may be sudden and severe. Pancreatitis is relatively rare.

Post-procedure instructions: Patients should be observed closely for several hours for signs of haemorrhage or sepsis. Six hours bed rest is typical.

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Anaesthetic Considerations

Preop

Patient Demographic

- The demographic requiring PTC is fairly wide.
- Most patients are over 60 years old.
- Fitness is variable. Patients being treated for benign disease may be relatively young and fit. However, patients in whom PTC is being undertaken as a bridge to palliation may be extremely frail and unwell.

Assessment

- Aside from general preoperative assessment, particular attention should be paid to any available imaging – patients will have had a CT scan and this can provide useful information for the anaesthetist e.g., the presence of a pleural effusion.
- Similarly, if there has been a recent attempt at ERCP, the endoscopist may have commented on the presence of foodstuffs in the stomach, indicating gastric outlet obstruction, which obviously presents a significant risk of aspiration.
- Haematology and biochemistry results must be reviewed, in particular, for derangements of coagulation due to impairment of synthetic liver function. Abnormalities of biochemistry are common, in particular, renal impairment and electrolyte disturbances.

Perioperative Goals

- The radiologists simply require a still patient on whom to operate.
- Patients may be relatively hypotensive due to the direct physiological effects of obstructive hyperbilirubinaemia (reduced SVR, intravascular depletion, and myocardial depression). Therefore, under deep sedation or GA, maintenance of adequate blood pressure often requires management with IV fluids and metaraminol +/- ephedrine.

Intraop

Approach

- In simple biliary drainage sedation with analgesia is all that is required e.g., low dose propofol TCI with fentanyl boluses.
- If dilatation +/- stenting is planned, the procedure can be extremely painful at points (e.g., during dilation of the stent). Therefore, either a GA or deep sedation with analgesia (e.g., propofol and remifentanil/alfentanil) is appropriate.

- Good communication with the operator about when particularly stimulating parts of procedure are approaching is crucial.

Airway

- If patients are liable to easily obstruct their airway with deep sedation it is often preferable to GA from the start. Otherwise, one ends up having to support the airway and stand closer than is desirable to the radiation source.
- The radiologists do not require the patient to be paralysed and rarely require breath holds. Therefore, in the absence of significant regurgitation risk, a supraglottic airway device often suffices.

Antibiotics

- Prophylactic antibiotics are recommended for new tube placements and routine tube exchanges.

Analgesia

- Paracetamol plus regular and PRN short-acting opiates e.g., oral morphine, are often required for 24-48 hours.
- Postoperative pain that is severe should raise concerns of haemorrhage or pancreatitis.

Fluids

- Hypotension is the main intraoperative concern. This is usually easily remediable with fluids and vasopressors.

Postop

- Serious complications which may arise in the immediate postoperative recovery period include haemorrhage, sepsis, and pancreatitis. Staff looking after the patient postoperatively should be informed to have a high index of suspicion for these complications, and a clear plan of who to contact in the event of concerns.