Recurrent Pyogenic Cholangitis: Imaging and Intervention

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Learning objectives

To discuss the imaging features of recurrent pyogenic cholangitis and interventional management.
Background

Recurrent pyogenic cholangitis (RPC) is also known as oriental cholangiohepatitis as it is found almost exclusively in the people who live or have lived in South East Asian countries. It is characterized by intrahepatic pigment stone formation, causing biliary strictures, biliary obstruction and recurrent cholangitis. It is found almost exclusively in people who live or have lived in South East Asian countries.

Although exact cause is not known, it has been postulated that chronic infestation of the biliary tree by parasitic organisms such as Ascaris lumbricoides and Escherichia coli induces inflammatory and fibrotic changes in the biliary tree, leading to the stricture formation, bile stasis and intrahepatic stone formation. If left untreated, repeated episodes of cholangitis can lead to progressive hepato-biliary damage, resulting in liver abscesses, segmental liver atrophy or cirrhosis.

RPC should be considered when a patient with the southeast Asian demographic background presents with recurrent bouts of abdominal pain, fever, jaundice and with laboratory findings of leukocytosis and mildly elevated bilirubin.
Imaging findings OR Procedure details

Various imaging modalities play a crucial role, both in diagnosing RPC and in planning its treatment. They allow anatomic evaluation of the location, extent and severity of the disease, which is useful for planning appropriate treatment.

The management of RPC involves multidisciplinary approach, of which interventional radiology plays a crucial role. A variety of methods are used for treatment of RPC, including endoscopic, percutaneous, and surgical procedures, either alone or in combination, guided appropriately by imaging findings.

ULTRASOUND:

It is the first line of investigation in patients with RPC. The findings on ultrasound include

1. Disproportionate dilatation of the extrahepatic and central intra hepatic ducts with normal or mildly dilated peripheral ducts. The intrahepatic dilatation may be diffuse or localised and can be unrelated to the location of the calculi.

2. Periportal echogenicity (Fig 1).

3. Intrahepatic calculi. These may some times may be masked by the presence of pneumobilia. The calculi can be single or multiple, intra or extra-hepatic or both, and may or may not be calcified, with variable echogenicity and posterior shadowing (Fig 2)

4. Lobar or segmental atrophy of the liver.

5. Complications of the RPC which include abscess formations, bilomas, portal vein thrombosis, cholangiocarcinoma. Ultrasound is used routinely for follow up the patients with RPC. The development of new anechoic or hypoechoic focal liver lesion raises the possibility of biloma or abscess formation. The presence of a new hypo or iso or hyperechoic lesion should raise the possibility of a cholangiocarcinoma.

Ultrasound guidance is helpful in performing percutaneous aspiraiton or drainage of the abscess or biloma as well as in targeted biopsy of the suspected malignancy. PTC is also routinely performed under ultrasound guidance.

CT SCAN:
Multidetector CT with multiplanar reconstruction shows better visualisation of the dilated ducts as well as the possible sites of biliary strictures (Fig 4). Even subtle ductal dilatation will be shown on contrast CT. Hepatolithiasis is better visualised on plain CT with most of the biliary stone hyperdense to the normal unenhanced liver parenchyma. Pneumobilia is frequently seen in RPC and does not necessarily be due to previous intervention.

Hepatic parenchymal atrophy is a common finding in RPC, involving most frequently in the left lateral segments followed by the right posterior segments (Fig 3). Fatty infiltration may be seen in either atrophic or non-atrophic segments. Heterogenous parenchymal enhancement is seen more often during acute exacerbations. Biliary wall enhancement may also be seen on contrast CT in acute cholangitis. The abscess and bilioma formation are better delineated on contrast CT compared to ultrasound (Fig 5).

ERCP:

Direct cholangiography in RPC will show disproportionate extrahepatic biliary ductal dilatation, intra and extra hepatic calculi, multiple intrahepatic strictures, and abrupt tapering.

The advantage of ERCP over MRCP include better spatial resolution allowing better visualisation of peripheral ducts and ability to perform therapeutic intervention at the same sitting.

There is inherent risk of aggravating the sepsis in ERCP due to distension of the biliary tree with contrast.

MRI WITH MRCP:

The advantage of MRI with MRCP includes ability to show ducts upstream the obstruction or severe stenosis, evaluation of extra ductal disease, no risk of worsening the sepsis.

The ductal dilatation and biliary strictures are better seen on MRI than CT (Fig 4).

Non-calcified calculi can also be seen in MRI along with the calcified stones as filing defects. However distinguishing from pneumobilia may be difficult. The calculi are usually seen in the dependent aspects where as the gas locules are seen in a non-dependent location (Fig 6).
Atrophic segments are better visualised and are seen with crowded dilated ducts.

The complications related to RPC such as abscess, bilomas, portal vein thrombosis and malignancy are also better delineated on MRI.

**INTERVENTIONAL RADIOLOGY MANAGEMENT:**

The management can be broadly divided into two,

1. Treatment of acute complications

Percutaneous biliary drainage is the commonly performed procedure in patients presenting with acute cholangitis to relieve the sepsis. The biliary drainage catheter insertion may be a temporary measure to relieve the sepsis or can be used for long term drainage of the obstructed segments.

The percutaneous transhepatic and ERCP accesses can be used for balloon dilatation of the strictures, stent placements, mechanical lithotripsy with balloon dilatation, stone dredging using Fogarty balloon, Dormia basket etc to prevent the long term complications.

There is risk of aggravating the sepsis in interventional procedures as in ERCP. This is usually minimised by performing procedures under appropriate antibiotic cover and with low pressure, low dose contrast injections.

Some patients with recurrent pyogenic cholangitis may have undergone prior surgery making ERCP impossible. Percutaneous transhepatic access is useful in these patients. If the patients have undergone hepatojejunostomy or choledochojejunostomy stone removal can be performed through percutaneous jejunostomy access. This access can be maintained for long term to treat recurrent stone formation.

In patients with liver abscess formation, image guided drainage procedure can be performed. For suspected malignance image guided targeted biopsy can be performed for histopathological confirmation.(Fig 7 to 11).
Fig. 1: A 82 yr/F Chinese with past history of cholecystectomy presented with clinical features of RPC. Patient is on long term internal-external drainage. Fig A, Ultrasound shows periportal hyperreflectivity (Arrow) and atrophic right lobe. Intrahepatic stones cannot be clearly delineated. Fig B, CT plain study shows delineation of stones (Arrow) as well as better delineation of right lobar atrophy.

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Fig. 2

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**Fig. 3:** A 82 yr/F with prior cholecystectomy and side to side choledocho-duodenostomy for RPC. Fig A, CT shows atrophic left lobe with crowded and dilated ducts with intraductal calculi (Arrow). There is also hypodense lesion at the confluence of the right and left hepatic ducts, which was proven to be cholangiocarcinoma (Arrow head. Fig B, CT shows left portal vein thrombosis (Arrow).

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**Fig. 4:** 72 yr F with RPC. CT shows intrahepatic ductal dilatation with strictures. MRI better delineated the stricture as well as the intraductal debris.

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Fig. 5: A 58 yr/ F Chinese, past history of cholecystectomy and hepaticojejunostomy presented with sepsis. Fig, A, CT shows intrahepatic ductal dilatation with calculi (arrows) and pneumobilia. Fig, B, CT shows a multiloculated hypodense lesion with peripheral enhancement compatible with an abscess. There is also increased enhancement in the left lobe, suggesting inflammation.

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Fig. 6: A 54 yr/F Burmese, with past history of cholecystectomy and choledochoduodenostomy for RPC presented with features of recurrent cholangitis. MRI with MRCP shows intrahepatic biliary ductal dilatation, biliary strictures (Arrow head), few intrahepatic stones (Arrow) and signal voids in the non-dependent state suggesting aerobilia.
**Fig. 7:** A 54 yr/F Burmese, with past history of cholecystectomy and choledochoduodenostomy for RPC presented with features of recurrent cholangitis. Fig A, PTC shows stricture in the segment 3 duct near its confluence with the segment 2 duct as well as in the confluence of the left duct with the main duct (Arrow heads). Calculi are seen in common duct (Arrow). Fig, B The stricture was crossed and a plastic stent was placed across the stricture.

**Fig. 8:** A 82 year old with prior cholecystectomy and wide side to side choledocho-duodenostomy. Fig A, PTC shows strictures in the right anterior and posterior ducts near their confluence (Arrow). Fig, B, metallic stents were placed across these strictures restoring the patency.
**Fig. 9:** A 50 yr/F Malay with past history of left hepatectomy, cholecystectomy and hepatojejunostomy came for removal of the intrahepatic stones. Fig A shows dredging of filling defects (calculi) with dormia basket through PTC access. Fig B shows good resolution of the intrahepatic calculi.

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**Fig. 10:** 46 Yr /F with RPC. Fig A shows percutaneous jejunostomy access creation. Fig B, shows balloon dilatation through the jejunostomy access.

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Fig. 11: Algorithmic approach for management of RPC

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Conclusion

Imaging is important in diagnosing RPC and providing a road map for therapy. Treatment of RPC requires a multidisciplinary approach, of which interventional radiology is a key component.
References