The role of cholangiography with t-tube in the liver transplantation

Poster No.: C-0362
Congress: ECR 2012
Type: Educational Exhibit
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Keywords: Biliary Tract / Gallbladder, Fluoroscopy, Conventional radiography, MR, Cholangiography, Calcifications / Calculi, Transplantation, Pathology
DOI: 10.1594/ecr2012/C-0362

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Learning objectives

The authors intend to illustrate the normal anatomy of the biliary tree in liver transplantation, the main pathologic discoveries in this examination and to correlate the radiographic findings with patient outcomes.

For this purpose we analyzed a group of 141 patients who underwent post transplantation cholangiogram and selected the most common complications related to this procedure.

The authors also demonstrated the cholangiography technique performed in the Oporto hospital centre.

Background

The first liver transplant was performed in 1963. Portugal is currently a world leader in liver transplantation. The liver transplantation team of Oporto Hospital Centre usually places a T-tube in the biliary anastomosis.

In most adult liver transplanted patients, biliary reconstruction is accomplished by a choledochocholedochostomy. A t-tube is inserted into the common bile duct to stent the anastomosis and to monitor the quality and quantity of bile output. In our centre, cholangiography is performed 7-10 days after the transplant and if there are no complications a new cholangiography is repeated 4-6 months later. In the absence of abnormal findings, the drain is safely removed.

If there is a T-tube in situ, T-tube cholangiography is preferable to magnetic ressonance cholangiopancreatography because the biliary ducts distension through the introduction of contrast material permits better functional analysis.

Despite improvement in surgical techniques, biliary complications occur in about 5-15% of hepatic transplantations, typically in the early post transplantation (<3 months). These complications include bile obstruction, stone formation, bile duct stricture, anastomotic stenosis, bile leak, T-tube migration and sphincter of oddi dysfunction and are often amenable to management by endoscopic retrograde cholangiopancreatography (ERCP).
Imaging findings OR Procedure details

T- TUBE CHOLANGIOGRAPHY PROCEDURE

1. The patient is positioned supine on the X-ray table;
2. A preliminary image should be acquired;
3. The tip of the T-tube is cleaned with antiseptic, a butterfly needle is inserted into the T-tube and the syringe plunger is withdrawn to remove bile from within the duct. Then a injection of 20-40mL of water soluble contrast (dilution of sodium chloride 50%) is usually performed in the t-tube;
4. An early filling image is obtained (extra-hepatic tree opacification);
5. The entire biliary tree should be imaged during injection of contrast medium. Injection should continue until biliary tree is opacified and there is passage of contrast into the duodenum. If the intra-hepatic ducts do not fill, the patients may be tilted to trendelenburg position and further contrast is injected into the tube;
6. Finally, it should be assessed emptying of contrast into the duodenum. Fig. 1 on page 5

BILIARY COMPLICATIONS AFTER TRANSPLANTATION

We analyzed 141 patients and found the following post-transplant biliary complications:

- Anastomotic stenosis 17%
- Biliary leaks 21%
- T-tube migration 14%
- Obstruction by sludge, stones or debris 9,5%
- Sphincter of oddi dysfunction 21%

Anastomotic stenosis

Most of bile duct stenosis is focal and it's due to scar formation, occurring mostly at the choledochocholedochostomy anastomosis. If clinically relevant, these localized structures may be treated through ballon dilatation with or without subsequent stenting Fig. 2 on page 5

Non-anastomotic strictures are often multiple, intra-hepatic and occur in association with ischemia (often as a result of hepatic artery thrombosis or stenosis), cholangitis or pre-transplantation sclerosing cholangitis. Ischemia and cholangitis may sometimes be
treated with percutaneous transhepatic biliary drain across the narrowing locations. If recurrent sclerosing cholangitis occur, which is rare, endoscopic treatment is not possible.

**Biliary leaks**

Cholangiography is the most precise modality for detection of bile leak.

Bile leaks are more common after duct-to-duct anastomosis but typically occur at the site of the t-tube placement.

At cholangiography bile leaks appear as a extravasation of contrast material from the t-tube site into the peritoneal cavity as a single or multiple bilomas. Fig. 3 on page 6

Most of these leaks are small and resolve spontaneously but if necessary it can be treated with stent placement at the leakage site or percutaneous drainage (in bilomas).

**T-tube migration**

The migration of a T-tube is a frequent complication, usually it does not cause serious clinical consequences and its treatment is by simple reposition of the drain. Fig. 4 on page 7 and Fig. 5 on page 8

**Sludge, stones and debris**

Alterations in bile composition after transplantation may lead to increased biliary sludge and stone formation, which can cause bile duct obstruction. It can be caused by administration of immunosuppressors (like cyclosporine). Fig. 6 on page 9 and Fig. 7 on page 10

**Sphincter of oddi dysfunction**

In a minority of patients submitted to liver transplant it may occur a sphincter of oddi dysfunction. It is characterized by a decrease in size of the ampulla of vater associated with upstream dilatation.
The cause of this is unclear but it has been hypothesized that can be associated with devascularization or denervation of the ampulla of vater leading to this sphincter of oddi dysfunction.

The treatment, in these cases, involves endoscopic sphincterotomy. Fig. 8 on page 11

**Images for this section:**

![Cholangiography: procedure steps.](image)

**Fig. 1:** Cholangiography: procedure steps.
Fig. 2: Anastomotic stenosis
Fig. 3: Anastomotic leak
Fig. 4: T-tube migration into the proximal jejunal loop
Fig. 5: T-tube migration into the confluence of hepatic ducts
**Fig. 6:** Group of four oval filling defects related to stones, in the distal main biliary duct, 6 months post transplantation
Fig. 7: Transplanted biliar duct partially obstructed by a set of cellular debris, later removed by endoscopic approach.
Fig. 8: Sphincter of Oddi dysfunction
Conclusion

Despite the constant advances in liver transplantation the rate of biliary complications remains a significant problem.

In spite the use of the T-Tube in biliary anastomosis is not consensual it is still a non-invasive technique that easily detects different biliary complications, avoiding more aggressive procedures such as ERCP.

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References


