MRCP vs. ERCP

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Advanced Therapeutic Endoscopy

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Initial Thoughts

- "So, it is my prediction that MRCP will have a huge effect on ERCP practice in the United States."
- "If I had a pancreatic or biliary problem I would search out … a center with the most sophisticated noninvasive techniques… very quickly."
- "We all want the best for our patients; should we treat them differently than we would ourselves?" 5/15/98

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http://www.ddc.musc.edu/ddc_pro/pro_development/hot_topics/impact_MRCP-cotton.htm

Learning Goals

- Know what ERCP and MRCP stand for
- Advantages and disadvantages of MRCP
- Indications for ERCP
- Poor Indications for ERCP
- Clinical Use in common disorders for MRCP
- Effects of MRCP on ERCP in training
- Cases

ERCP

- **Endoscopic retrograde cholangiopancreatography**
- (en-doh-SKAH-pik
- REH-troh-grayd
- koh-LAN-jee-oh-PANG-kree-uh-TAH-gruh-fee)

MRCP

- My Rectum Can't Poop
- "MRCP" as a type of snake
- Magnetic resonance cholangiopancreatography

herp-l-humilis-ath-**MRCP**-hs

- **WESTERN THREADSNAKE**

MRCP

- Non-venomous snake found in Arizona

Naeem Knows Snakes!

INTRODUCTION

- Magnetic resonance cholangiopancreatography (MRCP) is a noninvasive technique for evaluating the intrahepatic and extrahepatic bile ducts and the pancreatic duct.

Barish, MA, Yucel, EK, Ferrucci, JT. Magnetic resonance cholangiopancreatography. N Engl J Med 1999; 341:258.

Intro

- Unlike conventional endoscopic retrograde cholangiopancreatography (ERCP), MRCP does not require contrast material to be administered into the ductal system.
- Thus, the morbidity associated with endoscopic procedures and contrast materials is avoided.
- However, MRCP does not currently allow any intervention to be performed, such as stone extraction, stent insertion, or biopsy.

MRCP INTRO

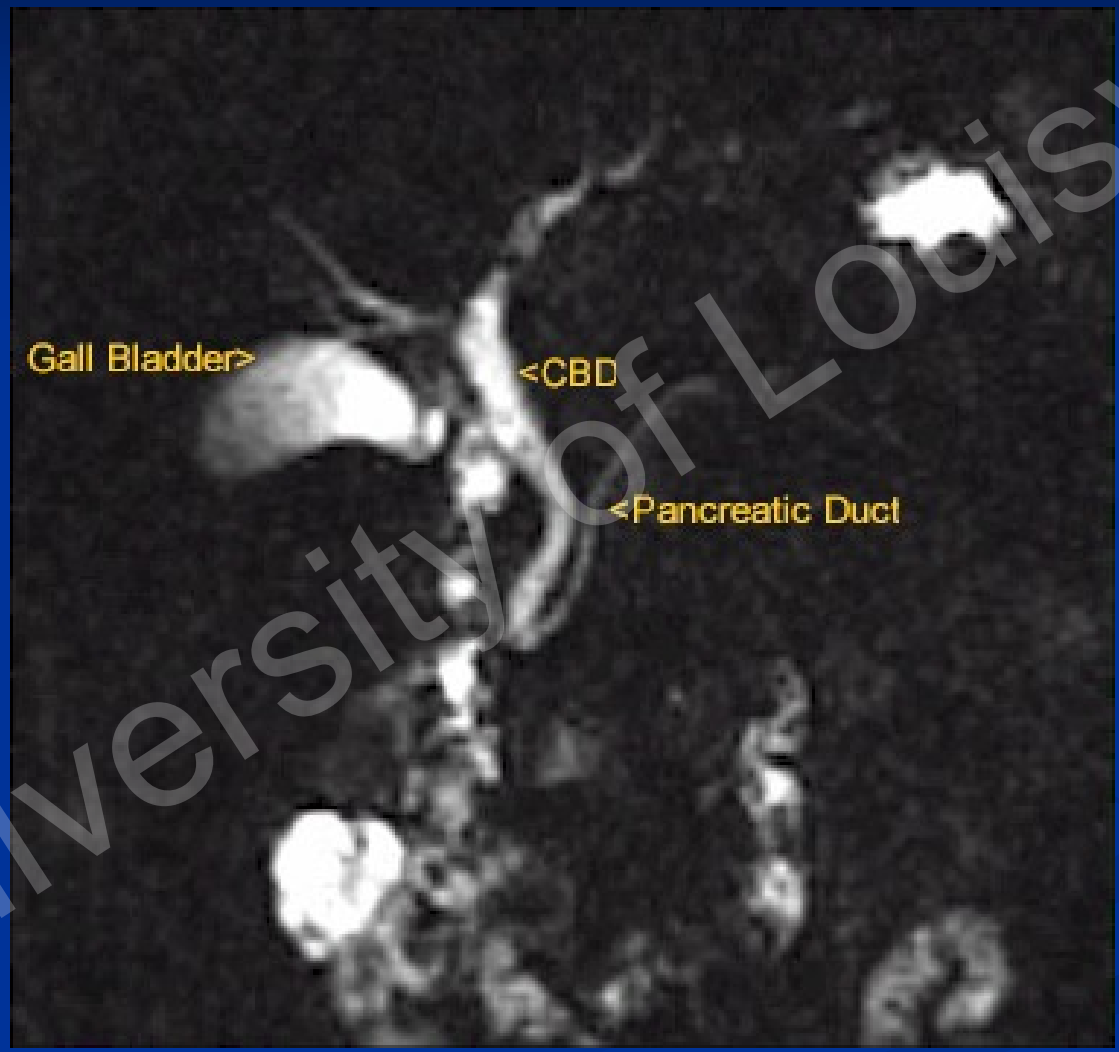
- First described by Walner et al in 1991
- MRCP is based on a heavily T2 weighted pulse sequence which shows stationary fluids, such as bile, to appear at high signal intensity whereas the surrounding liver and flowing blood generates little signal.
- As a result of this combination of imaging characteristics, MRCP provides optimal contrast between the hyperintense signal of the bile and the hypointense signal of background tissue.

Plain English

- Stationary or slow-flowing fluid within the bile and pancreatic ducts appear very **bright** relative to the low signal intensity produced by adjacent solid tissues **dark**
- With the specific image acquisition sequences used, flowing blood had little or no measurable signal; as a result, blood vessels were not mistaken for bile or pancreatic ducts.
- The ducts could be visualized from multiple projections, thereby duplicating cholangiographic images noninvasively.

Bret, PM, Reinhold, C. Magnetic resonance cholangiopancreatography. Endoscopy 1997; 29:472.

Example MRCP



Limitations

- The main potential problems with MRCP are image artifacts and difficulty in patient compliance.
- Image artifacts can be produced by a bright signal arising from stationary fluid within the adjacent duodenum, duodenal diverticulae, and ascitic fluid.
- In addition, local areas of dropout of signal can be caused by metallic clips following cholecystectomy, crossing defects induced by the right hepatic artery, or from severely narrowed ducts, such as occurs with primary sclerosing cholangitis (PSC).
- The presence of metal leads or fragments precludes any MR imaging study.

Limitations

- Currently, MRCP has lower resolution than direct cholangiography and can miss small stones (<4 mm), small ampullary lesions, primary sclerosing cholangitis, and strictures of the ducts.
- MRCP also has difficulty visualizing small stones in the pancreatic duct.
- Certain anatomic characteristics or disorders can mimic bile duct obstruction or common bile duct stones.
- Obstructing stones are generally easier to identify than nonobstructing stones (especially if smaller than the thickness of the acquired image slices).
- Small stones may not be distinguishable from sludge, mucin, or even blood.

Advantages and Disadvantages

MRCP

Advantages of MRCP:

- Non invasive (avoids complications of diagnostic ERCP or PTC)
- No sedation usually required
- No iodinated intravenous contrast (avoids iodine anaphylaxis and contrast nephropathy)
- Rapid scan time
- No ionizing radiation (safe in pregnancy and children)
- Delineates ductal anatomy proximal to obstructions
- Delineates anatomy post biliary-enteric anastomosis
- T1 images define extraductal structures (useful in staging malignancy)

http://www.ddc.musc.edu/ddc_pro/pro_development/hot_topics/impact_MRCP.htm

Disadvantages of MRCP:

- Added cost to therapuetic ERCP (but may prevent diagnostic studies)
- Duct images may be obscured by other fluid filled structures (renal cysts, ascites, pseudocysts)
- Contraindicated after ferromagnetic implants (eg.pacemaker, anuerysm clips)
- Artifacts from implants (metal stents, TIPS, surgical clips)
- Claustrophobia in some patients
- ? Lack of standardized scanning protocols

http://www.ddc.musc.edu/ddc_pro/pro_development/hot_topics/impact_MRCP.htm

Indications for ERCP

8. Endoscopic Retrograde Cholangiopancreatography (ERCP) is generally indicated in:

A. The jaundiced patient suspected of having biliary obstruction (appropriate therapeutic maneuvers should be performed during the procedure).
B. The patient without jaundice whose clinical and biochemical or imaging data suggests pancreatic or biliary tract disease.
C. Evaluation of signs or symptoms suggesting pancreatic malignancy when results of direct imaging (e.g., US, CT or MRI) are equivocal or normal.
D. Evaluation of pancreatitis of unknown etiology.
E. Preoperative evaluation of the patient with chronic pancreatitis and/or pseudocyst.
F. Evaluation of the sphincter of Oddi by manometry.

http://www.askasge.org/uploadedFiles/Publications_and_Products/Practice_Guidelines/2000_appropriate.pdf

ERCP Indications contd.

G. Endoscopic Sphincterotomy
   1. Choledocholithiasis
   2. Papillary stenosis or sphincter of Oddi dysfunction causing significant disability
   3. To facilitate placement of biliary stent or balloon dilation of biliary stricture
   4. Sump syndrome
   5. Choledochocele involving the major papilla
   6. Ampullary carcinoma in patients who are not candidates for surgery
   7. Facilitate access to the pancreatic duct

H. Stent placement across benign or malignant strictures, fistulae, postoperative bile leak or in high-risk patients with large unremovable common duct stones.

I. Balloon dilation of ductal strictures.

J. Nasobiliary drain placement for prevention of or treatment of acute cholangitis or infusion of chemical agents for common duct stone dissolution, for decompression of an obstructed common bile duct or postoperative bile leak.

K. Pancreatic pseudocyst drainage in appropriate cases.

L. Tissue sampling from pancreatic or bile ducts.

M. Therapy of disorders of the pancreatic duct.

9. ERCP is generally not indicated in:

A. Evaluation of abdominal pain of obscure origin in the absence of objective findings which suggest biliary or pancreatic disease.
B. Evaluation of suspected gallbladder disease without evidence of bile duct disease.
C. As further evaluation of proven pancreatic malignancy unless management will be altered.

Clinical Use

- MRCP provides accurate depiction and measurements of the bile and pancreatic ducts in 95 percent of examinations; associated anatomic variants, such as pancreas divisum and choledochal cysts, can also be visualized.
- The technique is useful for documenting communication between pancreatic cysts and ducts, and for evaluating the nature of pancreatic cysts.
- However, since it is fluid within ducts that is depicted, MRCP cannot differentiate between focal strictures and spasm of the common bile duct.

Bret, PM, Reinhold, C. Magnetic resonance cholangiopancreatography. Endoscopy 1997; 29:472.

Common Disorders

Bile duct obstruction

- MRCP can identify the larger intrahepatic ducts and the extrahepatic ducts in 83 to 100 percent of patients with normal caliber ducts
- It has a greater ability to depict abnormal dilated ducts, and provides diagnostic cholangiogram in 90 to 100 percent of patients; it also reveals the level of obstruction in 80 to 100 percent of cases
- May have a role in the diagnosis of postcholecystectomy biliary complications

Hintze, RE, Adler, A, Veltzke, W, et al. The significance of magnetic resonance cholangiopancreatography (MRCP) compared to endoscopic retrograde cholangiopancreatography (ERCP). Endoscopy 1997; 29:182.

Bile duct obstruction

- A systematic review that included a total of 67 studies found that the overall sensitivity and specificity of MRCP for the diagnosis of biliary obstruction were 95 and 97 percent, respectively.
- Sensitivity was lower for stones (92 percent) and for malignant conditions (88 percent).
- In a prospective double-blind study MRCP had a high sensitivity, but lower specificity for identifying post-transplant biliary strictures.
- However, MRCP is a passive anatomic technique that does not display functional information, such as the degree of obstruction to flow, which can be seen by conventional cholangiography.

Romagnuolo, J, Bardou, M, Rahme, E, et al. Magnetic resonance cholangiopancreatography: a meta-analysis of test performance in suspected biliary disease. Ann Intern Med 2003; 139:547.

Biliary obstruction pitfalls

- There are some technical pitfalls that can interfere with the interpretation of MRCP in bile duct obstruction.
- For example, low union of the cystic duct with the common hepatic duct with both ducts running in parallel for a significant distance may result in a combined image suggestive of common bile duct dilation.

David, V, Reinhold, C, Hochman, M, et al. Pitfalls in the interpretation of MR cholangiopancreatography. AJR Am J Roentgenol 1998; 170:1055.

Bile duct obstruction

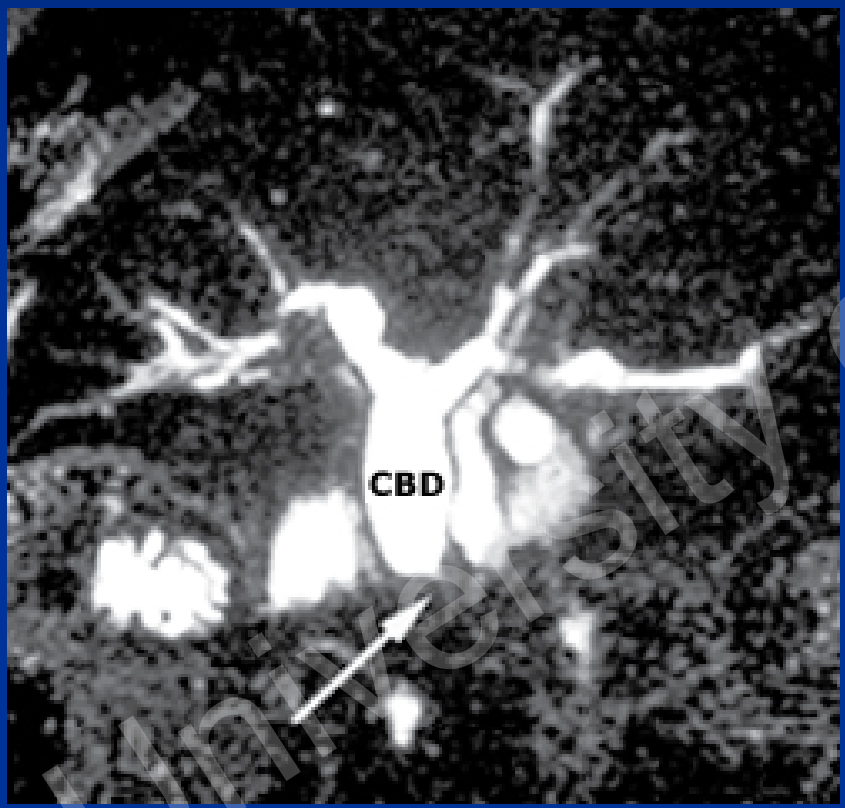
- Once ductal dilation is established by ultrasonography, the next step is to fully image the biliary tree via ERCP or percutaneous transhepatic cholangiography (PTC).
- These procedures can exclude choledocholithiasis and define the location and extent of the biliary lesion.
- ERCP is preferred in patients with primary sclerosing cholangitis (a major predisposing factor to cholangiocarcinoma), since the marked stricturing of the intrahepatic biliary tree makes a percutaneous approach difficult.
- Conversely, PTC is preferred to image the more proximal biliary system if there is complete obstruction of the distal biliary tree.

Cholangiocarcinoma

- The role of MRCP in the diagnosis and management of bile duct malignancy is not yet defined.
- It will probably prove to be a useful noninvasive adjunct to present techniques, since it has the capability to evaluate the bile ducts both above and below a stricture while also identifying any intrahepatic mass lesions).
- One series evaluated MRCP in 126 patients with suspected bile duct obstruction.
- Fourteen had malignant obstruction that was diagnosed by MRCP in 12; the positive predictive value was 86 percent and the negative predictive value 98 percent.

Guibaud, L, Bret, PA, Reinhold, C, et al. Bile duct obstruction and choledocholithiasis: Diagnosis with MR cholangiography. Radiology 1995; 197:109.

Cholangiocarcinoma



- This MRCP image, obtained without having to opacify the bile ducts, demonstrates a circumferential narrowing of the distal common bile duct (CBD, arrow) due to a focal cholangiocarcinoma.
- The obstructing tumor is causing dilation of the CBD.

Malignant Hilar and Perihilar Obstruction

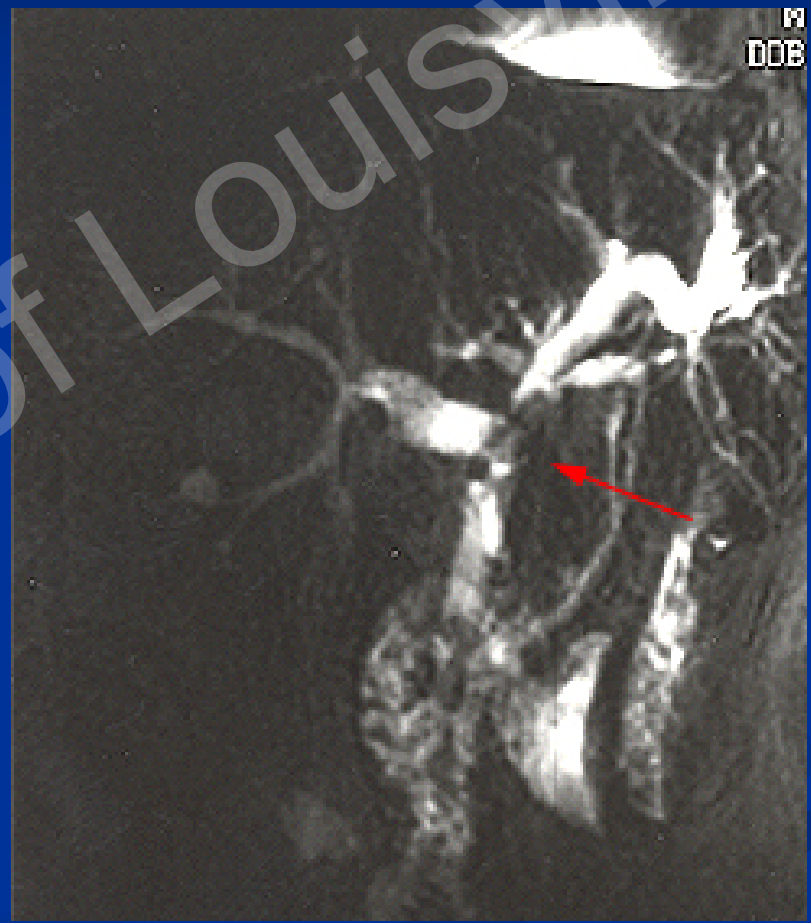
- MRCP appears to be useful in delineating the anatomical extent of perihilar obstruction and interpreting its etiology.
- One study, for example, included 40 patients with malignant perihilar biliary obstruction who underwent ERCP and MRCP.
- Both tests were equally effective in detecting the biliary obstruction.
- However, MRCP was superior in the investigation of the anatomical extent and the type of tumor. Similar conclusions have been reached in other reports.

Yeh, TS, Jan, YY, Tseng, JH, et al. Malignant perihilar biliary obstruction: Magnetic resonance cholangiopancreatographic findings. Am J Gastroenterol 2000; 95:432.

Lopera, JE, Soto, JA, Munera, F. Malignant hilar and perihilar biliary obstruction: Use of MR cholangiography to define the extent of biliary ductal involvement and plan percutaneous interventions. Radiology 2001; 220:90.

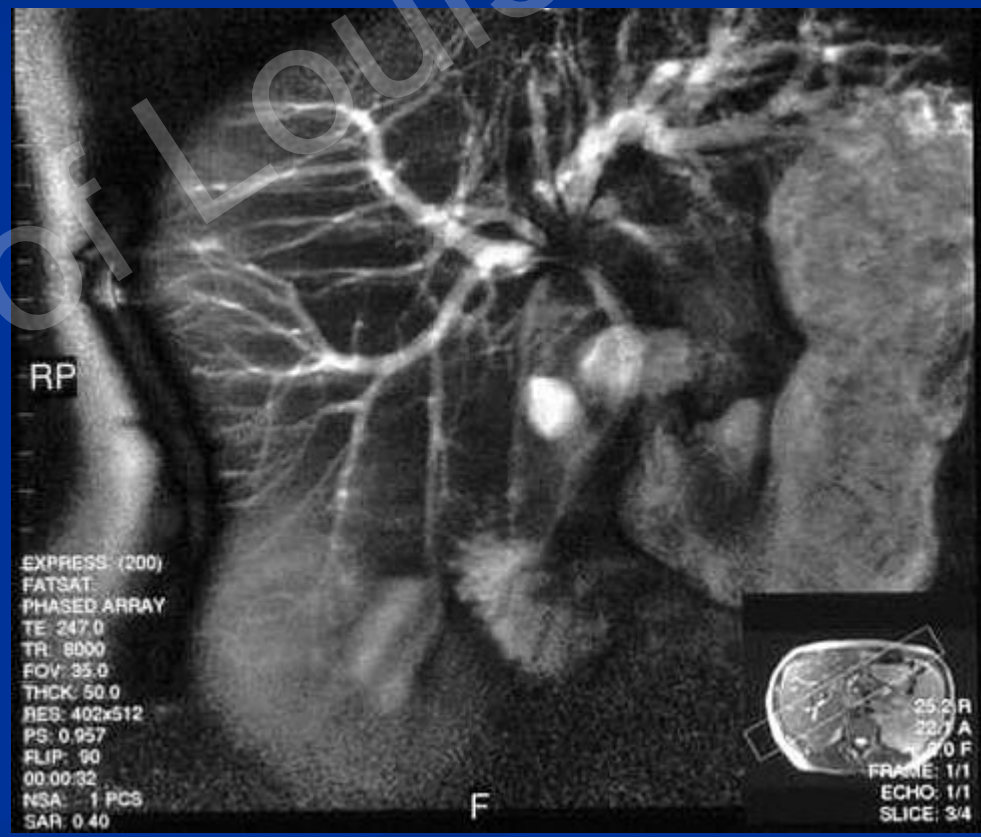
Malignant Hilar Obstruction

- MRCP depicts an intrabiliary filling defect (arrow) due to a hilar papillary cholangiocarcinoma.



Malignant Hilar Obstruction

- MRCP demonstrating a hilar cholangiocarcinoma.
- There is a stricture and obstruction at the hilum with intrahepatic biliary dilatation.



Patients with known or suspected PSC

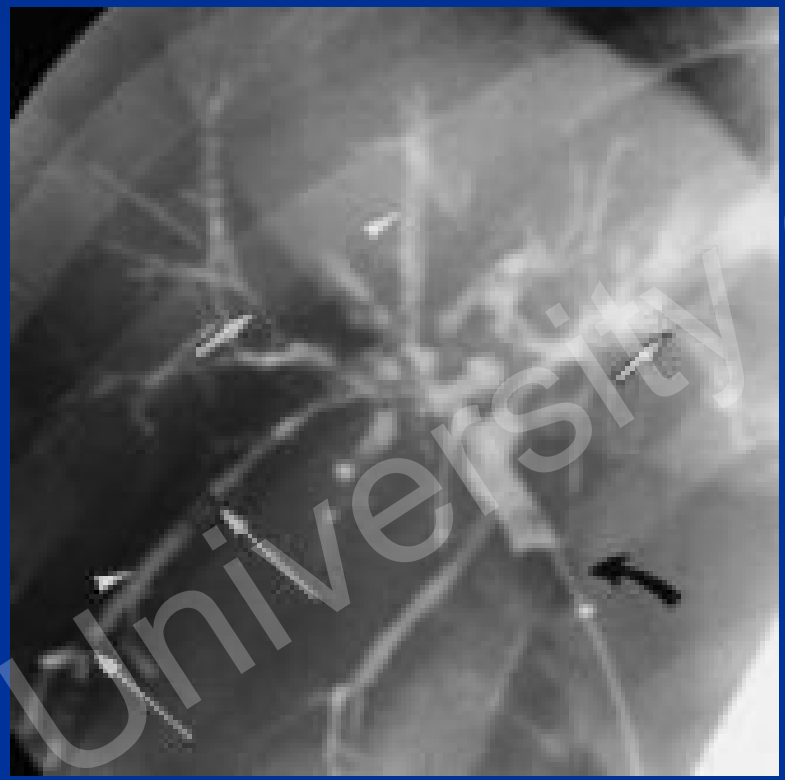
- In patients with known or suspected PSC, MRCP is performed along with routine MR images to document the segmental extent of ductal involvement to help plan for surgery, search for intrahepatic metastases, and identify aberrant ductal anatomy.
- Routine MR images are obtained to document the extent of extrahepatic involvement, including nodes at the porta hepatis.

Patients with known or suspected PSC

- Characteristic changes of PSC are visible on MRCP
- MRCP provides less spatial resolution than ERCP and lower sensitivity for detecting subtle peripheral ductal abnormalities in the liver.
- Peripheral ducts may not be visualized because imaging is performed when ducts are in their physiologic, nondistended state.
- In addition, the subtle mural irregularities see on ERCP may not be detected with MRCP.
- MRCP does not permit therapeutic intervention.
- The accuracy of MRCP for diagnosis or screening of cholangiocarcinoma in patients with PSC has not been well established.

Ernst, O, Asselah, T, Sergent, G, et al. MR cholangiography in primary sclerosing cholangitis. AJR Am J Roentgenol 1998; 171:1027.

PSC



Common duct stones

- Common duct stones are readily displayed by MRCP as a signal void within the bright signal arising from bile
- Multiple studies have compared test characteristics of MRCP with other imaging modalities in detection of choledocholithiasis.
- As a general rule, test characteristics of MRCP appear to be similar to ERCP for detecting choledocholithiasis (sensitivity 80 to 100 percent, specificity 85 to 100 percent)
- In an illustrative study (involving 32 patients with suspected biliary pancreatitis), the sensitivity of transabdominal ultrasonography, CT, MRCP, ERCP and intraductal ultrasonography was 20, 40, 80, 90, and 95 percent, respectively compared with ERCP plus stone extraction as the reference standard.
- The overall agreement between MRCP and ERCP was 91 percent.

Varghese, JC, Farrell, MA, Courtney, G, et al. A prospective comparison of magnetic resonance cholangiopancreatography with endoscopic retrograde cholangiopancreatography in the evaluation of patients with suspected biliary tract disease. Clin Radiol 1999; 54:513.

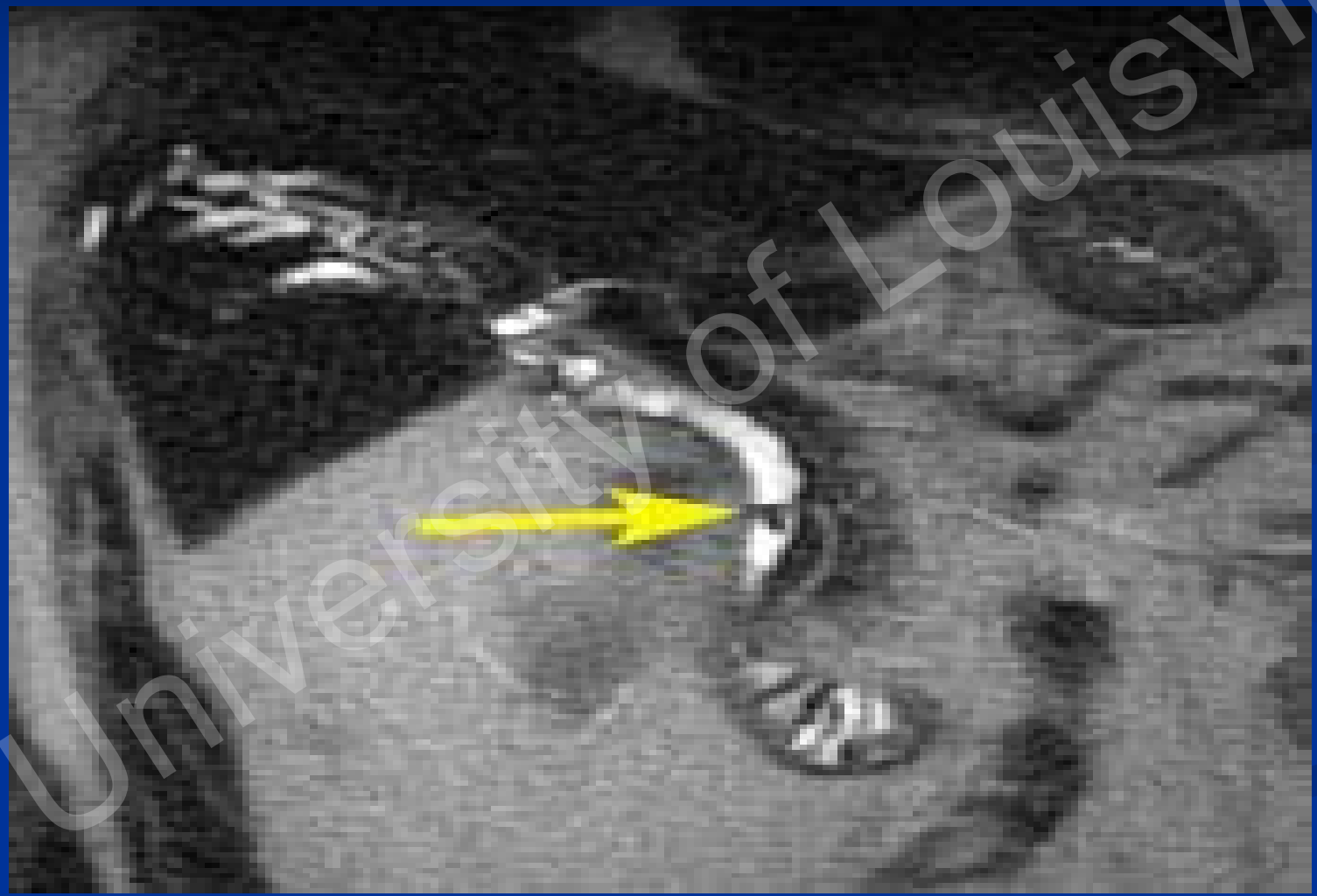
Moon, JH, Cho, YD, Cha, SW, et al. The detection of bile duct stones in suspected biliary pancreatitis: comparison of MRCP, ERCP, and intraductal US. Am J Gastroenterol 2005; 100:1051.

Common duct stones

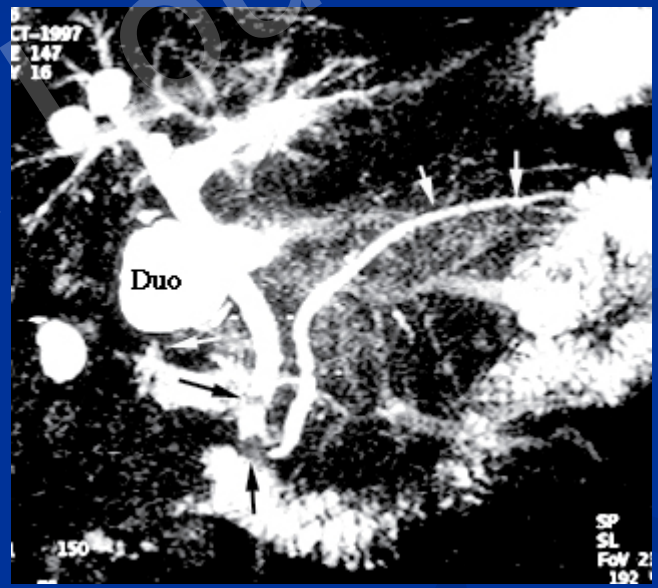
- However, as noted above, test characteristics depend in part upon the imaging techniques, experience, size of the stone, and anatomy surrounding biliary tree.
- Sensitivity of MRCP decreased with dilated bile ducts (73 percent for a bile duct diameter >10 mm versus 89 percent for small diameter bile ducts) in one of the reports above.
- In the presence of a dilated CBD, MRCP has a 90 to 95 percent concordance with ERCP in diagnosing CBD stones over 4 mm in diameter

Chan, YL, Chan, AC, Lam, WW, et al. Choledocholithiasis: Comparison of MR cholangiography and endoscopic retrograde cholangiography. Radiology 1996; 200:85.

Non-obstructing calculus



- MRCP image shows two small stones in the distal common bile duct (arrows) immediately adjacent to the duodenal bulb (Duo).
- Note the normal appearing, nondistended pancreatic duct (small white arrows).



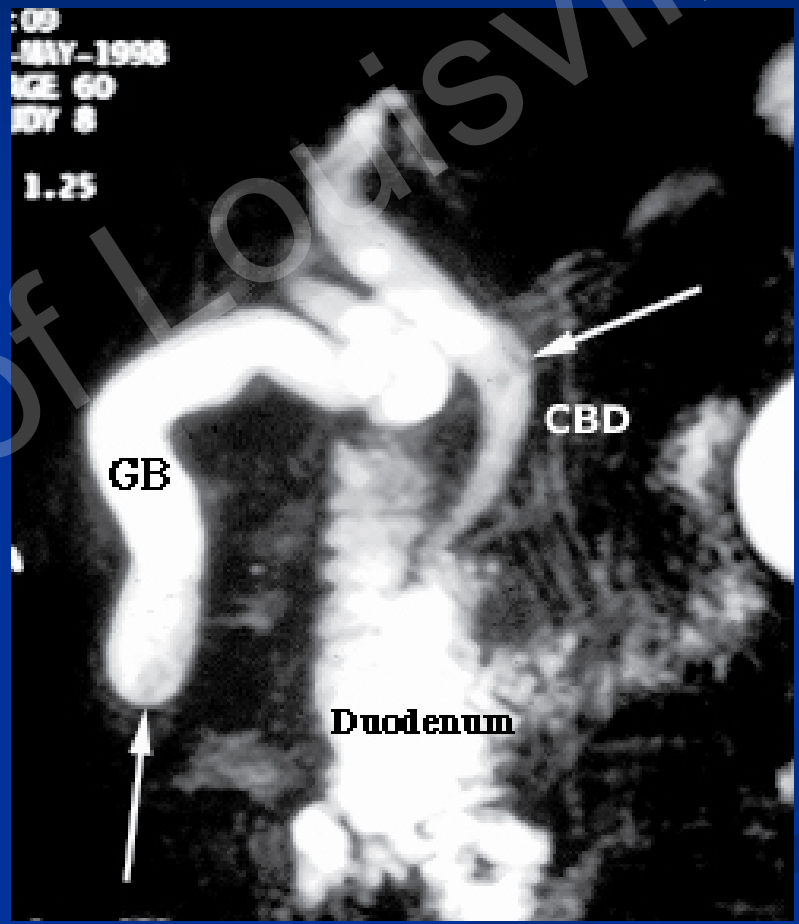
Stones

- Stones larger than 4 mm are readily seen but cannot be differentiated from filling defects such as blood clots, tumor, sludge, or parasites.
- Other mimickers of choledocholithiasis include flow artifacts, biliary air, and a pseudostone at the ampulla.

Barish, MA, Yucel, EK, Soto, JA, et al. MR cholangiopancreatography: Efficacy of three-dimensional turbo spin-echo technique. AJR Am J Roentgenol 1995; 165:295.

Stones

- MRCP study, obtained in a 60-year-old woman with recurrent right upper quadrant pain and an unremarkable ultrasound examination, shows small stones (arrows) in the gallbladder (GB) and the common bile duct (CBD).



Stones

- The choice of procedure varies with the clinical setting and local availability.
- In patients with cholangitis, for example, ERCP is preferred because it permits therapeutic drainage of the obstruction.
- However, MRCP may be performed if cholangitis is not severe and the risks of ERCP are high.
- MRCP may also be useful after unsuccessful or incomplete ERCP and in imaging the CBD in patients undergoing laparoscopic cholecystectomy.
- Endoscopic ultrasound may also be an option in individuals considered at increased risk for ERCP.

Soto, JA, Yucel, EK, Barish, MA, et al. MR cholangiopancreatography after unsuccessful or incomplete ERCP. Radiology 1996; 199:91.

Acute cholecystitis

- The role of MRCP for the diagnosis of acute cholecystitis was evaluated in a series that included 35 patients with symptoms of acute cholecystitis who underwent both ultrasound and MR cholangiography prior to cholecystectomy.
- MRCP was superior to ultrasound for detecting stones in the cystic duct (sensitivity 100 versus 14 percent) but was less sensitive than ultrasound for detecting gallbladder wall thickening (sensitivity 69 versus 96 percent).
- At the present time its role in the diagnosis of acute cholecystitis should remain within clinical trials.

Park, MS, Yu, JS, Kim, YH, et al. Acute cholecystitis: Comparison of MR cholangiography and US. Radiology 1998; 209:781.

Pancreatitis and pancreatic cancer

- MRCP has been evaluated in both acute and chronic pancreatitis. In patients with acute pancreatitis, MRCP is useful for evaluating the bile ducts and cystic duct remnants for stones, for evaluating the pancreatic ducts, and for documenting the presence of cysts in or around the pancreas.
- However, ERCP is often preferred in patients with gallstone pancreatitis since endoscopic papillotomy performed during the same procedure may be beneficial in patients with obstructive jaundice (with a serum bilirubin concentration above 5 mg/dL) or biliary sepsis.
- In patients with failed ERCP and in those with biliary-enteric anastomoses with which ERCP may be contraindicated, MRCP can be used to image the ducts and evaluate the anastomosis, respectively.

Soto, JA, Barish, MA, Yucel, EK, et al. Pancreatic duct: MR cholangiopancreatography with a three-dimensional fast spin-echo technique. Radiology 1995; 196:459.

Pancreas divisum

- MRCP can also detect pancreas divisum.
- However, the possible association of this variant with the development of either acute or chronic pancreatitis remains controversial.

Bret, PM, Reinhold, C, Taourel, P, et al. Pancreas divisum: Evaluation with MR cholangiopancreatography. Radiology 1996; 199:99.

Pancreatic Cancer vs. CP

- MRCP appears to be as accurate as ERCP for distinguishing pancreatic cancer from chronic pancreatitis.
- Prospective study involving 124 patients who were suspected of having pancreatic cancer and underwent a number of diagnostic studies, including ERCP and MRCP.
- The correct diagnosis was confirmed histologically and clinically.
- A diagnosis of pancreatic cancer was established in 37 patients (30 percent); the others had chronic pancreatitis (46 percent) or other causes.
- The sensitivity and specificity of MRCP for diagnosing pancreatic cancer were 84 and 97 percent, which was similar to ERCP 70 and 94 percent, respectively

Adamek, HE, Albert, J, Breer, H, et al. Pancreatic cancer detection with magnetic resonance cholangioopancreatography and endoscopic retrograde cholangiopancreatography: A prospective controlled study. Lancet 2000; 356:190.

Chronic Pancreatitis

- MRCP demonstrating features of chronic pancreatitis.
- There is a dilated main pancreatic duct, a psuedocyst in the head of the pancreas and prominent side branches.

Secretin-enhanced MRCP

- Secretin-enhanced MRCP is being increasingly studied for evaluation of pancreatic exocrine function and in the early diagnosis of chronic pancreatitis.
- It is used most commonly in patients with chronic pancreatitis, a setting in which it can help characterize subtle pancreatic disease by improving the depiction of the pancreatic duct anatomy.
- Secretin stimulation is not used for imaging bile ducts.

Fukukura, Y, Fujiyoshi, F, Sasaki, M, Nakajo, M. Pancreatic duct: morphologic evaluation with MR cholangiopancreatography after secretin stimulation. Radiology 2002; 222:674.

MRCP Advantages

- Gastric outlet or duodenal stenosis
- Surgical rearrangement (eg, Billroth II) or ductal disruption, resulting in ducts which cannot be assessed by ERCP.
- Can detect bile duct obstruction occurring as a complication of chronic pancreatitis.
- Post-ERCP pancreatitis correlates with the extent of pancreatic ductal filling further underscoring an advantage of MRCP for pancreatic ductal imaging.

Cheon, YK, Cho, KB, Watkins, JL, et al. Frequency and severity of post-ERCP pancreatitis correlated with extent of pancreatic ductal opacification. Gastrointest Endosc 2007; 65:385.

Effect of MRCP Introduction on ERCP Practice: Are There Implications for Service and Training?

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Department of Surgical Gastroenterology, Gartnavel General Hospital, Glasgow, UK

Gut 2006;**55**:1365-1366; doi:10.1136/gut.2006.097055

Effects of MRCP on ERCP Practice

- ERCP requires considerable training
- Consensus suggests 180–200 diagnostic/therapeutic ERCPs are required to obtain competence within a training facility with sufficient case volume for viable training opportunities.
- Selective cannulation of the bile duct has been used as a benchmark for technical success.
- Moreover, multivariate analyses find case volume to independently predict ERCP related complications

American Society for Gastrointestinal Endoscopy. Principles of training in gastrointestinal endoscopy. *Gastrointest Endosc* 1999;**49**:845–53.[

Freeman ML. Procedure-specific outcomes assessment for endoscopic retrograde cholangiopancreatography. *Gastrointest Endosc Clin N Am* 1999;**9**:639–47.

Effects of MRCP on ERCP Practice

- "Diagnostic" ERCP should rarely be required with the increasing accessibility to newer imaging modalities.
- Magnetic resonance cholangiopancreatography (MRCP) has been found to be of equivalent diagnostic utility as ERCP.
- Such developments may reduce ERCP case volume and potentially increase procedure complexity with implications for service and training.
- Few studies have reported potential changes to ERCP practice following MRCP introduction.

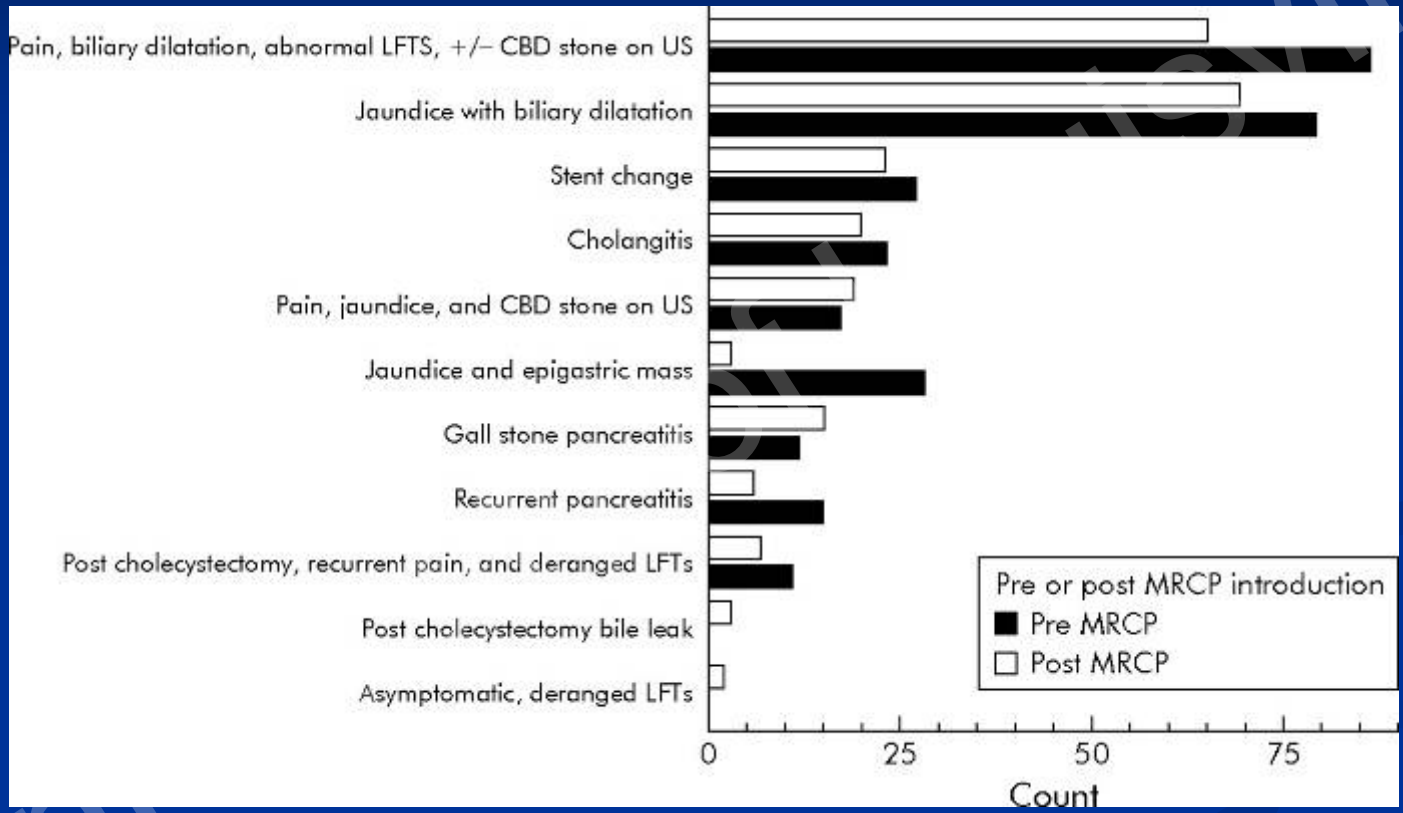
Methods

- 542 consecutive ERCPs during a 28 month period from November 2001 to February 2004 from a prospective database.
- The effect of MRCP introduction on ERCP practice was assessed 14 months after the addition of MRCP facilities to our unit and compared with the 14 month period prior to MRCP introduction.

Methods

- Pre-MRCP introduction, 310 ERCPs (298 with complete data) were performed and 232 were performed in the post-MRCP period.
- Indications for ERCP were categorized by clinical, biochemical, and ultrasound (USS) findings and the likelihood of therapeutic intervention for each indication assessed before and after MRCP introduction.
- Failed cannulation was defined by the inability to cannulate the papilla and opacify the required duct.

Figure 1 Indications for endoscopic retrograde cholangiopancreatography (ERCP) in pre-magnetic resonance cholangiopancreatography (MRCP) and post-MRCP introduction periods. CBD, common bile duct; LTFS, liver function tests.



Jenkins, J T et al. Gut 2006;55:1365-1366

The ERCP indication profile changed little following MRCP introduction.

Results

- A 25% reduction in total ERCP numbers was found in the post-MRCP period and the monthly mean number of ERCPs performed was reduced from 22 to 17 per month.
- Cannulation failure rates pre-MRCP and post-MRCP were 8.7% (26 ERCPs) and 14.2% (33 ERCPs), respectively.

Discussion

- We have encountered alterations in ERCP practice following MRCP introduction with fewer, potentially more complex, procedures being performed.
- Subset analysis found change only in the group with pain, biliary dilatation, with abnormal LFTs±CBD stone on USS, potentially reflecting improved identification of duct stones by MRCP.
- Objective assessment of technical difficulty was not easy, as both trainees and trainers were both involved in performing ERCPs and no validated criteria to assess ERCP difficulty were available during the study period.

Conclusions of Study

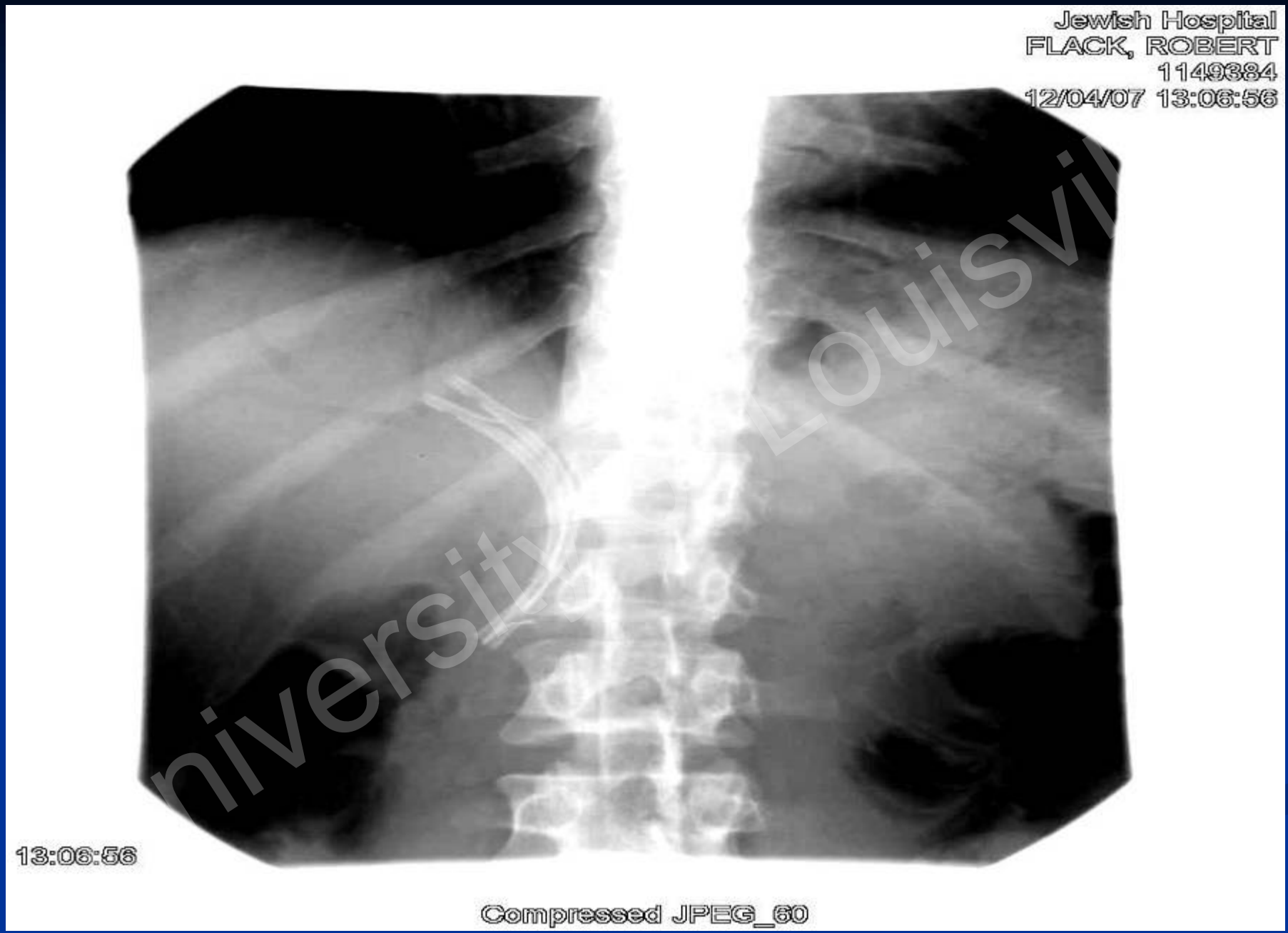
- MRCP introduction has an impact on ERCP practice. ERCP services and training may require redirection towards fewer but more complex procedures.
- These changes may necessitate a reduction in the number of cases performed on a list, may result in fewer trainees embarking on ERCP training and, as endoscopy centers require threshold numbers of cases to ensure competency in technique and adequacy of training, may reduce the number of centers able to offer viable training opportunities.

Key Points

- Know abbreviations (nurses will ask!!!)
- ERCP and MRCP are both great diagnostically
  - MRCP has fewer complications
- ERCP can perform therapeutics
- Naeem doesn't like snakes

CASE 1

46 yo wm c chronic abd pain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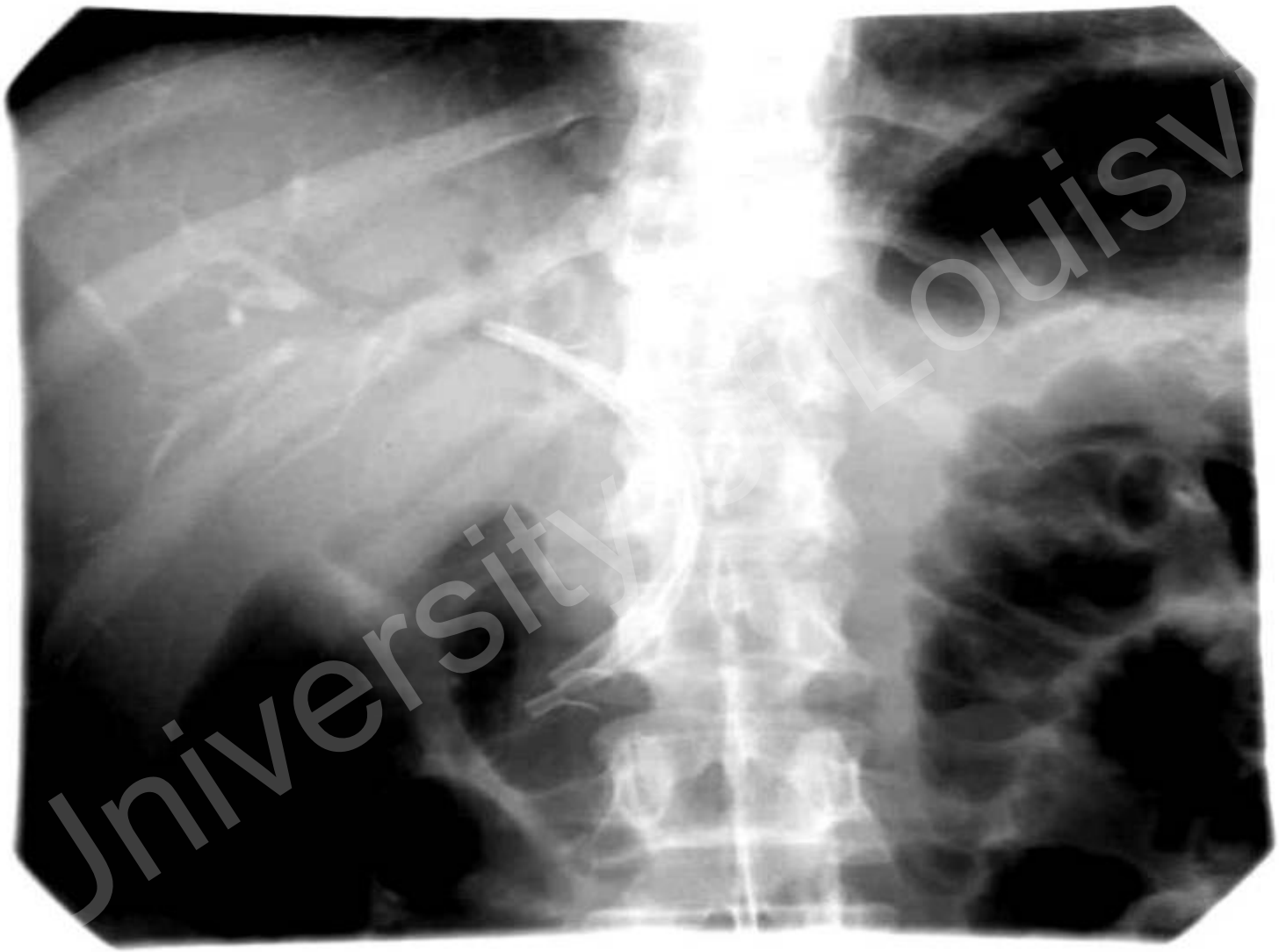

Case #2

69 yo s/p “surgery”


Jewish Hospital
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University of Louisville
14:30:19
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DONNELLY, JOHN
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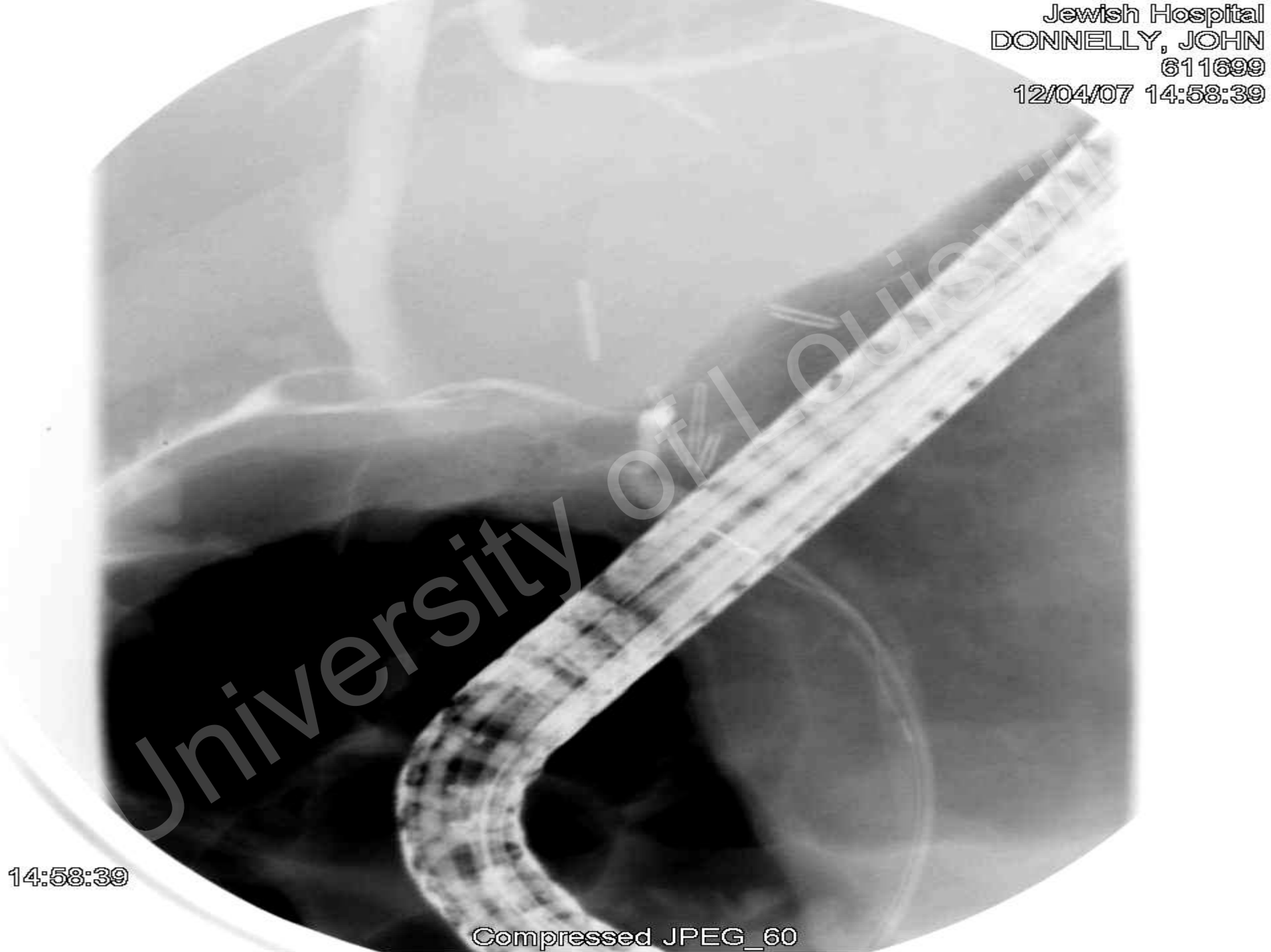
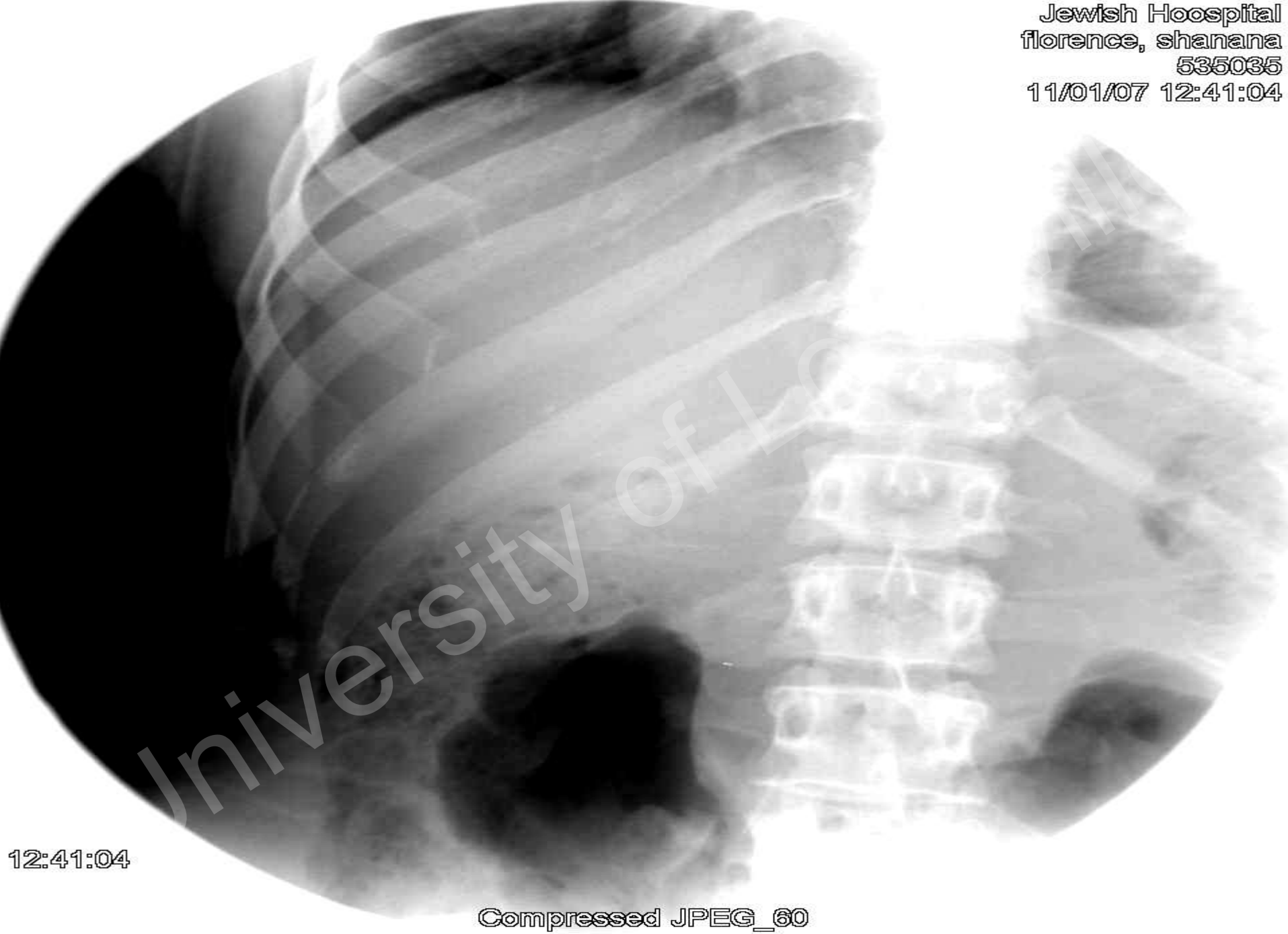
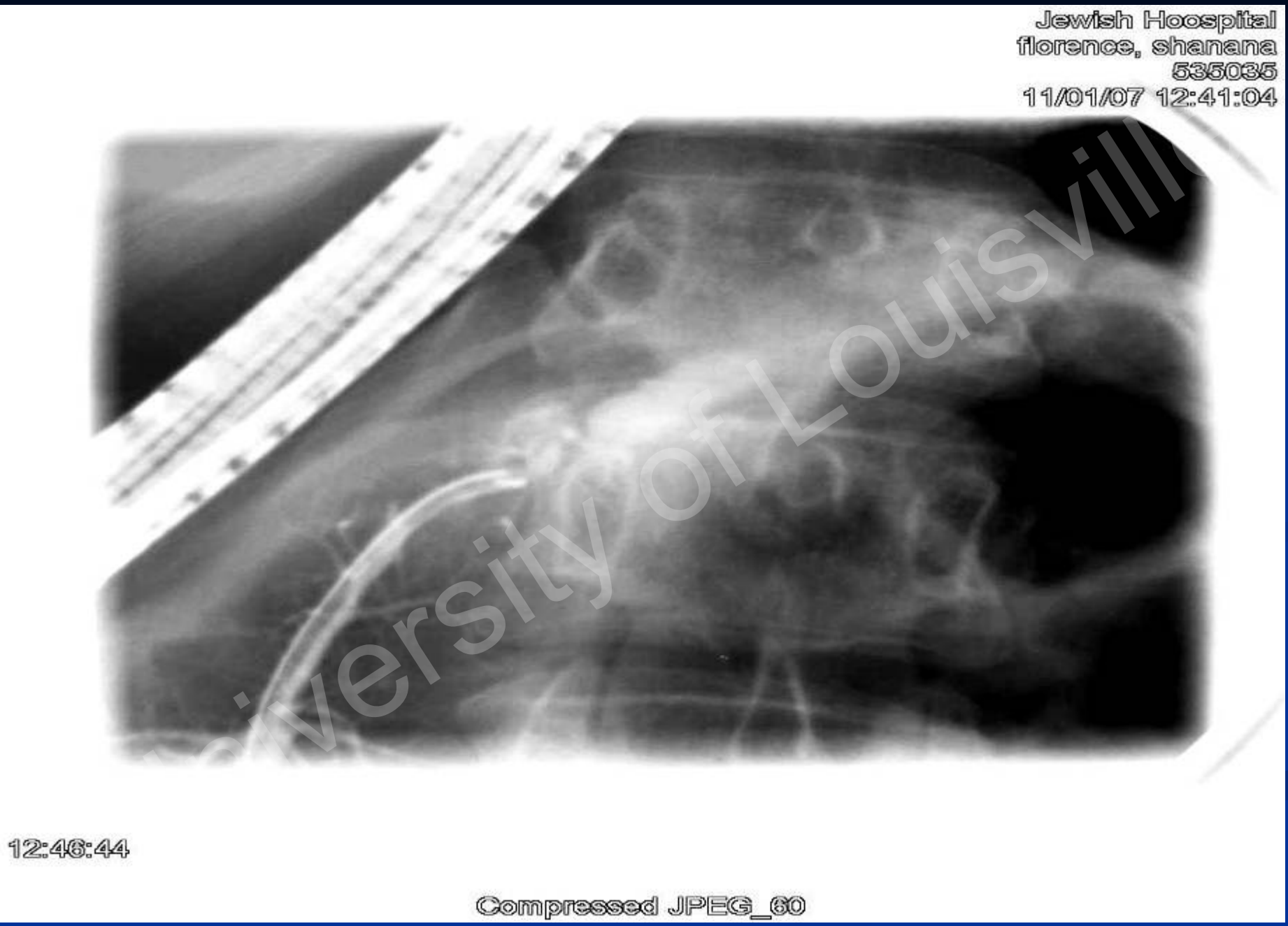
DONNELLY, JOHN
611699
12/04/07 14:50:05
University of Louisville
14:50:05
Compressed JPEG_60

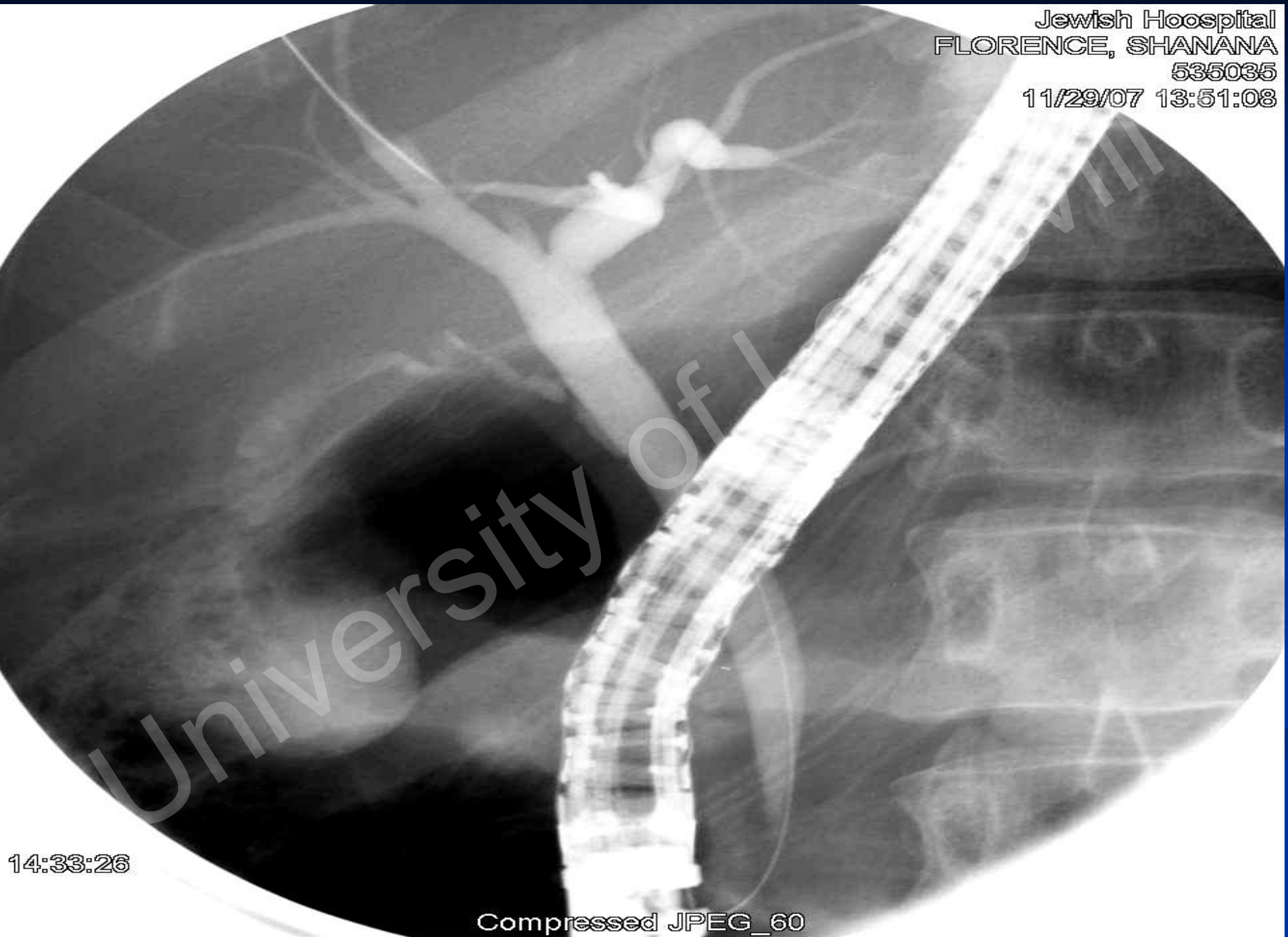

Jewish Hospital
DONNELLY, JOHN
611699
12/04/07 14:58:39
University of Louisville
14:58:39
Compressed JPEG_60

Case 3

25 yo c chronic abd pain






Jewish Hoospital
FLORENCE, SHANANA
535035
11/29/07 13:51:08
14:33:26
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THE END