Simple Biliary Catheter exchanges

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Introduction

- Management of pre-existing biliary drainage catheters is a common yet a challenging practice in most institutions involving large IR practices.
- With increasing numbers of patients with liver diseases, both benign and malignant, available IR techniques have become widely accepted and play a major role in preventative maintenance of these Pts.
- Preventative maintenance usually involve a coordinated team approach of:
  - Interventional Radiologists, RRAs, Hepatologists, Oncologists, and Gastroenterologists.
LOOKS CAN BE DECEIVING

Your typical biliary drain exchange may not be so SIMPLE.
“WHEN YOU THINK OF THE BILIARY SYSTEM THINK OF A SYSTEM FULL OF ____ OR HOT AIR.”
IT NEEDS TO BE?
Etiologies of Cholestasis

- Cholestasis is usually caused by a narrowing or complete obstruction of the bile ducts.
- This normally disrupts the natural flow of bile into the duodenum and eventual cholestasis. Hence, bacterial GROWTH.
- This causes a very sick patient
Cholestasis

- Is a condition in which the bile flow from the liver stops or slows
- Biliary system above the obstruction becomes distended
- No flow of bile, bacterial growth, sepsis
Normal bile flow anatomy

- https://youtu.be/ky1xGE6jW7U
Benign Etiologies Cholestasis

**Surgical**
- Cholecystectomy
- Liver transplant
- Bile duct repair
- Cholelithiasis
  - Bile duct injury

**Non-surgical**
- PSC
- Necrotizing pancreatitis
- Ascending cholangitis
- Hepatic artery embolization
- Post intra-arterial chemotherapy
- Pancreatic pseudocyst
Malignant Etiologies

- Cholangiocarcinoma
- Gallbladder Ca
- Metastasize
- HCC
- Pancreatic Ca
- Lymphoma
- HCC
### Bismuth Classification System

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Malignant Obstruction

Bismuth Classification I

Bismuth Classification II

https://emedicine.medscape.com/article/186850
Benign Cholestasis

Focal intrahepatic Stricture
s/p cholecystectomy
Bismuth IIIa

https://emedicine.medscape.com/article/186850-overview
Treatment options (IR)

- Upon presentation benign and malignant causes of biliary obstruction may be difficult to distinguish
  - ERCP (Gold standard)
  - PTD (IR)
  - Surgical
  - Brachial Therapy
Management of benign causes

- Placement of 8-10F drainage catheters
- 6-10 wk routine exchange
- Cholangiograms
  - Thru the tube
  - Over the wire
- Balloon dilation
- Upsize drainage catheters over a period of 12 months up to size 20F.
- 20F catheter remaining for 6 months
- Duct patency
  - Externalization
  - Capping trial for 2 weeks
  - Patient tolerance
    - Remove
  - Pt. intolerance
    - Exchange, place to bag
- Persisting stricture
  - Replace/ exchange
  - Explore surgical options
Initial PTC and drainage catheter placement

Catheter upsizing every 2-12 weeks with 6-12 months of stenting (8-22F)

Once optimal catheter size is reached (20-22F) Follow-up 8-12 weeks

Pullback cholangiogram with sheath, externalization of stent, two week capping trial, Labs drawn for bilirubin baseline, week follow-up, patient education

Possible Balloon dilatation

Symptomatic trial period

Asymptomatic trial period

Chronic biliary drainage Metal stent Surgical Revision Treatment success

Lyr bilateral cholangiogram Fogarty balloon test Free flowing of contrast in duodenum

cholangiogram Tube removal
Management of malignant Ob.

- **PALLIATIVE**
  - Routine exchange of internal/external biliary drainage catheters approximately every 6-12 weeks
  - Maintain catheter size between exchanges
    - Unless occluded
      - upsize
    - **Internalization**
      - Plastic or metallic stents
        - 4-6 month prognosis
        - Some pts. Out live
External Biliary Drainage Devices

External biliary catheter were originally the treatment of choice

- Inconvenience of a bag
- Electrolyte loss
- Metabolic imbalance
- Failed internalization
Int/Ext Biliary drainage catheters

- Standard therapy
- Side holes above and below obstruction
- Usually able to manipulate through obstruction
- TIP - small bowel
  - digestion
- Nutrition improved
- Metabolic imbalance no longer an issue
- Capped, no bag
DRAINAGE DEVICES

BILIARY

Cook

Internal/external

Boston

Merit
INDICATIONS FOR EXCHANGE

- Fever > 101 Degrees F
- Chills
- Nausea
- RUQ pain
- ↑ T Bilirubin
- ↓ Drainage output
- Hemobilia
- Peri catheter leakage
- Dislodged
- Cholangitis
CASE #1

70 Asian Male with history of HBV, Dx. with Hepatocellular carcinoma (HCC) (unresectable due to bilateral duct involvement) being managed with bilateral biliary drainage catheters.

Presented with:

- Acute cholangitis
  - Chills
  - Painless jaundice
  - RUQ pain
  - Leaking
6.5cm mass in the liver, GROSSLY STABLE LARGE HETEROGENEOUS MASS IN CENTRAL LEFT HEPATIC COMPATIBLE WITH KNOWN HEPATOCELLULAR CARCINOMA.

BILATERAL PTC CATHETERS IN PLACE. INTERVAL IMPROVEMENT IN LEFT BILIARY DILATATION. HOWEVER, NEW LEFT-SIDED CHOLANGITIS WITH MULTIPLE NEW SUBCENTIMETER LOW-ATTENUATION FOCI, FAVOR SMALL ABSCESSES RATHER THAN PROGRESSIVE NEOPLASM. THESE ARE TOO SMALL FOR PERCUTANEOUS DRAINAGE.

ENLARGING RIGHT PERIHEPATIC FLUID COLLECTION, APPROACHING RIGHT PTC CATHETER INSERTION SITE, PERHAPS SMALL BILOMA.
Scout image existing drains
Procedure

- Scout image
- Contrast injection- positioning, bile ducts
- Pre-existing Rt. tube removed over Amplatz
- Gross hemorrhage from the tract
- Next plan of action?
DON’T WORRY HELP IS ON THE WAY
Procedure
CASE 1
Here is what I did……
I advanced to catheter back into the tract to tamponade the bleed.
Consulted STAFF

I asked the tech to:
Prep additional tray for Angiogram
  ▪ get a micro puncture set for arterial access
  ▪ 5F sheath
  ▪ Sos catheter
  ▪ Prep for femoral access
Case 1

Procedure:

- Rt. Femoral a. was accessed (US) staff Physician
  - Clean area
- 5F vascular sheath placed
- SOS, micro catheter – Celiac a., CH a., Ant Rt. H a.
- Removal Rt. biliary catheter – positioned near head
  - Dirty, kept trays and Equip. separate
  - Watched for gross hemorrhage
- Angiogram performed via Rt. Hep A.
Results

- No extravasation identified (Rt. ha.)
- Over the wire Rt. cholangiogram performed
  - Extensive clot within the biliary system
  - No obvious communication with vasculature
  - Communication with biloma
- Additional angiogram of the Rt. ant. Hep A. performed in multiple projections
  - Extravasation of Rt. Ant Hep A. noted
Bleed Rt. Anterior Hep A.
Intervention

- **Multiple micro-coils** deployed Rt. Ant Hep A.
- Post embolization angiogram
  - No further extravasation
- Upon attempted exchange Rt. Drain
  - **Persistent hemorrhage** from tract.
  - Hemorrhage decreased
- **What would you do next?**
Embolization Rt. HA.
Procedure

- Cone bean CT performed
  - Non diagnostic
- Branch of Rt. Inf. And Sup hepatic artery interrogated
  - No sign of extravasation
- What next?
Cone Beam CT (Non-diagnostic)
Embolization

Rt. Ant. Hep. A. embolized with:
Additional coils
Rt. Ant Hep. A. reinterrogated with no additional extrav seen
Thru the tube cholangiogram
Procedure

- Pre-existing bilateral biliary drainage catheters were up-sized to 14F drainage catheters.
- Cope loop within the duodenum
- Final contrast injection - bile ducts, side holes
- Catheters secured (o Prolene), flushed, connected to gravity drainage
- Simultaneously femoral sheath removed,
- Hemostasis obtained (Mynx closure Device)
Drains were subsequently placed without further incident.
Further Intervention

- Patient presented to IR multiple times within a 3 week period, for **persistent leaking** mostly right side requiring tube changes/upsizing.

- **PERSISTNT LEAKING?**
Additional Intervention

- Approximately 4 weeks s/p initial intervention patient returns to IR. Secondary to ongoing issues with gross hemobilia, from possible tumoral erosion perhaps?
- Given the patient was tachycardic with significant amount of discomfort; procedure was performed with GENA
Angiogram - Pseudoaneurysm
Embolization of Pseudoaneurysm
Additional Intervention

- Angiogram Lt. Hep A. interrogated
  - Extensive neovascularity
    - Multiple tumoral microaneurysms
  - Embolization with Gelfoam.

- Biliary tube injection
  - Large amount of hem biliary
  - Contrast extending into the tumor bed

- Bilateral tube exchanged 16F Rt., 14F Lt.
  - Rt. 2 additional side holes
Hepatic Tumor Blush
Embolization of tumor bed
Post-exchange Cholangiogram
Post-procedural care

- Give the large amount of hemobilia it was elected to administer continuous flushing with a continuous amount of normal saline for 48 hours then transitioned to drainage.
- Pt more stable, labs may cap
- Continue to observe Pt.
DISCUSSION

- Tubes placed at an outside facility
- Pt. presented with chills, RUQ painless jaundice?
- A 20 min procedure turned into a 2.5 Hr. case
  - I thought this would be simple, should have figured. Caught off guard.
Hepatocellular Carcinoma

- Hepatocellular carcinoma (HCC) is the most common primary malignancy of the liver.
- It is strongly associated with cirrhosis, from both alcohol and viral aetiologies.
- HCC makes up approximately 5% of all cancers partly due to the high rates of hepatitis B infection.
- Fifth most common cancer in the world.
- Third most common cause of cancer-related death (after lung and stomach cancer).
Cholangitis

- Patient also initially presented with Acute cholangitis
- Bacteria infection of the biliary tree
  - Warrants immediate decompression
- Many forms:
  - PSC, Ascending, Chemotherapy induced ect...
Hepatocellular Carcinoma

- The demographics are strongly influenced by the regions in which chronic hepatitis B infection is common, which account for over 80% of cases worldwide.
- The highest prevalence is in Asia.
- Clinical presentation includes:
  - Jaundice
  - Hepatomegaly/mass
  - Portal HTN- portal vein invasion
  - Haemorrhage form tumor
Radiographic features

Probably one of the only diseases that be dx without a biopsy

- Tumor receives blood from HA.
- Arterial phase enhancement
- Venous phase washout
- Characteristic pseudocapsular enhancement
Discussion

- Liver transplant/resection, chemoembolization, ethanol ablation, radiofrequency ablation, cryoablation, and radiotherapy.

- Most common site for METS: lung, adrenal glands, lymph nodes, and bone.

Differential Dx:
- Cholangiocarcinoma,
- Hepatocellular Adenoma,
- Cirrhosis

https://www.google.com/search?q=HCC+ring+enhancement&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjRiqfKx8faAhXtzVykKHbN6ChIQ_AUICygC&biw=1366&bih=653#imgrc=WLqvk5_1zJm7RM:
Discussion

- HCC may affect the biliary system in several different ways including:
  - Tumor thrombosis
  - Hemobilia
  - Bile duct thrombosis

- Patient presented to IR with hemobilia
  - Possibly due to: Bleed, tumor erosion

- Upon cholangiogram- there were ductal filling defects (thrombus) Recommended continuous flushing- for 48 hrs. There after once 1x/day
Discussion

- Hemorrhage possibly due to:
  - Injured vessel at the time of placement
    - Which was tampanoded by drainage catheter
  - Possible **pseudoaneurysm**?
    - Large pseudo aneurysm off Rt. Hep A.- embolized coils
  - Vascularization of tumor
    - Tumor blush neovascularity from Lt. hepatic
    - Embolized with gelfoam not coils. Not sure why?
Bilomas

- **PERSISTENT LEAKAGE**
  - Huge

- **Solutions?**
  - Drainage exchange
  - Upsizing - Rt. Was upsized from 14F to 16F
    - May or may not be effective
  - Biloma is the real issue
    - Bilomas are collections of bile
      - Intra/ extrahepatic
Bilomas

- Bilomas
  - Causes:
    - Spontaneous
    - Post surgical
    - Biliary drainage insertions
    - 70% RUQ, 30% LUQ
    - May wall off cause or demonstrate active leakage
      - Which is what has happened here.
    - Cholangiogram- Rt. Biliary system communication with biloma.
Bilomas continued

- Treatment options
  - CT/ US Guided Pigtail drainage catheter
    - NO pigtail warranted, resolved
  - Surgical drainage
    - Non used in this case

- Differential diagnosis:
  - Hepatic abscess
  - Cystadenoma
LFTs lab values

- Interpretation of LFTs: Elevation of which of these enzymes represents the predominant abnormality in cholestatic liver disease involving obstruction?

  a. Elevation of AST and ALT > ALP, T-Bili
  b. Elevation of ALP, T-Bili > AST and ALT
  c. Elevation of ALP with normal AST and ALT
  d. None of the above

- AST = Aspartate transaminase, ALT = Alanine transaminase, ALP = alkaline phosphatase
Liver Enzymes

- Interpretation of LFTs: Elevation of which of these enzymes represents the predominant abnormality in cholestatic liver disease involving obstruction?

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AST = Aspartate transaminase, ALT = Alanine transaminase, ALP = alkaline phosphatase, T Bilirubin
LFTs lab values

- **Interpretation of LFTs**: Elevation of which of these enzymes represents the predominant abnormality in cholestatic liver disease involving obstruction?

- **Hepatic alkaline phosphatase (ALP)**
  - is an enzyme in the cells lining the biliary ducts.
  - ALP is associated with the plasma membrane of hepatocytes adjacent to the biliary canaliculus.

- **Bilirubin**: orange/yellow pigment made in the liver from broken down hemoglobin excreted in the bile. Biliary obstruction is found in the blood.

Accordingly, diseases that predominately affect hepatocyte secretion (e.g., obstructive diseases) will show higher elevation of ALP & Bilirubin compared to AST and ALT.

- **AST and ALT**
  - more indicative of hepatocellular injury (e.g., drug toxicity, viral hepatitis).

Examples of **obstructive disease** include:

- PSC (Primary sclerosing cholangitis)
- PBC (Primary biliary cirrhosis)
- Cholangiocarcinoma
- Stones
Antibiotic prophylactics

Biliary interventions: When should prophylactic antibiotics be used?

A. On a case-by-case basis in patients with no signs or symptoms of biliary sepsis, based on risk factors and expected findings.

B. Where inadequate or incomplete drainage is anticipated (hilar strictures, PSC, Cholelithiasis).

C. If the patient had a recent ERCP or PTBD (e.g., less than a week).

D. For routine catheter exchanges, due to anticipated catheter colonization.

- C and D
- B, C, and D
- All of the above
Antibiotic prophylactics

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e. c and d

f. b, c, and d

g. All of the above
Antibiotic prophylactics

- Biliary interventions: Which of these agents is appropriate for prophylaxis?
  
a. Zosyn  
b. Ceftriaxone  
c. Ampicillin/sulbactam  
d. a and b  
e. All of the above  
f. None of the above
Antibiotic prophylactic

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Antibiotic Prophylactics

- Biliary interventions: Which of these agents is appropriate for prophylaxis?

- **Zosyn** (combination of Piperacillin/Tazobactam) 3.375 g IV
  - **Piperacillin**
    1. Good biliary excretion and coverage of the biliary bacterial flora
    2. Decreased risk of nephrotoxicity
  - **Tazobactam**
    1. Covers β-lactamase producing species of *E. coli*

- Alternative agents:
  - **Ceftriaxone** (3rd generation cephalosporin) 1 g IV
  - **Ampicillin/sulbactam** 1.5–3 g IV
Complications / Resolutions

- **LEAKING** → **POSSIBLE OCCLUSION** → **UPSIZE, EXCHANGE**
- **NO DRAINAGE** → **POSSIBLE OCCLUSION** → **GENTLE FLUSH, EXCHANGE**
- **DISPLACEMENT** → **BROKEN SUTURE** → **EXCHANGE, TRIANGLESUTURE**
- **PAIN, FEVER** → **OCCLUDED, KINKED** → **EXCHANGE, GRAVITY BAG**
- **DISLOGED** → **REACCESS /EXCHANGE**
- **GROSS HEMATURIA** → **ANGIOGRAM WITH EMBOLIZATION**

*DON’T FORGET YOUR CHOLANGIOGRAMS*
Take Home Points

- Anticipate complications
- Capped versus Gravity Drainage
- Be aware of bleeding during tube changes.
- Always use appropriate antibiotics.
- Review Pt. history, labs, long term plan
- Be aware of surrounding anatomy in scout images.
- Final catheter position
  - Holes must be aligned with ducts
THANK YOU

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