Diagnosis and Management of Bile Duct Injuries related to TransArterial ChemoEmbolization

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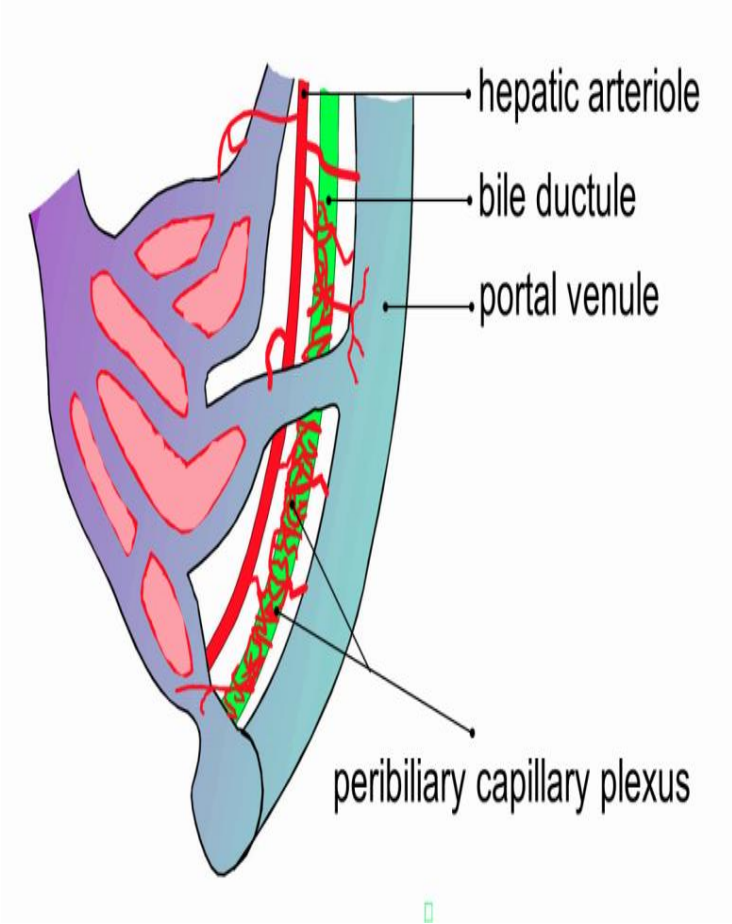
Biliary injuries, related to the transarterial chemoembolization

- Transarterial chemoembolization (TACE)
  - most frequently used palliative treatment for unresectable advanced hepatic tumors
  - cytotoxic action of selectively-injected intra-arterial chemotherapy and the ischemic effects of embolising agents (lipiodol, gelform, drug eluting bead)

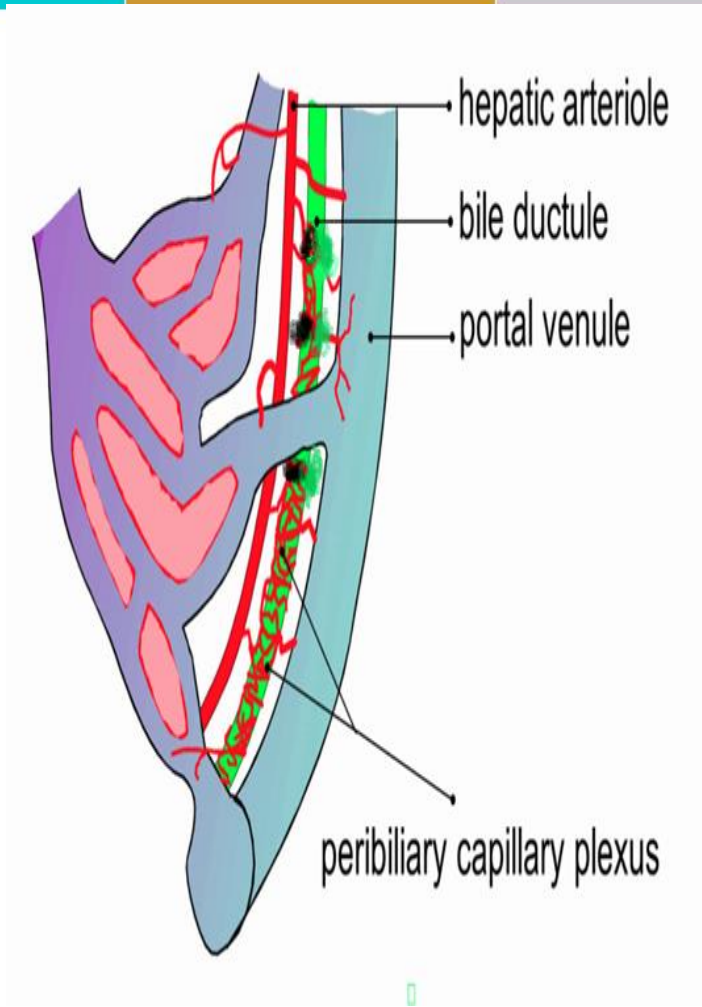
Mechanism and Patterns of bile duct injuries

- Intrahepatic bile ducts
  - fed exclusively from the hepatic arterial branches that give off a vascular plexus (peribiliary capillary plexus) around the bile ducts



Mechanism and Patterns of bile duct injuries

- microvascular damage (ischemia, vasculitis, fibrosis) of the peribiliary capillary plexus
  - Acute-stage bile duct injury
    - Necrosis the bile ductule
  - Chronic-stage bile duct injury
    - Stricture of the bile duct



Clinical manifestation of bile duct injury

- Related to the bile leak or obstruction
- Nausea, vomiting, abdominal pain, fever, jaundice, etc
- Complication, such as bile peritonitis, cholangitis, abscess, biliary cirrhosis, etc

Bile duct injury imaging

- Diagnosis, assessment of the extent of injury, and treatment planning

- Cholescintigraphy, computed tomography (CT), ultrasonography (US), magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC)

Bile duct injury imaging

- CT – most useful
  - fluid collections (biloma, bile peritonitis), biliary injury (duct dilatation, fistula formation, duct stricture or obstruction), etc
- MRCP
  - Non-invasive diagnosis, evaluation of entire bile duct (biliary mapping)
  - using heavily T2 weighted image (3D MRCP) and hepatocyte-selective contrast agent with biliary excretion (direct cholangiography)

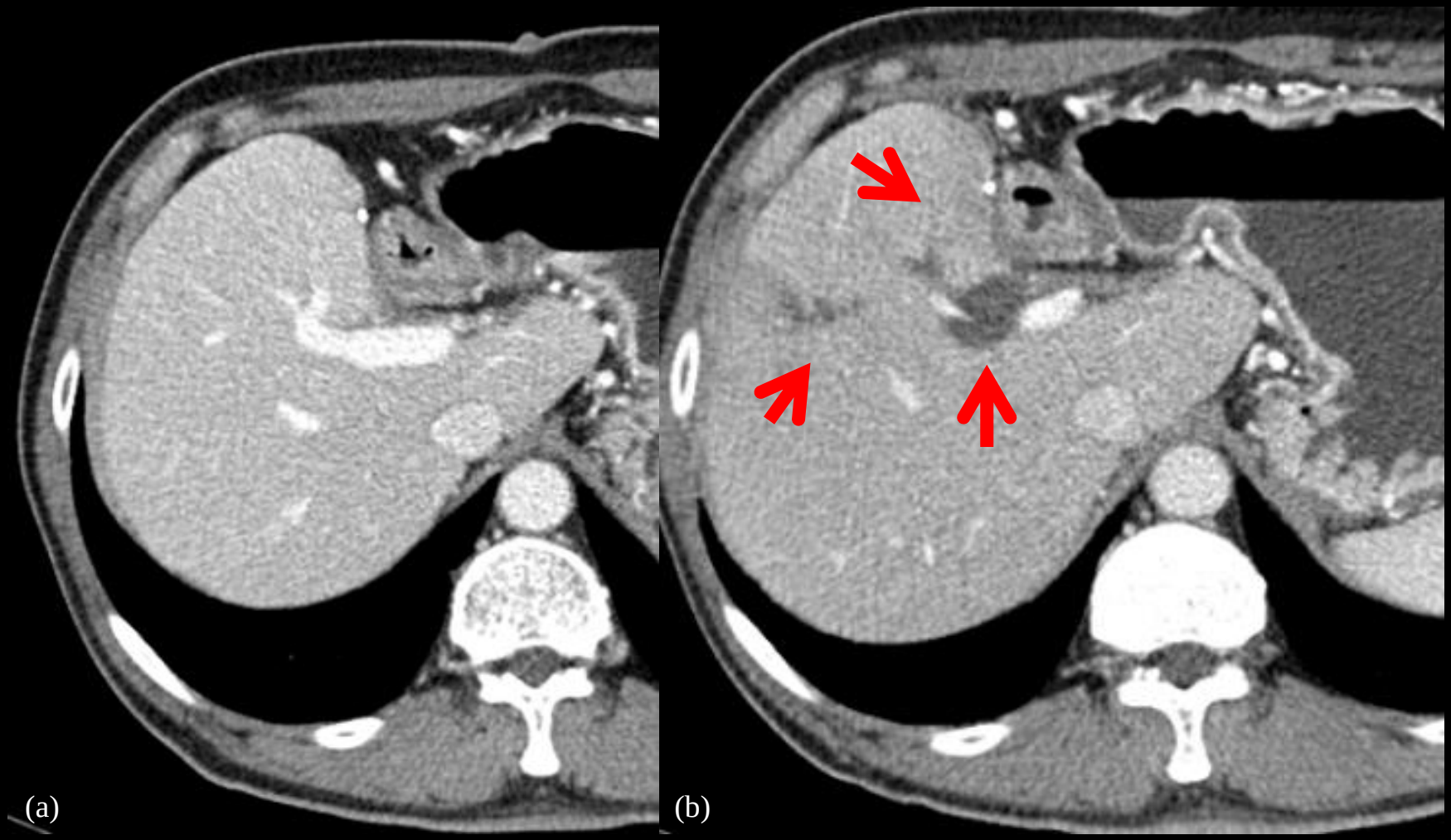
Bile duct injury imaging

- ERCP – more invasive than MRCP
  - simultaneous therapeutic intervention (biliary stent, drainage, etc)
  - limitations of evaluating proximal to a major duct transection or ligation and status of surgical biliary-enteric anastomosis

- PTC – more invasive than MRCP
  - Using intervention of percutaneous transhepatic biliary drain placement, simultaneous therapeutic intervention (biliary stent, drainage, etc)

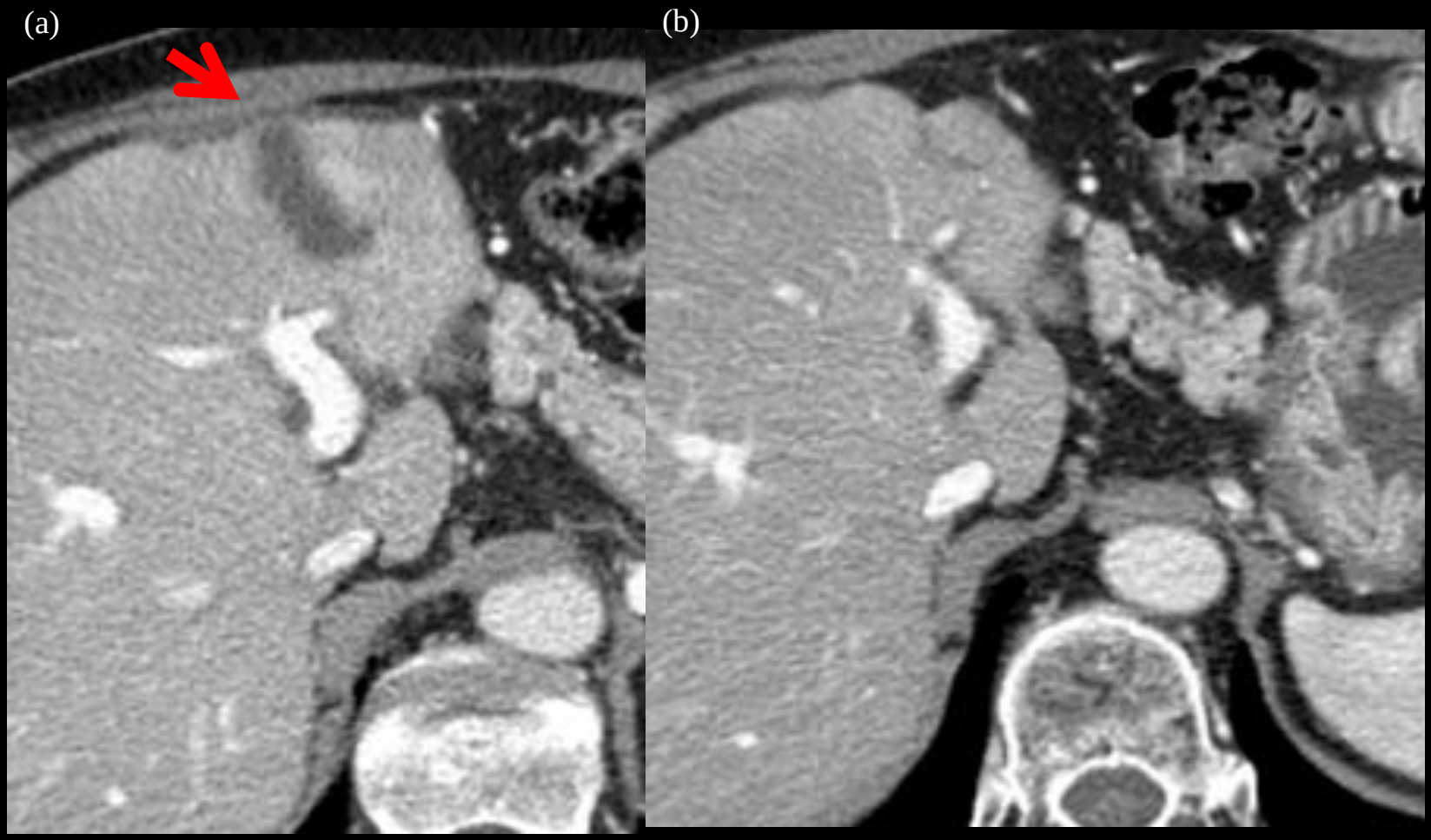
Types of bile duct changes after TACE

- m/c Diffuse dilatation of IHD
- Biloma
  - develop within 2 months of chemoembolization
  - related to iodized oil or drug eluting bead (peribiliary capillary plexus injury)
- Focal stricture of large bile ducts
  - conjoined serious biliary infections
  - related to gelatin sponge particles (hepatic arteriole injury)



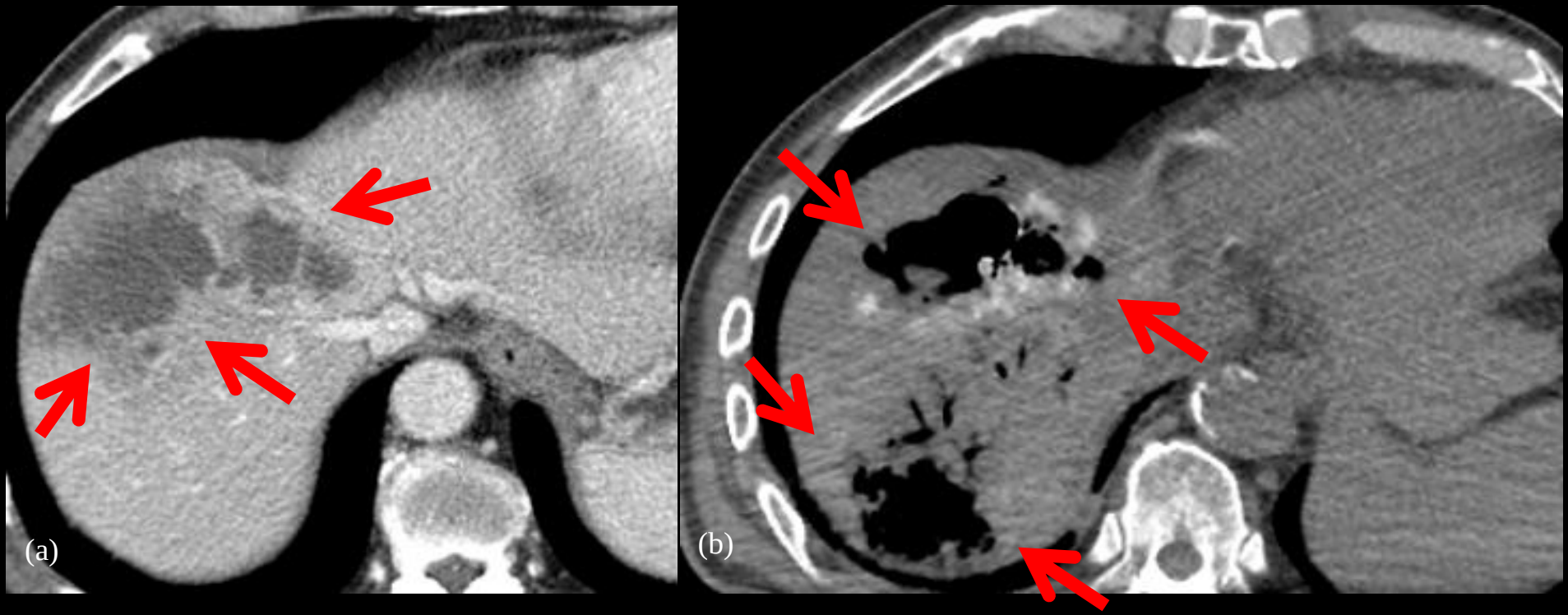
Bile duct injury after TACE in a 56-year-old man .

CT images show before (a) and after 2 months (b) TACE. Multifocal irregular bile ducts dilatations are noted (arrows).



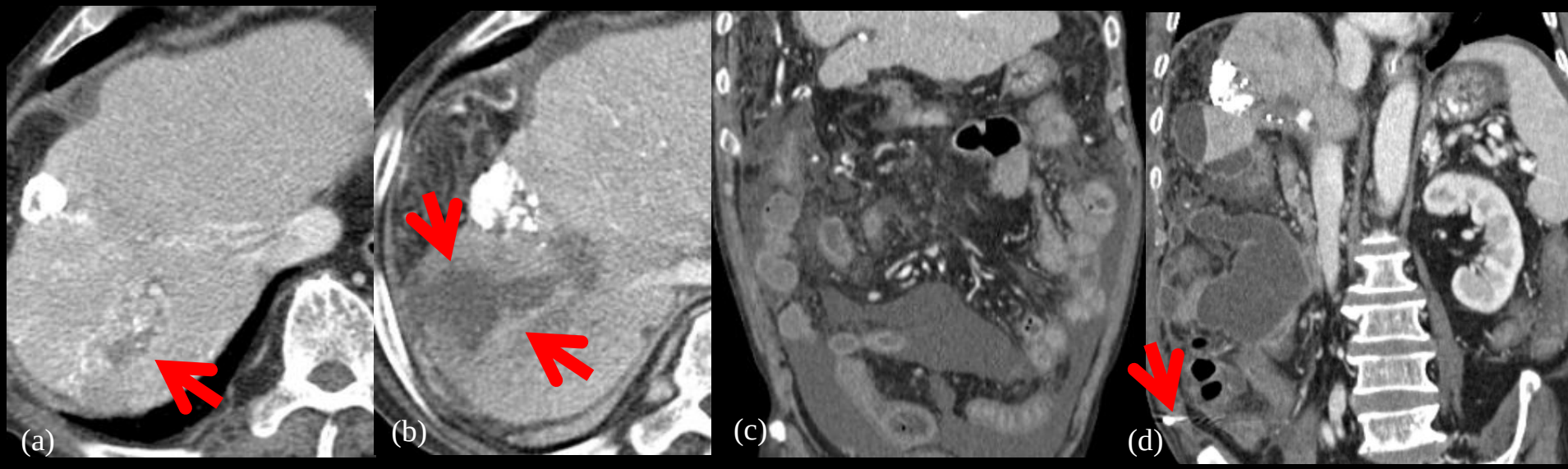
Biloma formation after TACE in a 66-year-old man .

CT image (a) shows focal biloma formation (arrow) on S3 of liver. After 7 months CT image (b) reveals biloma was spontaneously resolved.



Biloma and abscesses formations after TACE in a 63-year-old woman.

After TACE, CT image (a) shows large biloma fomration (arrows) on S8/4 of the liver. After repeat TACE, he complained fever and abdominal pain. CT image (b) reveals gas formation abscesses formation (arrows), previously biloma area and another area.



Biloma and bile peritonitis after TACE in a 80-year-old man.

After TACE, CT image (a) shows focal duct injury (arrow) on S7 of liver. After two months, he complained abdominal pain and CT image (b) reveals biloma formation (arrows) on S8 of liver and another image (c) shows large amount of ascites and mild peritoneal thickening (bile peritonitis). Drainage catheters were inserted at interaperitoneal cavity and biloma, but after 1 month, CT image reveals multifocal loculated bile fluids at right paracolic gutter and right perihepatic area. He died, because of uncontrolled infection.

Prognostic factors of bile ducts injury after TACE

- Tumor size (> 5cm)
- pre-existing biliary ductal dilatation (injuries)
- proximal chemoembolization injection
- repeat chemoembolization procedures
- noncirrhotic liver with good liver function
- additional use of gelfoam particles

Treatment of bile duct injury

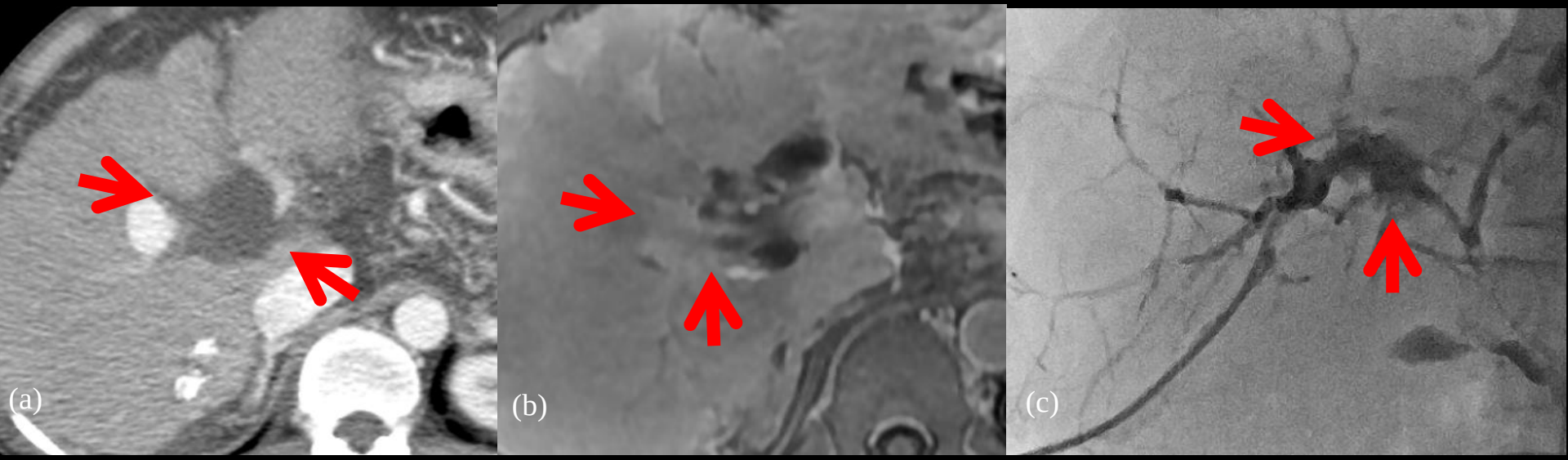
- Peripheral bile duct necrosis
  - spontaneously resolution
  - symptoms rarely occur, conservative treatment

Treatment of bile duct injury

- Biloma
  - diagnosis by enhanced CT
  - treatments vary according to the severity of the complication
    - Conservative treatment
      - no severe infection, no interval increase of biloma
    - Percutaneous drainage or segmental hepatectomy combined with antibiotics
      - moderate to severe infection, and/or increase of biloma
    - Metallic stent
      - no decrease of very large bilomas by percutaneous transhepatic drainage

Treatment of bile duct injury

- Biloma and focal stricture of large bile ducts
  - biliary stasis with cholangitis and abscess formation, sepsis, septicemia
  - Relief of bile obstruction and stasis by percutaneously drainage or surgery



Biloma with hilar area obstruction after TACE in a 42-year-old man.

After TACE, CT image (a) shows biloma formation (arrows) adjacent hilar area of liver. Because of increase of bilirubin, MRCP was performed. Biliary phase of MRCP (b) reveals that contrast material were collected at intra-cavity of biloma (arrows). PTBD performed for relief of bile obstruction and PTC (c) shows contrast material leakage (arrows) at hilar area of bile duct.

Conclusion

- There is characteristic bile duct injury patterns associated with transarterial chemoembolization and these injuries are usually clinical insignficant. Howevere bile injuries complications are sometimes problematict.Understanding the mechanisms of bile duct injuries after transarterial chemoembolization more comprehensively is helpful in diagnosis and management. This exhibition provides cases of clinically significant bile duct injuries for helping diagnosis and management.