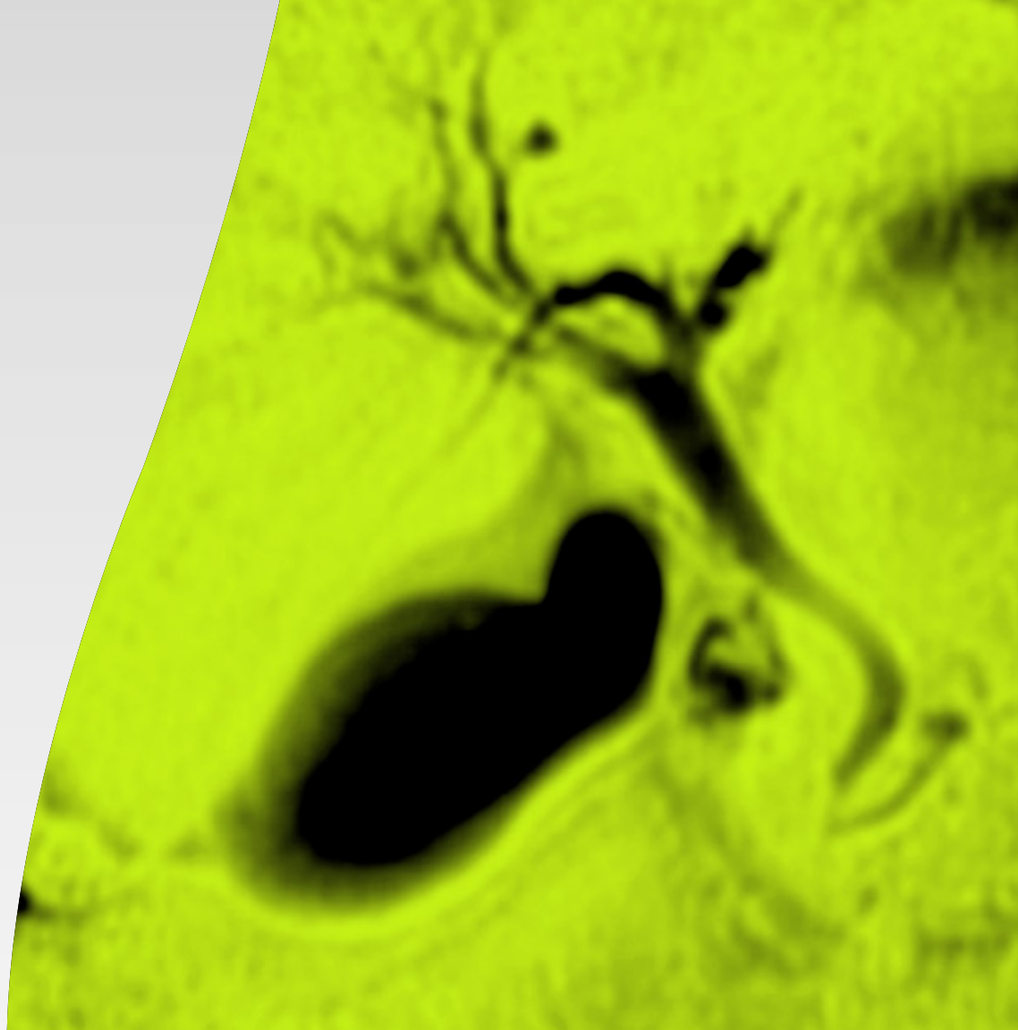
MODERN RADIOLOGY eBook

Bile Ducts

胆管



EUROPEAN SOCIETY OF RADIOLOGY

Preface

Modern Radiology is a free educational resource for radiology published online by the European Society of Radiology (ESR). The title of this second, rebranded version reflects the novel didactic concept of the ***ESR eBook*** with its unique blend of text, images, and schematics in the form of succinct pages, supplemented by clinical imaging cases, Q&A sections and hyperlinks allowing to switch quickly between the different sections of organ-based and more technical chapters, summaries and references.

Its chapters are based on the contributions of over 100 recognised European experts, referring to both general technical and organ-based clinical imaging topics. The new graphical look showing Asklepios with fashionable glasses, symbolises the combination of classical medical teaching with contemporary style education.

Although the initial version of the ***ESR eBook*** was created to provide basic knowledge for medical students and teachers of undergraduate courses, it has gradually expanded its scope to include more advanced knowledge for readers who wish to 'dig deeper'. As a result, *Modern Radiology* covers also topics of the postgraduate levels of the *European Training Curriculum for Radiology*, thus addressing postgraduate educational needs of residents. In addition, it reflects feedback from medical professionals worldwide who wish to update their knowledge in specific areas of medical imaging and who have already appreciated the depth and clarity of the ***ESR eBook*** across the basic and more advanced educational levels.

I would like to express my heartfelt thanks to all authors who contributed their time and expertise to this voluntary, non-profit endeavour as well as Carlo Catalano, Andrea Laghi and András Palkó, who had the initial idea to create an ***ESR eBook***, and - finally - to the ESR Office for their technical and administrative support.

Modern Radiology embodies a collaborative spirit and unwavering commitment to this fascinating medical discipline which is indispensable for modern patient care. I hope that this ***educational*** tool may encourage curiosity and critical thinking, contributing to the appreciation of the art and science of radiology across Europe and beyond.

Minerva Becker, Editor
Professor of Radiology, University of Geneva, Switzerland

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CHAPTER OUTLINE:

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章节大纲：

前言

*《现代放射学》*是由欧洲放射学协会 (European Society of Radiology, ESR) 在线发布的免费放射学教育资源。第二版（更名版）标题反映了 ***ESR 电子书***新颖的教学概念，它以简洁页面的形式巧妙地融合文本、图像和示意图，并辅以临床影像学案例、问答部分和内容超链接，使读者能够在各基于器官的部分、更具技术性的章节、摘要以及参考文献之间快速切换浏览。

其章节以 100 多名公认欧洲专家的优秀稿件为根基，涉及各类一般技术和基于器官的临床影像学主题。同时采用了全新的图形外观，展示了佩戴时尚眼镜的 Asklepios，象征着传统医学教学与现代风格教育的结合。

虽然初版 ***ESR 电子书***旨在为医学生和本科生教师提供医学基础知识，但现已逐渐扩充其知识领域，为希望“深入挖掘”的读者提供了更多高阶技术知识。因此，*《现代放射学》*还涵盖了***欧洲放射学培训课程***研究生水平的各类主题，旨在解决住院医师的研究生教育需求。此外，书中还囊括了全球医疗专业人士的反馈，他们希望更新自己在医学影像特定领域的知识，并对 ***ESR 电子书***在基础和高等教育水平上的深度和清晰度表示高度赞赏。

我要衷心感谢所有为这项非营利活动自愿贡献时间和专业知识的作者，以及最初提出创作 ***ESR 电子书***的 Carlo Catalano、Andrea Laghi 和 András Palkó，最后还要感谢 ESR 办公室所提供的技术和行政支持。

*《现代放射学》*充分体现了医者的协作精神和对这门热门医学学科坚定不移的承诺，这是现代患者护理必须具备的优秀精神品质。我希望这款***教育***工具能够激励各位始终保持好奇心和批判性思维，从而促进整个欧洲乃至欧洲以外地区对放射学艺术和科学的认识。

Minerva Becker，编辑
瑞士日内瓦大学放射学教授

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NOTE FROM THE COORDINATORS:
Thank you to Chinese radiology experts for bridging languages and open the world-class English resource by ESR to every Mandarin-speaking student, fueling global radiology talent with a single click

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章节大纲：

翻译致谢

本章节为《现代放射学电子书》的部分译文。

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胆管

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审定：
中华医学会放射学分会

译者寄语：
感谢中国放射学专家们的倾力奉献！你们跨越了语言的鸿沟，将欧洲放射学会 (ESR) 的世界级学术宝库呈献给广大中文学子。如今，前沿智慧一键即达，为全球放射学人才的蓬勃发展注入了强劲动力。

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<?> QUESTIONS

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>▪< 进阶知识

>|< 比较

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MODERN RADIOLOGY eBook

Based on the ESR Curriculum for Radiological Education

Bile Ducts

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CHAPTER OUTLINE:

胆管

章节大纲：

基于 ESR 课程的放射学教育

胆管

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Chapter Outline

- Anatomy
- Anatomical Variants
- Diagnostic Imaging Techniques
  - Ultrasound
  - Computed Tomography
  - Magnetic Resonance Imaging
  - Endoscopic Ultrasound
- Diseases of the Biliary Tract
  - Benign Pathology
    - Lithiasis and Complications
    - Other Diseases
  - Malignant Pathology
    - Cholangiocarcinoma
  - Congenital Abnormalities
    - Anomalous Junction of the Pancreaticobiliary Ductal System
    - Bile Duct Cysts
- Interventional Procedures
  - ERCP
  - Percutaneous Transhepatic Cholangiography
- Take-Home Messages
- References
- Test Your Knowledge

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

章节大纲

- 解剖结构
- 解剖结构变异
- 影像诊断技术
  - 超声
  - 计算机断层扫描
  - 磁共振成像
  - 内镜超声
- 胆道疾病
  - 良性病变
    - 结石症及其并发症
    - 其他疾病
  - 恶性病变
    - 胆管癌
  - 先天性异常
    - 胰胆管合流异常
    - 胆管囊肿
- 介入治疗
  - 经经内镜逆行胰胆管造影 (ERCP)
  - 经皮肝穿刺胆道造影
- 核心要点
- 参考文献
- 知识测试

Anatomy

Bile Ducts

胆管

CHAPTER OUTLINE:

章节大纲：

解剖结构

/ Anatomy

The bile ducts are divided into the **intrahepatic and extrahepatic** portions.

/ Intrahepatic Ducts

/ The intrahepatic ducts run in the **portal triads** with the portal veins and hepatic arteries.

/ Bile canaliculi unite to form segmental bile ducts that drain each liver segment. Segmental ducts combine to form sectional ducts.

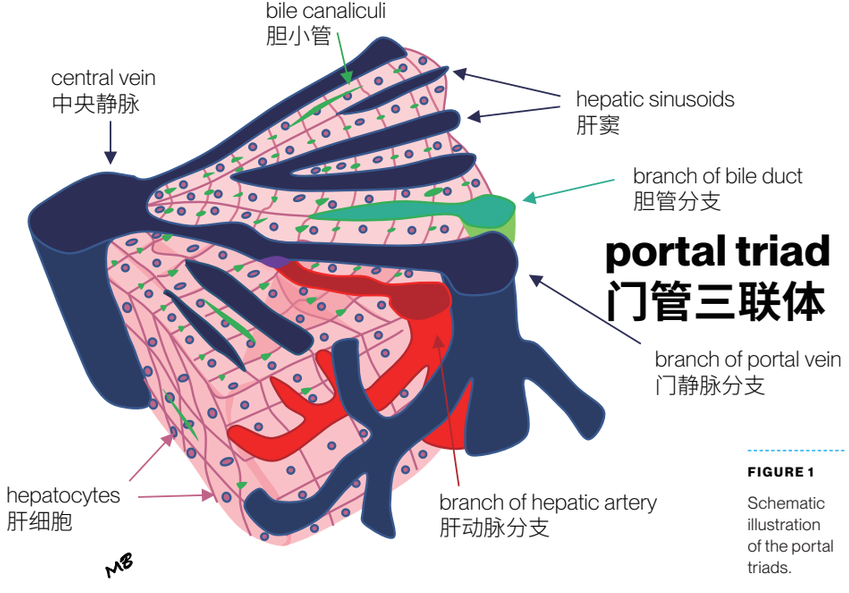


FIGURE 1

Schematic illustration of the portal triads.

/ Bile Ducts

CHAPTER OUTLINE:

/ 解剖结构

/ 胆管

章节大纲：

胆管分为**肝内和肝外**两部分。

/ 肝内胆管

/ 肝内胆管与门静脉和肝动脉共同走行于**门管三联体**内。

/ 胆小管汇合形成段胆管，负责引流每个肝段。段胆管再汇合形成叶胆管。

图 1

门管三联体示意图。

/ Intrahepatic Ducts

- Left hepatic duct – divided into several branches responsible for draining the left liver (segments II-IV)
- Right hepatic duct – formed at the junction of the right posterior and anterior sectoral ducts
  - Right posterior sectoral duct - segments 6 and 7
  - Right anterior sectoral duct - segments 5 and 8

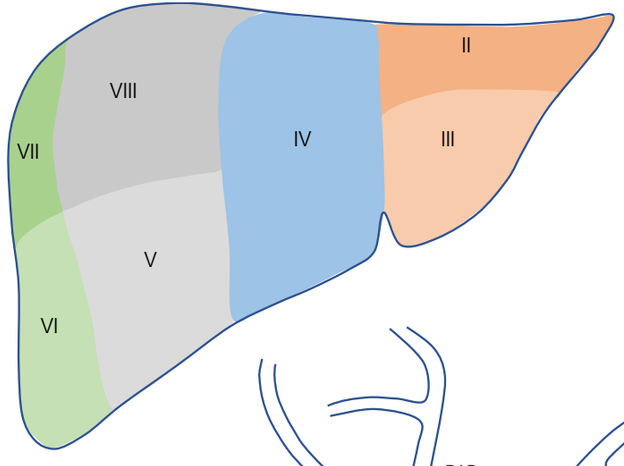


FIGURE 2

Liver segments.

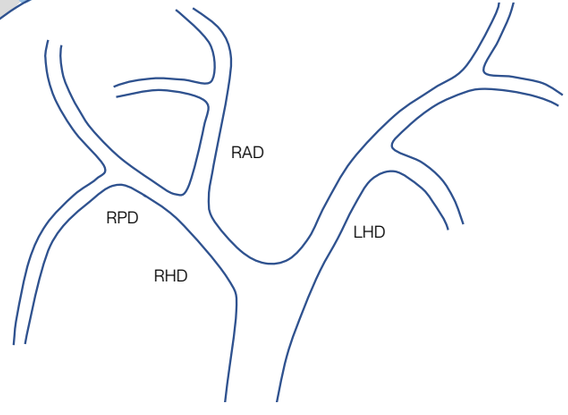


FIGURE 3

Biliary tree (branches). **RHD**, right hepatic duct; **RPD**, right posterior duct; **RAD**, right anterior duct; **LHP**, left hepatic duct.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 肝内胆管

- 左肝管 - 分成多个分支，负责引流左肝（II-IV 段）
- 右肝管 - 由右后叶胆管和右前叶胆管汇合而成
  - 右后叶胆管 - 第 6、7 段
  - 右前叶胆管 -第 5、8 段

图 2

肝脏分段。

图 3

胆道系统（分支）。**RHD**，右肝管；**RPD**，右后叶胆管；**RAD**，右前叶胆管；**LHP**，左肝管。

/ Extrahepatic Ducts

- A portion of the central right and left ducts
- **Common hepatic duct:** results from the junction of the right and left bile ducts at the liver hilum at an extrahepatic level. It corresponds to the ductal portion above the cystic duct insertion
- **Common bile duct (CBD):** the ductal segment below the cystic duct insertion
- Inferiorly, the distal common duct enters the head of the pancreas and travels along the posterior- most aspect of the pancreatic head to drain with the main pancreatic duct into the major papilla

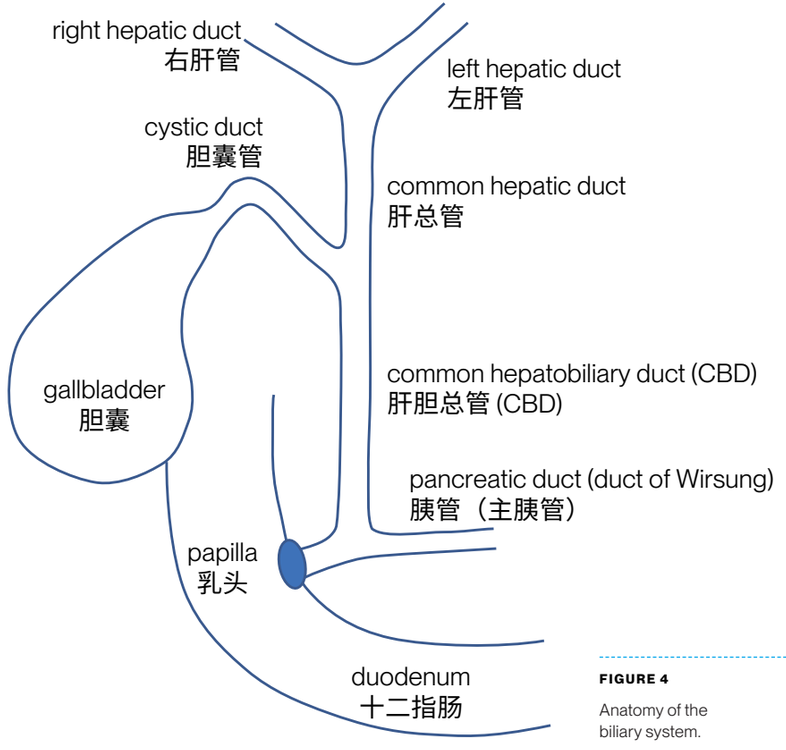


FIGURE 4

Anatomy of the biliary system.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

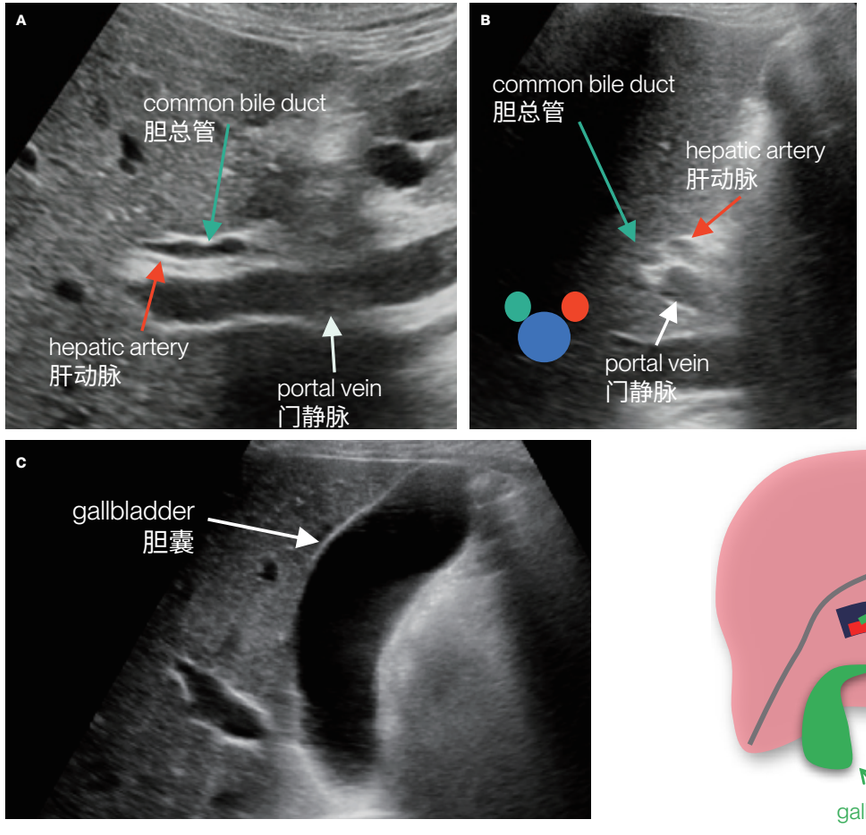
章节大纲：

/ 肝外胆管

- 中央区的部分左右肝管分支
- **肝总管：**由左右肝管在肝门处（肝外水平）汇合而成。对应于胆囊管插入点上方的导管部分
- **胆总管 (CBD)：**胆囊管汇入点以下的胆管部分。
- 远端胆总管从下方进入胰头，沿胰头最后方走行，与主胰管共同汇入十二指肠大乳头

图 4

胆道系统解剖结构。



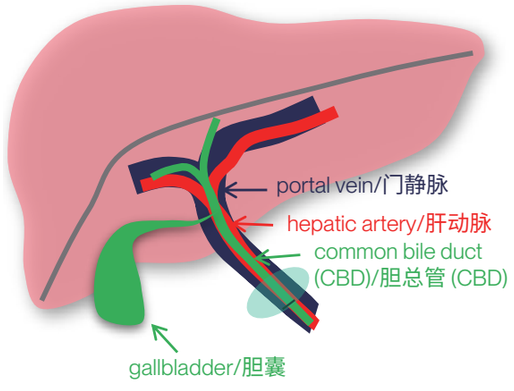


FIGURE 5

Normal anatomy of the extrahepatic ducts and gallbladder on ultrasound. Long axis (**A**) and short axis (**B**) of the portal triad. The normal width of the CBD (measured from the inner wall to inner wall) should be ≤ 4 mm for patients < 50 years with one additional mm allowed for every decade over 40. On the short axis view, the portal triad appears as three circles, referred to as the **Mickey Mouse sign**. Gallbladder imaged in long axis (**C**). The normal gallbladder wall measured at its thickest location should be < 3 mm.

Images courtesy of Gyorgi Varnay, MD, University Hospital Geneva

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

图 5

超声检查显示肝外胆管和胆囊的**正常解剖结构**。门管三联体长轴切面 (**A**) 和短轴切面 (**B**)。对于 50 岁以下的患者，CBD 的正常宽度（从内壁到内壁测量）应 ≤ 4 mm，40 岁以上的患者每增加 10 岁允许增加 1 mm。短轴切面上，门管三联体呈三个圆形，称为**米老鼠征**。胆囊长轴切面图像 (**C**)。正常胆囊壁最厚处测量值应 < 3 mm。

图像由日内瓦大学医院 Gyorgi Varnay 医学博士提供

Anatomical Variants

Bile Ducts

胆管

CHAPTER OUTLINE:

解剖结构变异

Anatomical variants of the biliary tree are common!

Normal anatomy of the biliary tree is present in only

58%

of the population.

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

胆道系统的解剖结构变异非常常见！

胆道系统的正常解剖结构仅见于

58%

的人群。

Recognition of bile duct variants are important to biliary surgery!

For example... mapping the cystic duct route can diminish the risk of complications associated to cholecystectomies, like transection of the extrahepatic bile duct.

Bile Ducts

CHAPTER OUTLINE:

Bile Ducts

章节大纲：

识别胆管结构变异对胆道手术至关重要!

例如……
明确胆囊管的走行路线可降低胆囊切除术相关并发症的风险，如肝外胆管的横断损伤。

/ Anatomical Variants of the Intrahepatic Bile Ducts

/ Right posterior duct draining into the left hepatic duct
(13-19%)

/ Right posterior duct joining with the right anterior duct by its lateral (right) aspect
(12%)

/ Triple confluence, with the right posterior, right anterior and left hepatic ducts joining at the same point to form the common hepatic duct
(11%)

/ Right posterior duct draining directly into the common hepatic or cystic duct
(6%)

/ Right anterior duct draining into the left hepatic duct
(6%)

/ 肝内胆管的解剖结构变异

/ 右后胆管汇入左肝管
(13-19%)

/ 右后胆管从其外侧（右侧）与右前胆管汇合
(12%)

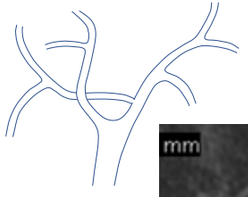
/ 三管汇合：右后肝管、右前肝管与左肝管在同一点汇合形成肝总管
(11%)

/ 右后胆管直接汇入肝总管或胆囊管
(6%)

/ 右前胆管汇入左肝管
(6%)

Illustration of the most common anatomical variants of the intrahepatic bile ducts

/ Right posterior duct draining into the left hepatic duct (most common variant)



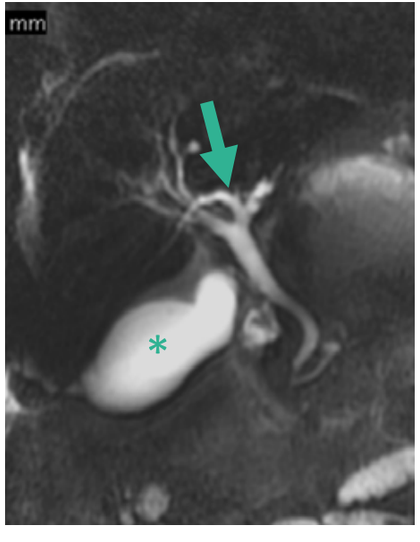


FIGURE 6

Magnetic Resonance Imaging showing right posterior duct (**arrow**) draining into the left hepatic duct (anatomical variant). Gallbladder (**asterisk**).

/ Triple confluence, with the right posterior, right anterior and left hepatic ducts joining at the same point to form the common hepatic duct

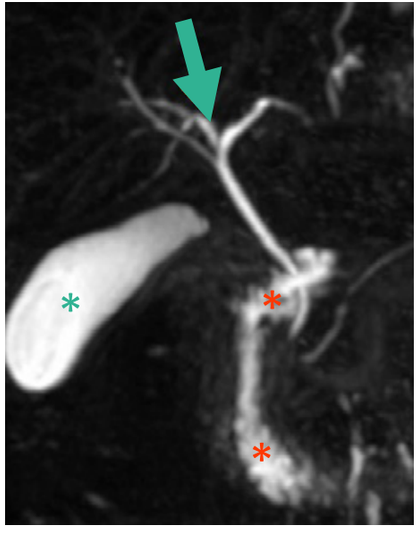


FIGURE 7

Magnetic Resonance Imaging showing triple biliary confluence (**arrow**). Gallbladder (**green asterisk**). Duodenum (**red asterisks**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

肝内胆管最常见的解剖结构变异示意图

/ 右后胆管汇入左肝管（最常见变异）

/ 三管汇合：右后肝管、右前肝管与左肝管在同一点汇合形成肝总管

图 6

磁共振成像显示右后叶胆管（箭头）汇入左肝管（解剖变异）。胆囊（星号）。

图 7

磁共振成像显示三叉状胆管汇合（箭头）。胆囊（绿色星号）。十二指肠（红色星号）。

/ Anatomical Variants of the Extrahepatic Bile Ducts

Three main variations of the cystic duct:

/ **Medial cystic duct insertion:**
joining the common hepatic duct at its medial aspect (rather than lateral side)
(15%)

/ **Low cystic duct insertion:**
into the distal-third of the common hepatic duct, near the ampulla of Vater
(10%)

/ **Parallel cystic duct course:**
courses parallel to the common hepatic duct for at least 2 cm
(10%)

CHAPTER OUTLINE:

章节大纲：

/ 肝外胆管的解剖结构变异

胆囊管的**三种主要变异**：

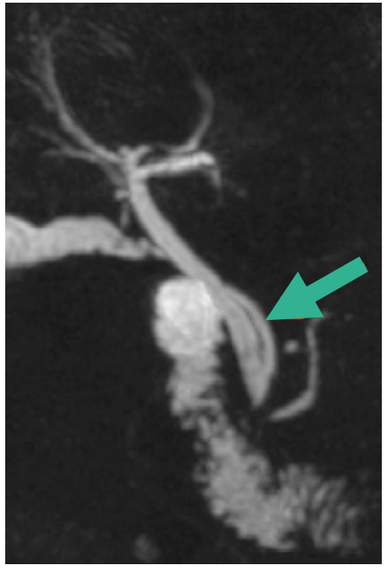
/ **胆囊管内侧汇入：**
从内侧（而非外侧）汇入肝总管
(15%)

/ **胆囊管低位汇入：**
汇入肝总管远段三分之一处，靠近 Vater 壶腹
(10%)

/ **胆囊管平行走行：**
与肝总管平行走行至少 2 cm
(10%)

Illustration of common anatomical variants of the extrahepatic bile ducts:

/ Medial cystic duct insertion:
joining the common hepatic duct at its medial aspect (rather than lateral side)
(15%)



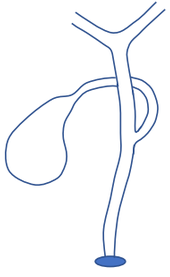
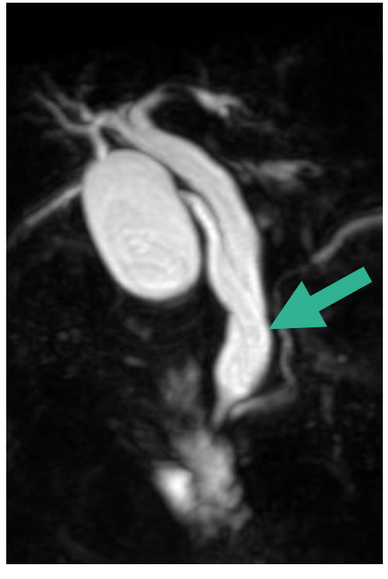


FIGURE 8

Magnetic Resonance Imaging showing the medial cystic duct insertion, passing anterior to the common hepatic duct.



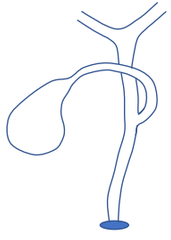


FIGURE 9

Magnetic Resonance Imaging showing the medial cystic duct insertion, passing anterior to the common hepatic duct.

/ Bile Ducts

CHAPTER OUTLINE:

肝外胆管常见解剖结构变异示意图：

/ 胆囊管内侧汇入：
从内侧（而非外侧）汇入肝总管
(15%)

图 8

磁共振成像显示胆囊管内侧汇入，走行于肝总管前方。

图 9

磁共振成像显示胆囊管内侧汇入，走行于肝总管前方。

/ 胆管

章节大纲：

Illustration of common anatomical variants of the extrahepatic bile ducts:

/ Low cystic duct insertion:
into the distal-third of the common hepatic duct, near the ampulla of Vater
(10%)

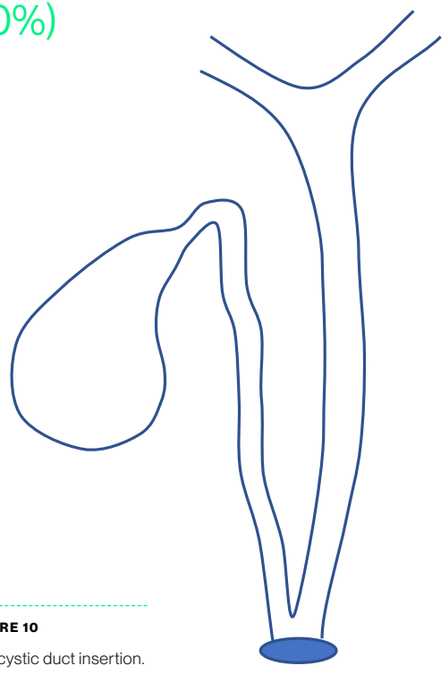


FIGURE 10
Low cystic duct insertion.

/ Parallel cystic duct course:
courses parallel to the common hepatic duct for at least 2 cm
(10%)

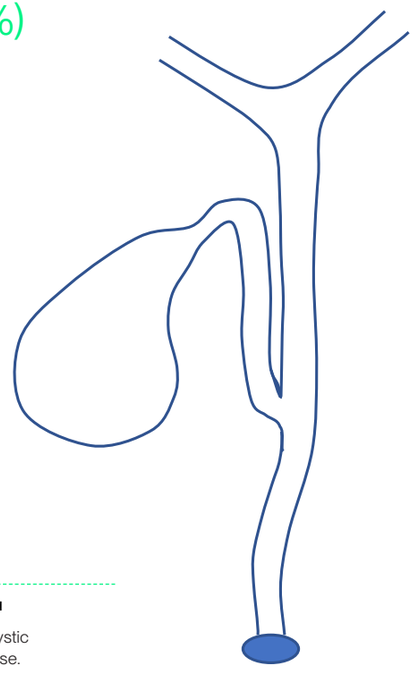


FIGURE 11
Parallel cystic duct course.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

肝外胆管常见解剖结构变异示意图：

/ 胆囊管低位汇入：
汇入肝总管远段三分之一处，靠近 Vater 壶腹
(10%)

/ 胆囊管平行走行：
与肝总管平行走行至少 2 cm
(10%)

图 10
胆囊管低位汇入。

图 11
胆囊管平行走行。

/ Anatomical variants of the gallbladder

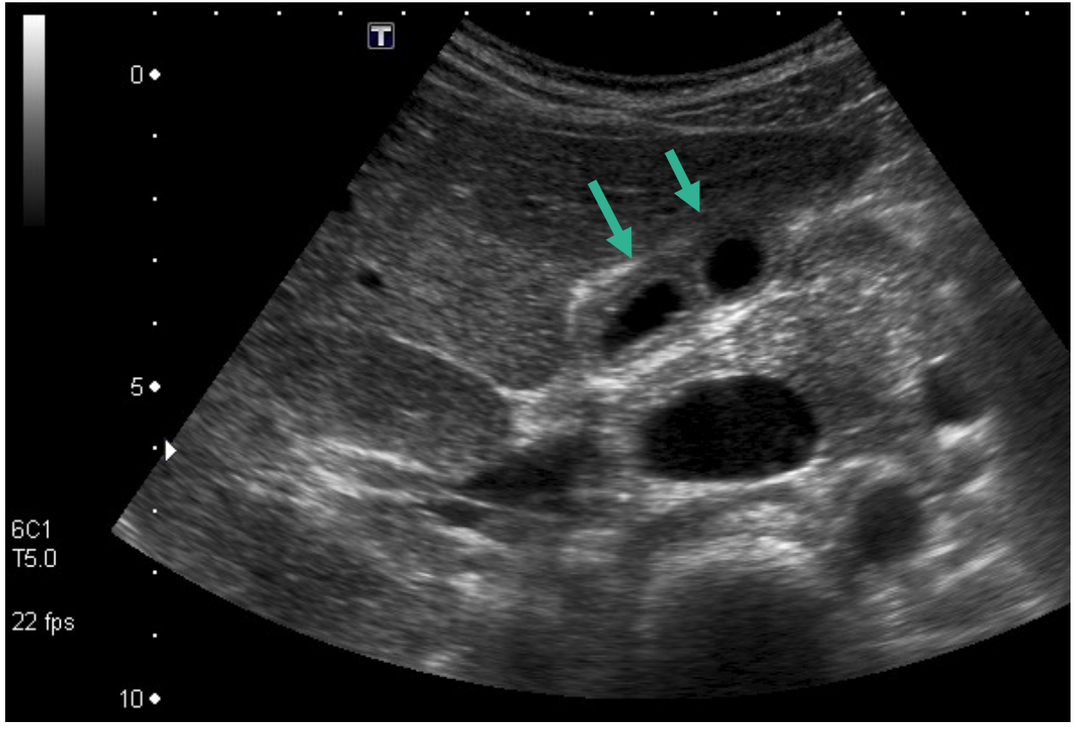


FIGURE 12

Ultrasound image showing gallbladder duplication (arrows).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 胆囊的解剖结构变异

图 12

超声图像显示胆囊重复畸形（箭头）。

Diagnostic Imaging Techniques

Bile Ducts

胆管

CHAPTER OUTLINE:

影像诊断技术

/ Strengths, Weaknesses and Role of Imaging Modalities – **Ultrasound**

Ultrasonography (US) is the primary and initial imaging modality of choice for patients presenting with **right upper quadrant pain**, especially for those with suspected diseases of the **gallbladder and the biliary tract**.

ADVANTAGES:

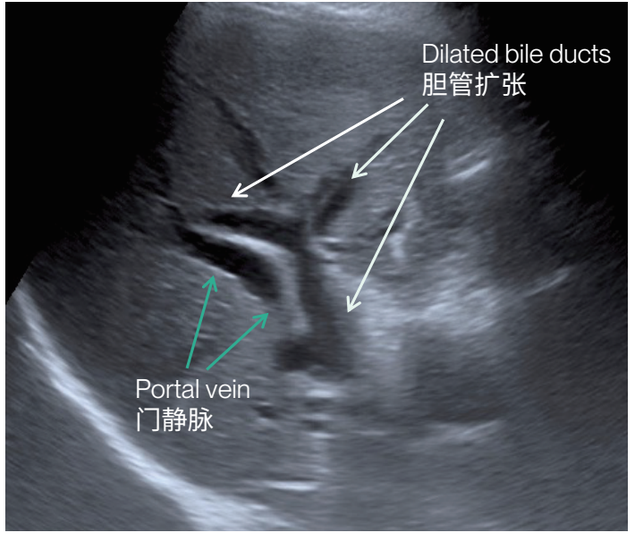
+ Low cost and availability.
+ Does not use ionising radiation.
+ High accuracy in detecting biliary dilatation.

DISADVANTAGES:

– Inconsistent visualisation of the distal common bile duct.
– Low sensitivity for determining the cause of obstruction.

FIGURE 13

US scan depicting bile duct dilatation (arrows).



<!> ATTENTION

Additional imaging may be required!

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 影像学检查方法的优势、劣势和作用——**超声**

超声检查 (US) 是出现**右上腹疼痛**患者的首选和初始影像学检查方式，尤其适用于疑似**胆囊和胆道**疾病的患者。

优点：

+ 成本低且普及率高。
+ 不使用电离辐射。
+ 检测胆管扩张的准确度高。

缺点：

– 远端胆总管显影不稳定。
– 确定梗阻原因的敏感性低。

图 13

US 扫描显示胆管扩张（箭头）。

<!> 注意

可能需要额外的影像学检查！

/ Strengths, Weaknesses and Role of Imaging Modalities – **Computed Tomography**

Computed Tomography (CT) is particularly useful when the diagnosis is **unclear** or when **alternative diagnoses** need to be excluded.

ADVANTAGES:

+ CT is sensitive for detecting biliary ductal dilatation, the level of biliary obstruction, bile duct tumours and inflammatory complications.

DISADVANTAGES:

– CT does not always visualise biliary stones (only 10-15% are radiopaque).
– Radiation exposure.
– Need to use i.v. contrast to clearly separate bile ducts from portal vein branches.

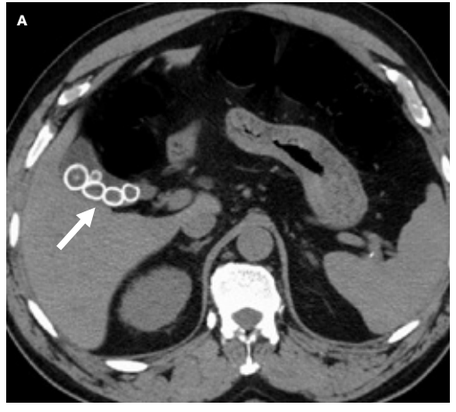


FIGURE 14

A: Non-contrast-enhanced CT showing gallstones with a low-density cholesterol centre and a dense peripheral rim of calcium (**arrow**).

B: Contrast-enhanced CT revealing dilatation of intra-hepatic bile ducts (**arrows**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 影像学检查方法的优势、劣势和作用——**计算机断层扫描**

计算机断层扫描 (CT) 在诊断**不明确**或需要排除其他鉴别诊断时特别有用。

优点：

+ CT 对检测胆管扩张、胆道梗阻水平、胆管肿瘤和炎性并发症具有敏感性。

缺点：

– 并不是所有的结石 CT 都能显示，仅有 10-15% 为阳性结石。
– 存在辐射暴露风险。
– 需要使用静脉对比剂以清晰区分胆管与门静脉分支。

图 14

A: 非增强 CT 显示胆结石，中央为低密度胆固醇，外围环绕高密度钙化（箭头）。

B: 增强 CT 显示肝内胆管扩张（箭头）。

Strengths, Weaknesses and Role of Imaging Modalities – **Magnetic Resonance Imaging (MRI)**

Magnetic Resonance Cholangiopancreatography (MRCP) is the best imaging modality to assess the biliary tract.

- **Principle:** Heavily T2-weighted MR sequences exploit the relatively high signal intensity of static fluids in the biliary tract, resulting in a very high bile-to-background contrast. Fat saturation is generally used to suppress the background fat signal allowing a better delineation of the biliary system.

ADVANTAGES:

+ Non-invasive, no contrast medium and no radiation exposure.
+ Complete depiction of intra- and extrahepatic bile ducts with surrounding structures.
+ Bile duct display and morphology similar to Endoscopic Retrograde Cholangiopancreatoography (ERCP).

DISADVANTAGES:

– Cost and availability.

95% sensitivity for the detection of biliary dilatation, strictures and intraductal stones

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

影像学检查方法的优势、劣势和作用——**磁共振成像 (MRI)**

磁共振胰胆管造影 (MRCP) 是评估胆道系统的最佳影像学检查方式。

- **原理：**重 T2 加权 MR 序列利用了胆道中静态液体相对较高的信号强度，产生极高的胆汁与背景对比度。脂肪饱和技术通常用于抑制背景脂肪信号，从而更清晰地显示胆道系统轮廓。

优点：

+ 无创、无需对比剂且无辐射暴露。
+ 完整显示肝内和肝外胆管及周围结构。
+ 胆管显示和形态类似于经内镜逆行胰胆管造影 (ERCP)。

缺点：

– 成本和普及度。

检出胆管扩张、狭窄和胆管内结石的**灵敏度达 95%**

/ **Magnetic Resonance Cholangiopancreatography (MRCP)** has a high accuracy to evaluate the bile ducts and, when combined with conventional MRI sequences, allows for detection of non-biliary disease.

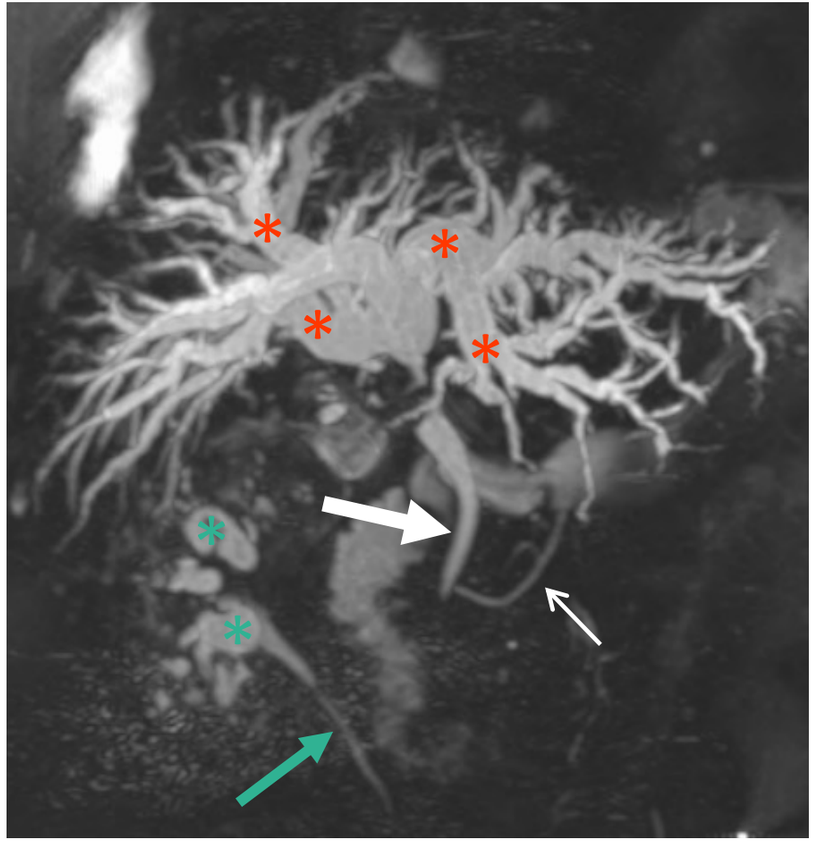


FIGURE 15

MRCP images (3D sequence) after accidental ligation of the CHD on laparoscopic cholecystectomy: dilatation of the intra and extrahepatic bile ducts (**asterisks**). Note that the normal common bile duct remains normal (**thick white arrow**). Pancreatic duct (**thin arrow**). Renal calices and pelvis (**green asterisks**). Ureter (**green arrow**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ **磁共振胰胆管造影 (MRCP)** 可以非常准确地评估胆管，而且当与常规 MRI 序列结合时，还可以检测非胆道疾病。

图 15

MRCP 影像（3D 序列）显示腹腔镜胆囊切除术中意外结扎胆总管后的肝内胆管与肝外胆管扩张（**星号**）。请注意，正常胆总管保持正常形态（**白色粗箭头**）。胰管（**细箭头**）。肾盏和肾盂（**绿色星号**）。输尿管（**绿色箭头**）。

- Hepatobiliary agents are gadolinium based intravenous MRI contrast agents which are partially excreted into bile - **50% of the administered dose is excreted by the hepatocytes.**
- **Contrast enhanced MR cholangiography** provides functional information about the excretion of bile, biliary anatomical detail and help detect bile leaks and assess the patency of biliary-enteric anastomoses.

FIGURE 16

Contrast-enhanced MR cholangiography obtained 20 min after i.v. injection of a hepatobiliary contrast agent.

<∞> REFERENCE

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

- 肝脏对比剂是基于钆的静脉注射 MRI 对比剂，部分经胆汁排泄——**给药剂量的 50% 由肝细胞排泄。**
- **增强 MR 胆管造影**可提供胆汁排泄功能信息、胆道解剖细节，并有助于检测胆漏和评估胆肠吻合口的通畅性。

图 16

静脉注射肝胆造影剂 20 分钟后的增强 MR 胆道造影。

<∞> 参考文献

/ Strengths, Weaknesses and Role of Imaging Modalities – **Endoscopic Ultrasound**

Endoscopic Ultrasound (EUS) is the standard procedure for the etiologic investigation of obstruction of the extrahepatic bile ducts. It provides detailed anatomical imaging features of the biliary tree and surrounding structures.

- It offers the possibility of performing EUS-fine needle aspiration for sampling masses, strictures or other type of bile ducts or pancreatic lesions.
- It is an invasive procedure and highly operator-dependent.

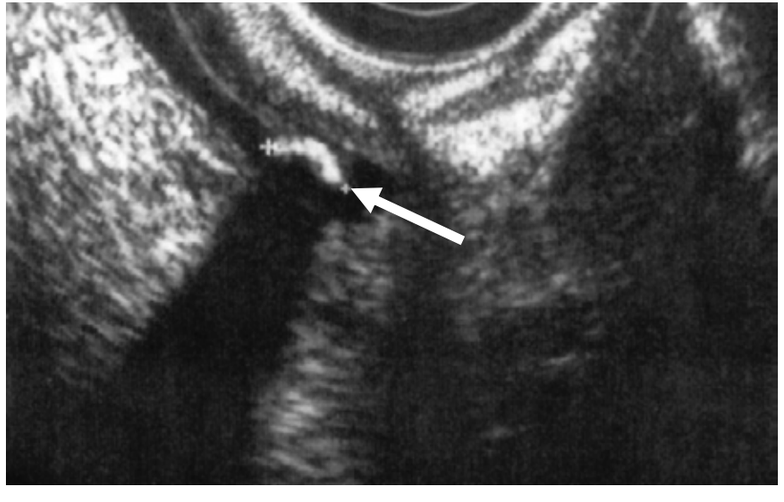


FIGURE 17

EUS image depicting an echogenic rounded focus with acoustic shadows (posterior attenuation of ultrasound waves) within the bile duct, compatible with a stone (**arrow**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 影像学检查方法的优势、劣势和作用 - **内镜超声**

内镜超声 (EUS) 是肝外胆管梗阻病因学检查的标准操作。它能提供胆道系统及周围结构的详细解剖影像特征。

- 内镜超声可进行 EUS-细针穿刺抽吸活检，对肿块、狭窄或其他类型的胆管或胰腺病变进行取样。
- 这是一种侵入性操作，且高度依赖操作者技术。

图 17

EUS 图像显示胆管内高回声圆形病灶伴声影（超声波后方衰减），符合胆管结石表现（箭头）。

Diseases of the Biliary Tract

Bile Ducts

CHAPTER OUTLINE:

胆道疾病

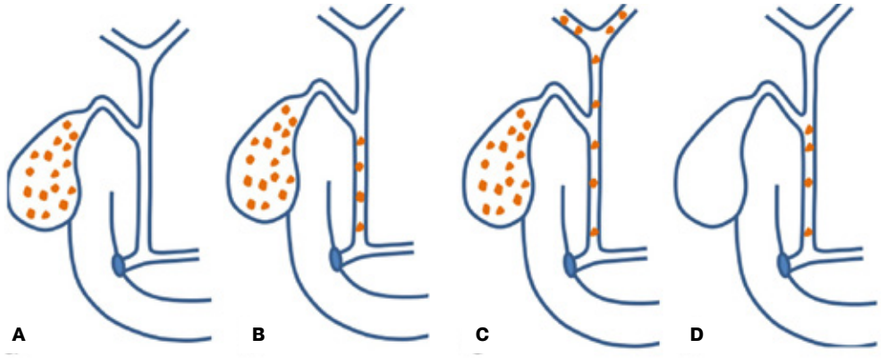
胆管

章节大纲：

/ Diseases of the Biliary Tree

/ Oversaturation and concentration of hepatic bile constituents, namely biliary acids, bilirubin and lipids (cholesterol, phospholipids), promote the formation of gallstones. About **80% of all gallstones** are cholesterol stones mixed with components of bilirubin and calcium salts.

/ Approximately **10 to 20% of the population** have gallstones.



<!> ATTENTION

Choledocholithiasis is the most common cause of biliary obstruction!

FIGURE 18

Gallbladder stones usually occur in numbers and are of various sizes (**A**), sometimes combined with common bile duct stones (**B**) and occasionally associated with intra-hepatic lithiasis (**C**). Common bile duct stones rarely occur in the absence of gallbladder stones (**D**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 胆道系统疾病

/ 肝胆汁成分（包括胆汁酸、胆红素和脂质[胆固醇、磷脂]）的过饱和与浓缩可促进胆结石形成。约 **80%** 的**胆结石**是混合胆红素与钙盐成分的胆固醇结石。

/ 约 **10%** 到 **20%** 的人患有胆结石。

<!> 注意

胆总管结石是胆道梗阻最常见的原因！

图 18

胆囊结石通常为多发且大小不一（A），有时合并胆总管结石（B），偶伴肝内胆管结石（C）。单纯胆总管结石（不伴胆囊结石）较为罕见（D）。

/ Ultrasound is usually the first method to visualise biliary stones, with a **sensitivity up to 95% for depicting stones within the gallbladder (cholecystolithiasis)**. Its **sensitivity decreases in the common bile duct (choledocholithiasis)** to approximately 50%, due to superimposed intestinal gas, especially in the absence of significant biliary dilatation.

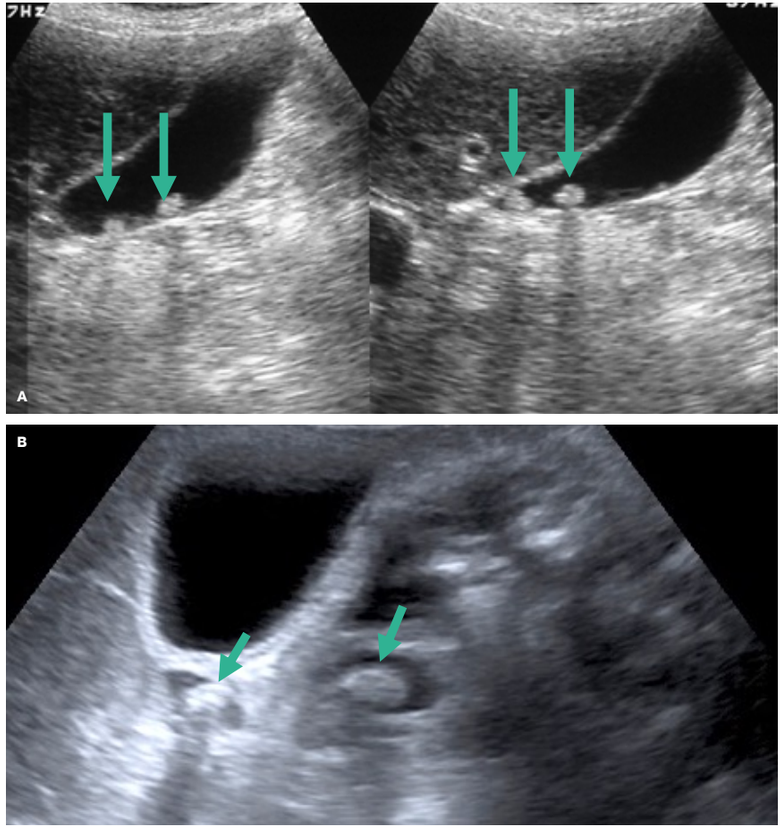


FIGURE 19

Ultrasound images showing echogenic rounded foci with acoustic shadows (posterior attenuation of ultrasound waves), compatible with lithiasis. In image **A** there are stones within the gallbladder (**arrows**) and in image **B** we can identify two stones impacted in the common bile duct (**arrows**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 超声通常是检测胆道结石的首选方法，**其显示胆囊内结石（胆囊结石）的灵敏度高达 95%**。由于肠道气体干扰（尤其在无明显胆道扩张时），**其对胆总管结石的检测灵敏度降低至**约 50%。

图 19

超声图像显示高回声圆形病灶伴声影（超声波后方衰减），符合结石表现。图像 **A** 显示胆囊内结石（箭头），图像 **B** 可见胆总管两枚嵌顿性结石（箭头）。

- **CT is only moderately sensitive to detect biliary stones** (approximately 65-88%), due to the variable content of calcium, requiring a pre-contrast acquisition.
- Depending on the composition, stones may show increased attenuation due to calcification (**easily recognised, but only corresponding to 20% of stones**), isoattenuation relative to bile because of cholesterol deposition, or hypoattenuation because of nitrogen gas.

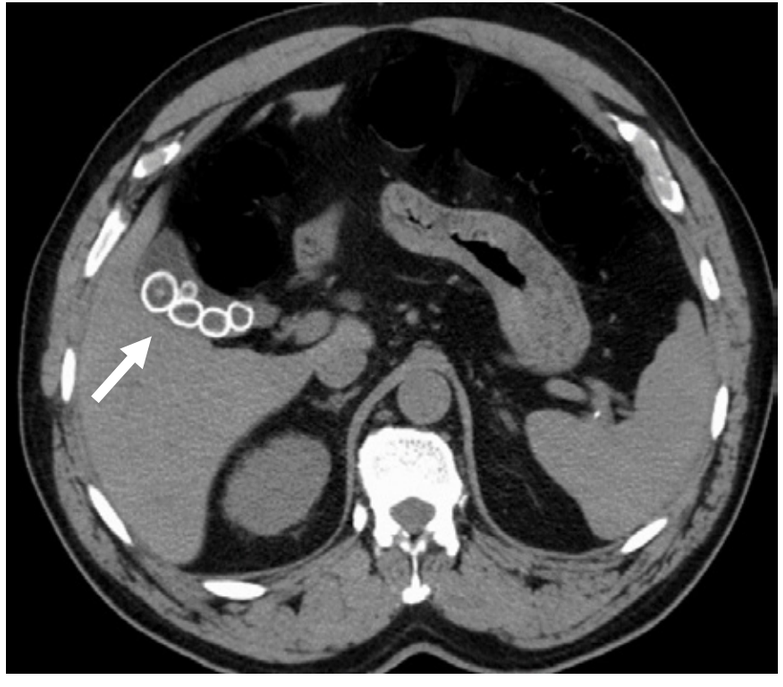


FIGURE 20

Non-contrast-enhanced CT showing gallstones with a low-density cholesterol centre and a dense peripheral rim of calcium.

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

- **CT 检测胆道结石的灵敏度仅为中等水平**（约 65%-88%），因钙含量差异需进行平扫扫描。
- 根据成分不同，结石可因钙化表现为高密度（**易于识别，但仅占结石的 20%**）、因胆固醇沉积表现为与胆汁等密度或因含氮气表现为低密度。

图 20

非增强 CT 显示胆结石中央为低密度胆固醇，外围环绕高密度钙化。

>|< COMPARE

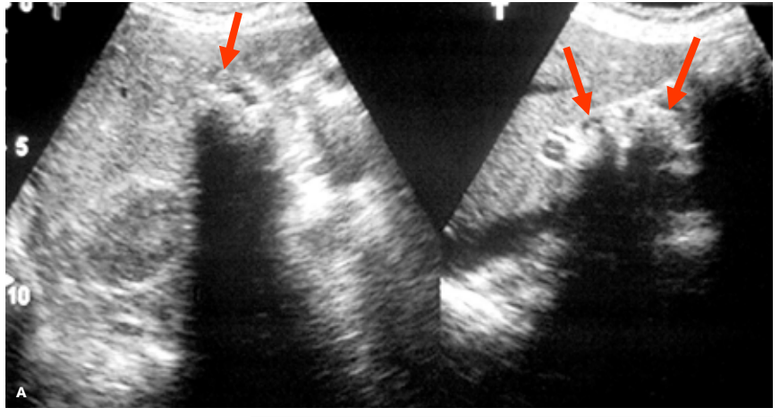


FIGURE 21

Ultrasound and CT performed in the same patient reveal the limitation of CT for the identification of stones. The US examination shows countless gallbladder stones (**arrows**), which are not identified on CT (**asterisk**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

>|< 比较

图 21

同一患者的超声与 CT 检查对比显示 CT 在结石识别中的局限性。超声检查显示胆囊内有大量结石（箭头），而 CT 检查未能显示（星号）。

/ MRCP has largely replaced ERCP as the gold standard for the diagnosis of choledocholithiasis, with similar sensitivity (90-94%) and specificity (95-99%).

/ Stones are shown as signal void on T2-weighted MRI with variable signal on T1-weighted imaging (pigmented stones are hyperintense due to the presence of metal ions).

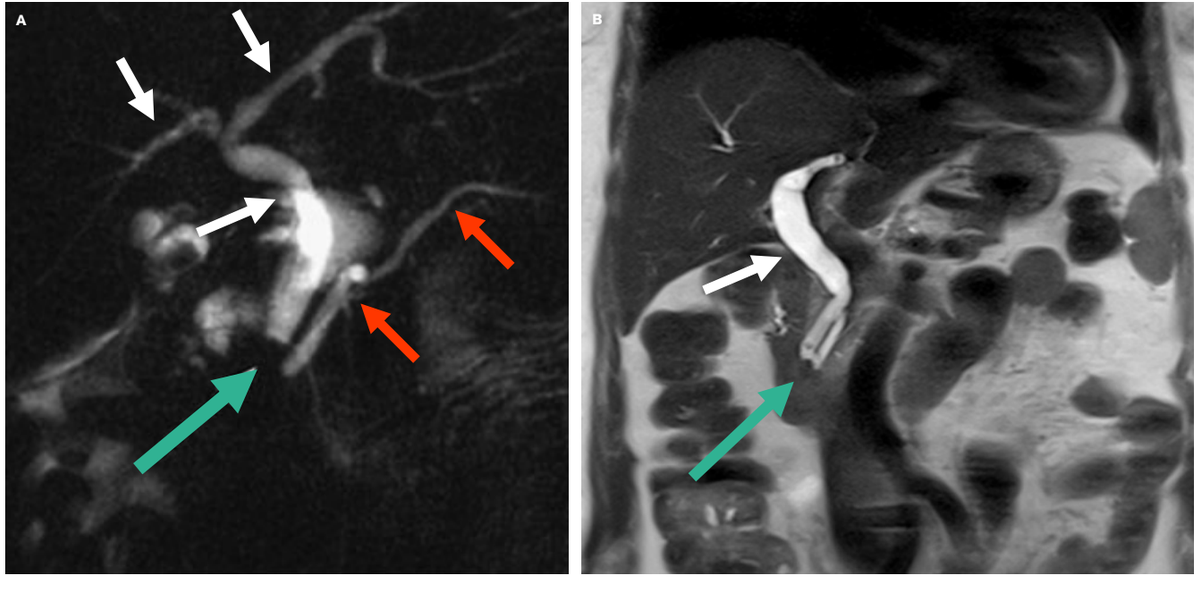


FIGURE 22

MRCP images demonstrate a stone impacted at the ampulla seen as a signal void (**green arrows**), causing dilatation of the biliary tree (**white arrows**) and Wirsung duct in A (**red arrows**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 磁共振胰胆管造影 (MRCP) 已基本取代经内镜逆行胰胆管造影 (ERCP) 成为诊断胆总管结石的金标准，两者具有相近的敏感性 (90-94%) 和特异性 (95-99%)。

/ 结石在 T2 加权 MRI 上呈信号缺失，T1 加权像信号可变（色素性结石因含金属离子呈高信号）。

图 22

MRCP 图像显示壶腹部嵌顿性结石，呈信号缺失（**绿色箭头**），胆道系统扩张（**白色箭头**）及 A 中的主胰管（Wirsung 管）扩张（**红色箭头**）。

/ Complications of Cholecysto-Choledocholithiasis

Cholecystolithiasis

- / Acute cholecystitis / perforation
- / Chronic cholecystitis/porcelain gallbladder/carcinoma
- / Biliodigestive fistula (biliary ileus; Bouveret syndrome)
- / Mirizzi's syndrome

Choledocholithiasis

- / Impacted stones/ pancreatitis
- / Cholangitis/liver abscesses

<▪> CORE KNOWLEDGE

Acute cholecystitis is an inflammation/ infection of the gallbladder, almost always due to complications of biliary stones (90-95%). The main cause is impacted infundibular/cystic stones with over-distension of the gallbladder and subsequent infection. It is the most common cause of acute pain in the right upper quadrant. In the absence of gallbladder stones, the condition is referred to as acalculous cholecystitis, that it is thought to occur due to biliary stasis and/or gallbladder ischemia in critically ill patients (e.g. trauma, burns, sepsis).

Chronic cholecystitis is a consequence of recurrent cholecystitis, almost always seen in the setting of cholelithiasis (90%). The gallbladder becomes shrunken with dystrophic calcification in the wall ("porcelain gallbladder"). It has a risk of 10 to 20% to develop carcinoma.

Acute bacterial cholangitis is a potentially life-threatening infection of bile ducts, usually arising in the setting of bile duct obstruction (choledocholithiasis accounts for up to 80% of cases). It can complicated with development of liver abscesses.

>▪< FURTHER KNOWLEDGE

Mirizzi's syndrome is an uncommon abnormality that consists of a common duct obstruction caused by a gallstone in the cystic duct or the gallbladder neck. The obstruction may be caused by the extrinsic compression of the stone or by an associated inflammatory reaction in the common bile duct. This is more likely to occur with a low-inserting cystic duct that travels in a common sheath with the common duct.

Biliodigestive fistulas may result after repeated inflammatory process associated with the chronic cholecystitis, leading the passage of gallstones into the lumen of duodenum (the most common) and consequent obstruction (gallstone ileus/Bouveret syndrome).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆囊-胆总管结石的并发症

胆囊结石

- / 急性胆囊炎/穿孔
- / 慢性胆囊炎/瓷化胆囊/癌
- / 胆肠瘘（胆石性肠梗阻；Bouveret 综合征）
- / Mirizzi 综合征

胆总管结石

- / 嵌顿性结石/胰腺炎
- / 胆管炎/肝脓肿

/ 胆管

章节大纲：

<▪> 核心知识

急性胆囊炎是一种胆囊的炎症/感染，几乎全部 (90-95%) 由胆结石并发症引起。主要原因是漏斗部/胆囊结石嵌顿导致胆囊过度扩张及继发感染。它是右上腹急性疼痛最常见的原因。若不存在胆囊结石，则称为非结石性胆囊炎，通常由于危重患者（如创伤、烧伤、败血症）的胆汁淤积和/或胆囊缺血所致。

慢性胆囊炎由胆囊炎反复发作发展而来，几乎均见于胆石症患者 (90%)。胆囊萎缩，壁内出现营养不良性钙化（"瓷化胆囊"）。其癌变风险为 10% 至 20%。

急性细菌性胆管炎是潜在危及生命的胆管感染，通常发生于胆管梗阻时（胆总管结石占病例的 80%）。可并发肝脓肿。

>▪< 进阶知识

Mirizzi 综合征是一种罕见病变，由胆囊管或胆囊颈部的结石导致胆总管梗阻。梗阻可能由结石外压或伴随的胆总管炎症反应引起。若胆囊管低位汇入并与胆总管共鞘走行，更易引发该综合征。

胆肠瘘可继发于慢性胆囊炎的反复炎症过程，导致胆结石进入十二指肠腔（最常见）并引发梗阻（胆石性肠梗阻/Bouveret 综合征）。

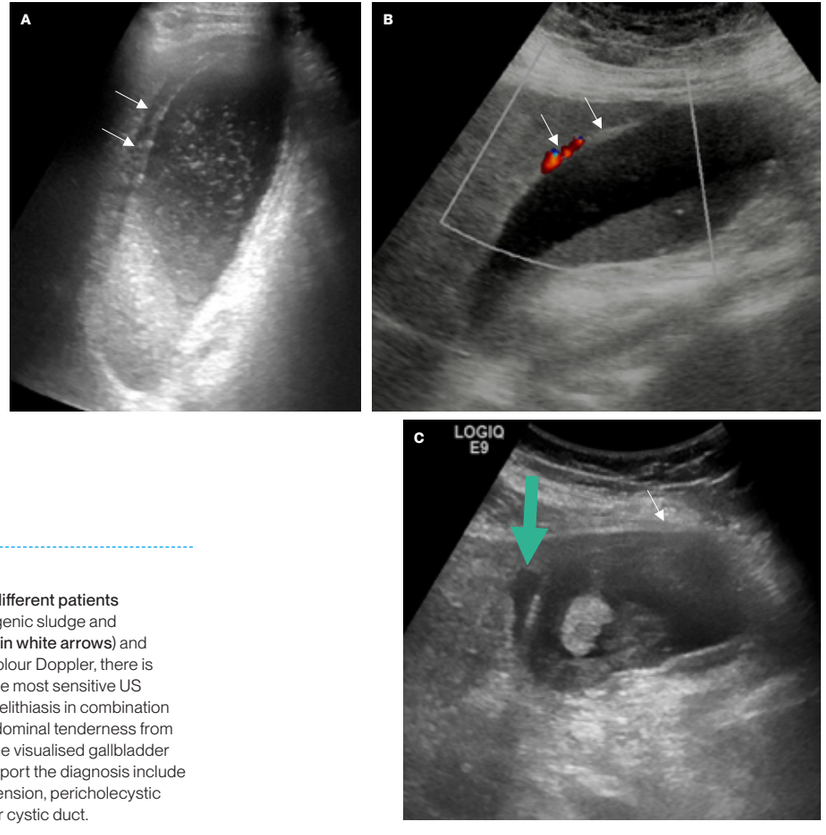


FIGURE 23

Ultrasound images – Acute cholecystitis in three different patients
Distended gallbladder (**A**, **B** and **C**) filled with echogenic sludge and gallstones, associated with thickening of the wall (**thin white arrows**) and pericholecystic collection (**green arrow** in **C**). On colour Doppler, there is increased vascularisation of the gallbladder wall. The most sensitive US finding in acute cholecystitis is the presence of cholelithiasis in combination with the **sonographic Murphy sign** (= maximum abdominal tenderness from applying pressure with the ultrasound probe over the visualised gallbladder during US). The other sonographic findings that support the diagnosis include gallbladder wall thickening (>4mm), gallbladder distension, pericholecystic fluid and a stone impacted in the gallbladder neck or cystic duct.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

图 23

超声图像——三位不同患者的急性胆囊炎表现胆囊扩张（A、B 和 C），充满强回声胆泥和胆结石，伴胆囊壁增厚（白色细箭头）和胆囊周围积液（C 中绿色箭头）。彩色多普勒显示胆囊壁血管增多。急性胆囊炎最敏感的超声表现是胆石症合并超声墨菲征（即超声检查时，超声探头压迫可见的胆囊时引起剧烈的腹部压痛）。支持诊断的其他超声表现包括胆囊壁增厚 (> 4 mm)、胆囊扩张、胆囊周围积液、胆囊颈或胆囊管嵌顿性结石。

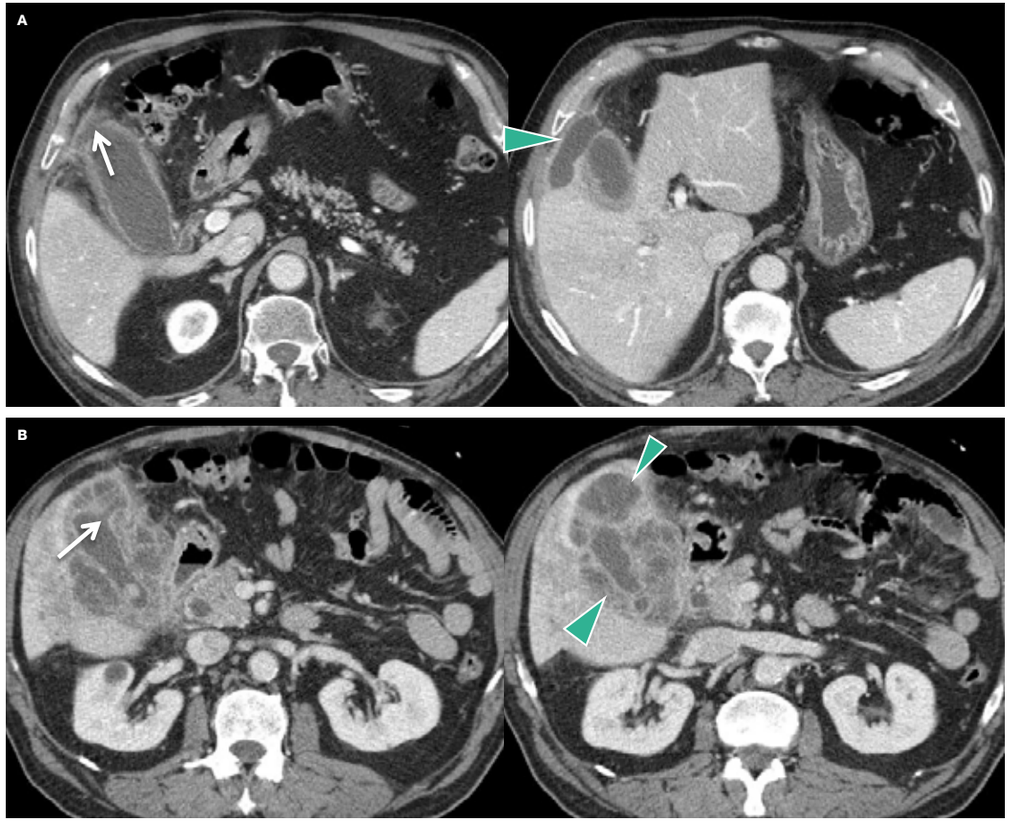


FIGURE 24

Contrast-enhanced CT scan showing **gallbladder perforation** in two different patients (**A** and **B**) of acute cholecystitis complicated with wall perforation, with illustration of the focal wall defect (**arrows**) and pericholecystic abscesses (**arrowheads**).

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

图 24

增强 CT 扫描显示两例急性胆囊炎并胆囊壁穿孔患者（A 和 B），图示胆囊壁局部缺损（箭头）和胆囊周围脓肿（箭头端）。

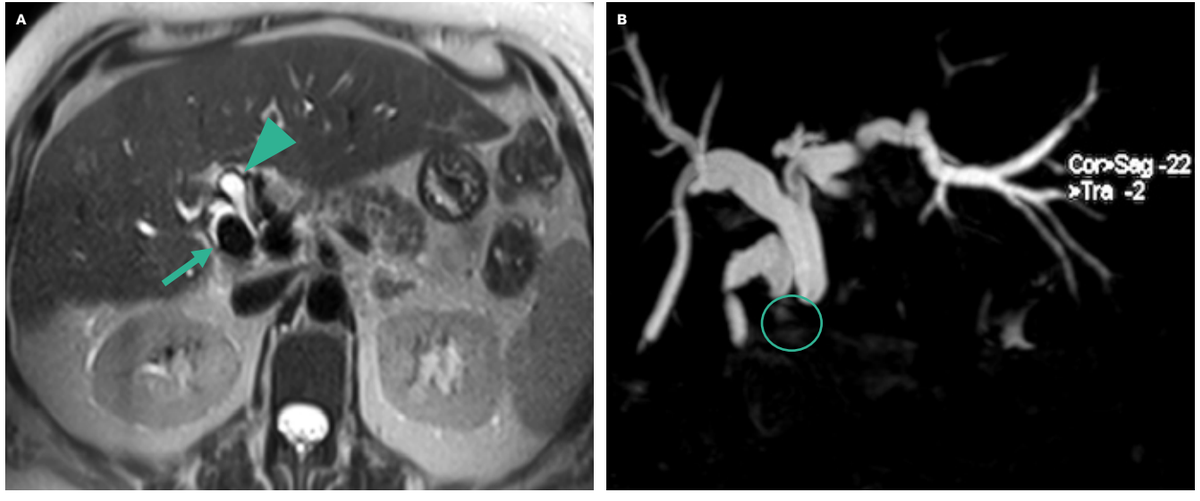


FIGURE 25

MRCP images - Mirizzi's Syndrome
A. There is a stone impacted in the cystic duct (**arrow**), causing extrinsic compression in the common bile duct (**arrowhead**) and subsequent dilatation of the biliary tree (image **B**). In image **B**, the stone corresponds to the circle drawn where there is an abrupt stenosis of cystic duct and common bile duct.

/ Bile Ducts

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/ 胆管

章节大纲：

图 25

MRCP 图像 - Mirizzi 综合征
A. 胆囊管内见嵌顿结石（箭头），导致胆总管外压性狭窄（箭头端），继而引发胆道系统扩张（图像 **B**）。在图像 **B** 中，结石对应图中圆圈标记处，可见胆囊管与胆总管在此处呈突然狭窄。

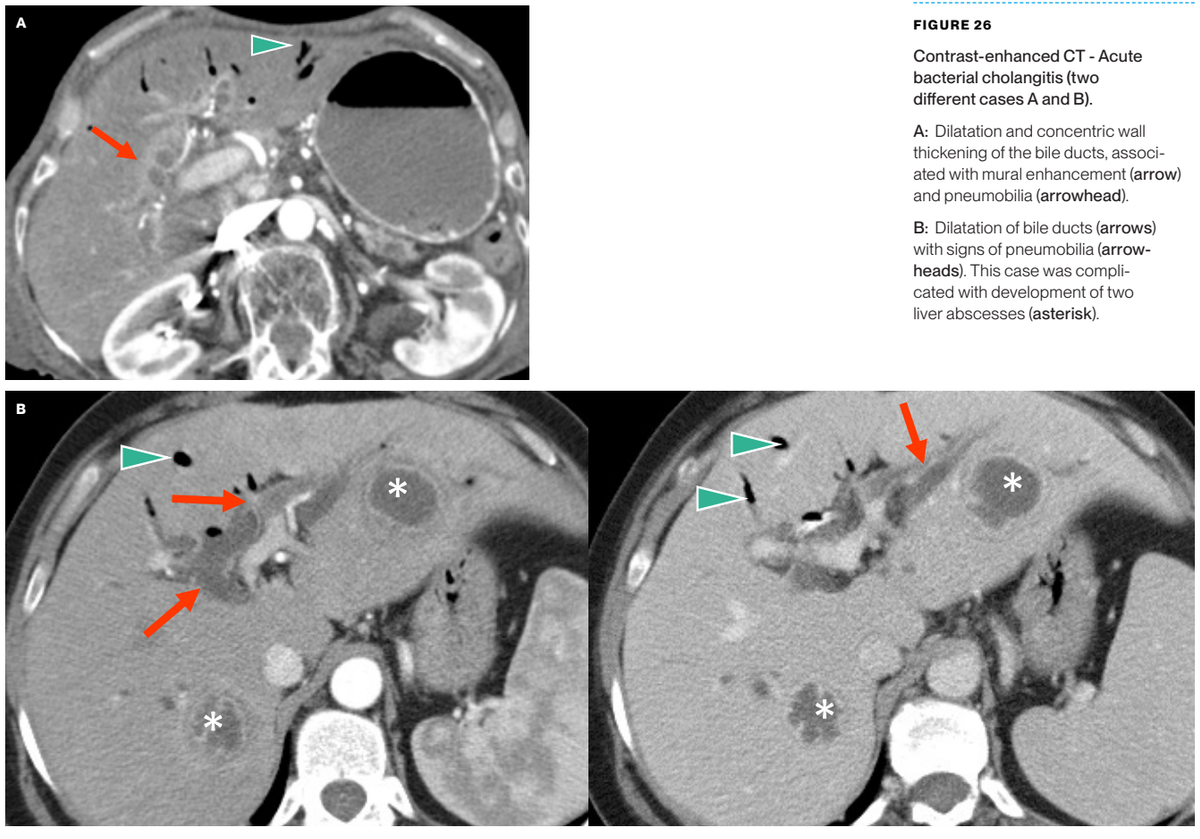

FIGURE 26

Contrast-enhanced CT - Acute bacterial cholangitis (two different cases A and B).

A: Dilatation and concentric wall thickening of the bile ducts, associated with mural enhancement (**arrow**) and pneumobilia (**arrowhead**).

B: Dilatation of bile ducts (**arrows**) with signs of pneumobilia (**arrowheads**). This case was complicated with development of two liver abscesses (**asterisk**).

/ Bile Ducts

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/ 胆管

章节大纲：

图 26

增强 CT - 急性细菌性胆管炎（两例不同病例 A 和 B）。

A：胆管扩张伴管壁同心圆样增厚，合并管壁强化（箭头）及胆管积气（箭头端）。

B：胆管扩张（箭头）伴胆管积气征象（箭头端）。该病例并发两处肝脓肿（星号）。

Emphysematous cholecystitis is a rare form of acute cholecystitis, characterised by ischemia/gangrene of the gallbladder wall and infection by gas-producing bacteria. Diabetes mellitus is considered the commonest predisposing factor. This condition has a significantly increased rate of mortality and it is considered a surgical emergency.

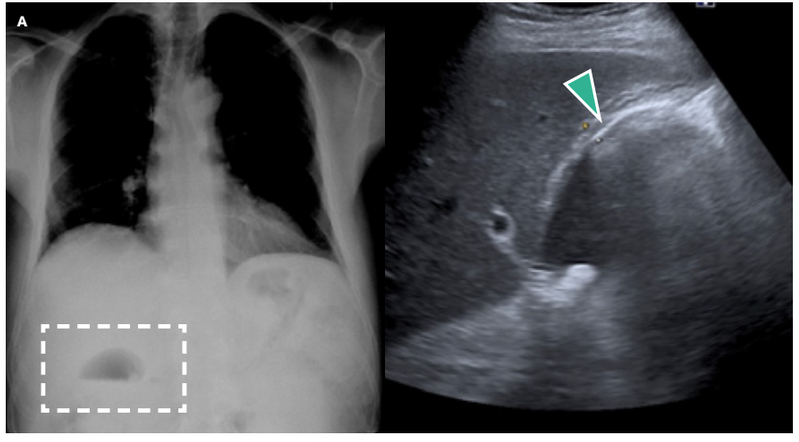

FIGURE 27

Emphysematous cholecystitis.

In image A, the conventional radiography shows gas in the right hypochondrium (**square**), compatible with air in the gallbladder. On ultrasonography, the air corresponds to highly echogenic material with dirty shadowing artefact (**arrowhead**).

In image B, computed tomography shows signs of cholecystitis (gallbladder distention, wall thickening, pericholecystic fat stranding) with presence of gas in the wall and lumen (**arrowheads**).

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

气肿性胆囊炎是一种罕见的急性胆囊炎，特征为胆囊壁缺血/坏疽和产气菌感染。糖尿病是其最常见诱因。该病死亡率显著增高，属于外科急症。

图 27

气肿性胆囊炎。

图像 A 中，常规 X 线摄影显示右季肋部气体（**方形框**），符合胆囊内积气表现。超声检查中，气体表现为高回声物质伴杂乱的声影伪影（**箭头端**）。

图像 B 中，CT 显示胆囊炎征象（胆囊扩张、壁增厚、胆囊周围脂肪间隙模糊），并见胆囊壁及腔内积气（**箭头端**）。

Primary sclerosing cholangitis is a specific type of cholangitis, corresponding to a progressive cholestatic disease characterised by inflammation and fibrosis of the bile ducts. It is commonly associated with inflammatory bowel disease (especially ulcerative colitis). Approximately 15% of patients with primary sclerosing cholangitis develop cholangiocarcinoma.

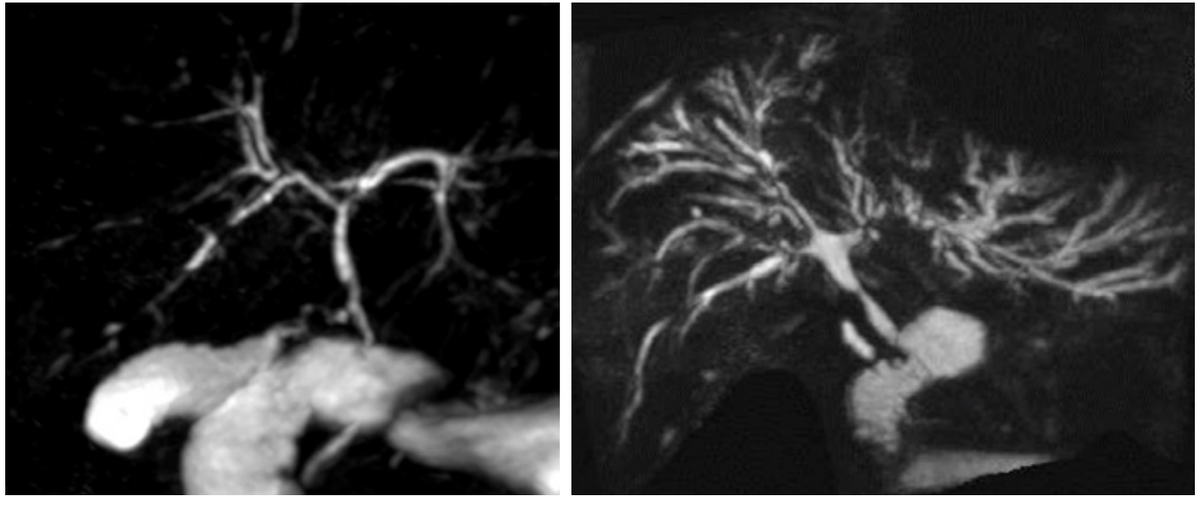

FIGURE 28

MRCP images – Primary sclerosing cholangitis. Two cases with the typical multifocal short-segmental strictures (intra- and extrahepatic). There is mild dilatation of the intrahepatic bile ducts alternating with normal ducts, sometimes producing the well known "beaded" appearance.

/ Bile Ducts

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/ 胆管

章节大纲：

原发性硬化性胆管炎是一种特殊类型的胆管炎，表现为以胆管炎症和纤维化为特征的进行性胆汁淤积性疾病。该病通常与炎症性肠病（特别是溃疡性结肠炎）相关。约 15% 的原发性硬化性胆管炎患者会发展为胆管癌。

图 28

MRCP 图像——原发性硬化性胆管炎。两例可见多发短节段性狭窄（肝内及肝外胆管）的典型病例。肝内胆管轻度扩张与正常胆管交替分布，形成典型的“串珠”样改变。

IgG4-related sclerosing cholangitis (ISC) is a rare chronic inflammatory disease of the biliary system that occurs in the context of a systemic disorder (IgG4-related disease) that can affect multiple organs. Autoimmune pancreatitis is seen in more than 90% of patients with ISC. ISC is frequently associated with stenosis and upstream dilatation of the bile ducts. The most commonly involved segment is the intrapancreatic bile duct segment.

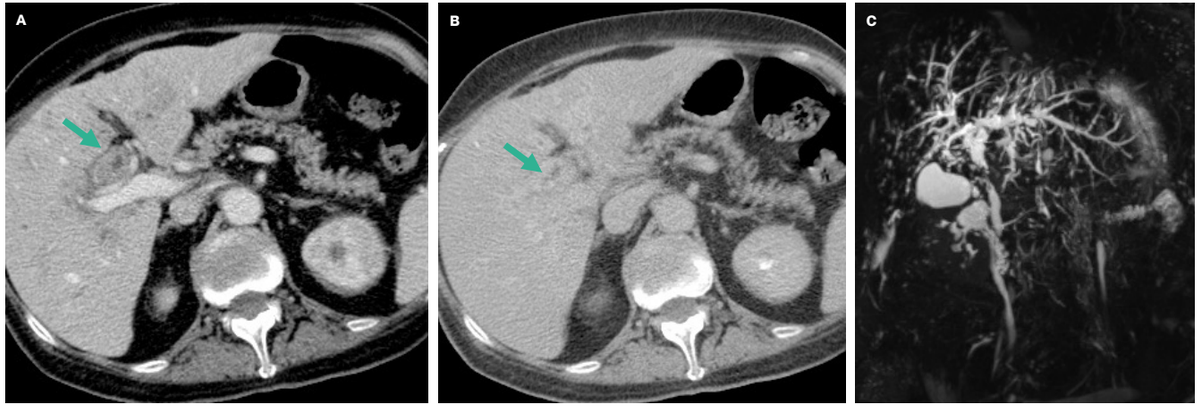

FIGURE 29

Contrast-enhanced CT (A, portal phase; B, delayed phase), MRCP (C) - ISC
Marked circumferential symmetric wall thickening of the bile ducts, with smooth outer and inner margins and progressive homogeneous contrast enhancement, most evident in the delayed phase, as seen in images **A** and **B** (**arrows**). In image **C**, we can see typical dilatation of the intrahepatic and extrahepatic biliary tree with many areas of stenosis of variable length.

Bile Ducts

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章节大纲：

IgG4 相关性硬化性胆管炎 (ISC) 是一种罕见的胆道系统慢性炎症性疾病，属于可累及多个器官的全身性疾病（IgG4 相关性疾病）的局部表现。90% 以上 ISC 患者合并自身免疫性胰腺炎。ISC 常伴有胆管狭窄和上游胆管扩张。最常累及胰内段胆管。

图 29

增强 CT（A，门静脉期；B，延迟期）与 MRCP (C) - ISC 胆管壁显著环形对称性增厚，内外缘光滑，可见渐进性均匀强化，延迟期强化最明显，如图像 A 和 B（箭头所示）。图像 C 中可见肝内、外胆管典型扩张，伴多发长度不等的狭窄段。

<▪> CORE KNOWLEDGE

Gallbladder carcinoma is a relatively rare malignant tumour and affects predominantly elderly women with long-standing cholecystolithiasis. On imaging, it is seen as a focal intraluminal mass, focal or diffuse irregular wall thickening or a large mass replacing the entire gallbladder, which contains gallstones in 90% of the cases. Differentiating between gallbladder carcinoma and chronic cholecystitis may be difficult in the absence of invasion of adjacent organs (especially liver) or other signs of metastatic disease.

Cholangiocarcinoma is a primary malignant tumour (adenocarcinoma) originating from the bile duct epithelium. There may be a slight male predilection (men older than 65 years are most commonly affected). Predisposing conditions include choledochal cyst, Caroli disease, recurrent pyogenic cholangitis, primary sclerosing cholangitis and viral infections (e.g. hepatitis B).

>▪< FURTHER KNOWLEDGE

Growth patterns of cholangiocarcinoma include mass-forming, periductal infiltrating, and intraductal polypoid:

- Mass-forming type presents as an intra-hepatic mass.
- The periductal infiltrating type presents as duct wall thickening, occurring most commonly at the bifurcation of the common hepatic duct, being referred to as **Klatskin tumour**.
- The intraductal polypoid is characterised by alterations in duct calibre, usually duct ectasia with or without a visible polypoid mass.

Bile Ducts

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胆管

章节大纲：

<▪> 核心知识

胆囊癌是一种相对罕见的恶性肿瘤，好发于长期患有胆囊结石的老年女性患者。影像学表现为局灶性腔内肿块、局灶性或弥漫性不规则壁增厚或取代整个胆囊结构的巨大肿块，90% 的病例合并胆囊结石。若未侵犯邻近器官（尤其是肝脏）或无其他转移征象，胆囊癌与慢性胆囊炎的鉴别可能存在困难。

胆管癌是一种起源于胆管上皮的原发性恶性肿瘤（腺癌）。该病可能略好发于男性，最常见于 65 岁以上男性。易感因素包括胆总管囊肿、Caroli 病、复发性化脓性胆管炎、原发性硬化性胆管炎和病毒感染（如乙型肝炎）。

>▪< 进阶知识

胆管癌的生长模式包括肿块型、管周浸润型和管内息肉型：

- 肿块型表现为肝内肿块。
- 管周浸润型表现为胆管壁增厚，最常见于肝总管分叉处，称为 **Klatskin 瘤**。
- 管内息肉型的特征是胆管径改变，通常伴有胆管扩张（伴或不伴可见的息肉样肿块）。

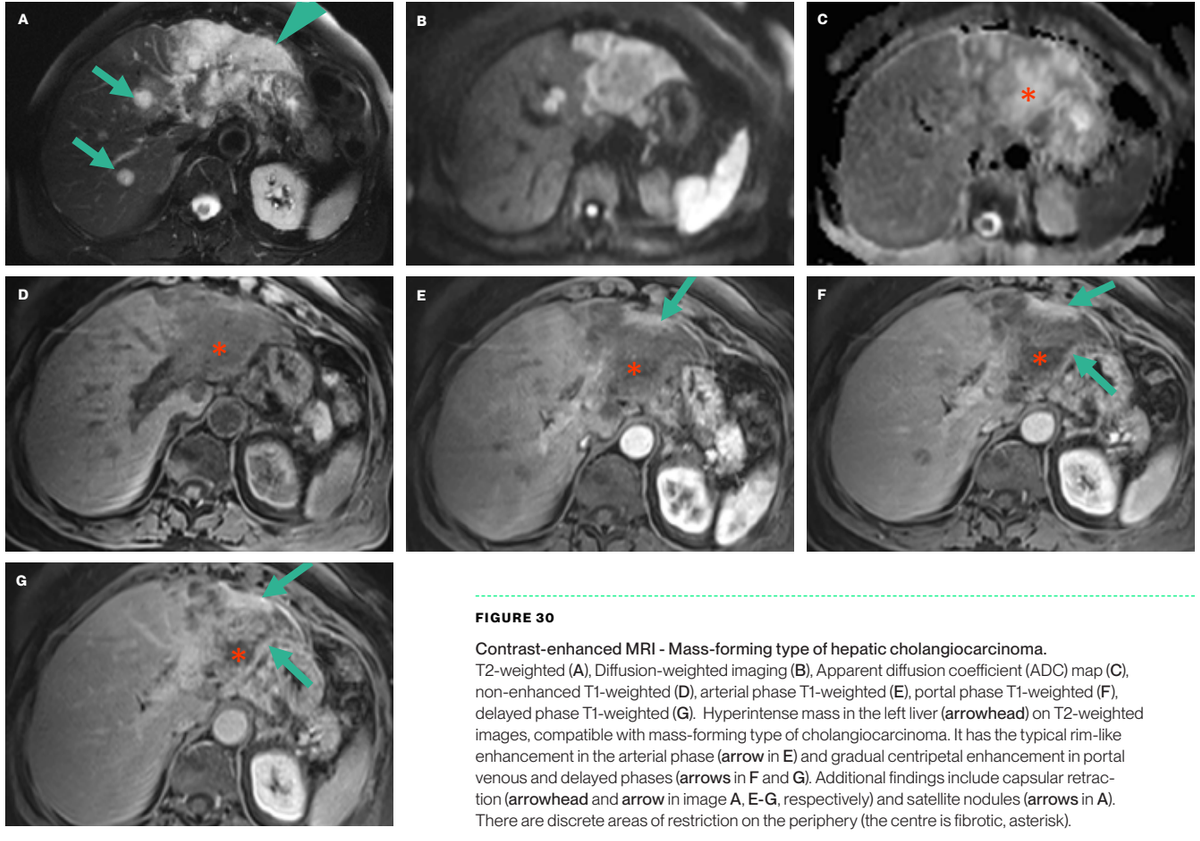

FIGURE 30

Contrast-enhanced MRI - Mass-forming type of hepatic cholangiocarcinoma.
T2-weighted (**A**), Diffusion-weighted imaging (**B**), Apparent diffusion coefficient (ADC) map (**C**), non-enhanced T1-weighted (**D**), arterial phase T1-weighted (**E**), portal phase T1-weighted (**F**), delayed phase T1-weighted (**G**). Hyperintense mass in the left liver (**arrowhead**) on T2-weighted images, compatible with mass-forming type of cholangiocarcinoma. It has the typical rim-like enhancement in the arterial phase (**arrow** in **E**) and gradual centripetal enhancement in portal venous and delayed phases (**arrows** in **F** and **G**). Additional findings include capsular retraction (**arrowhead** and **arrow** in image **A**, **E-G**, respectively) and satellite nodules (**arrows** in **A**). There are discrete areas of restriction on the periphery (the centre is fibrotic, asterisk).

/ Bile Ducts

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/ 胆管

章节大纲：

图 30

增强 MRI - 肿块型肝内胆管癌。
T2 加权像 (**A**)，扩散加权像 (**B**)，表观扩散系数 (ADC) 图 (**C**)、非增强 T1 加权像 (**D**)、动脉期 T1 加权像 (**E**)、门静脉期 T1 加权像 (**F**) 和延迟期 T1 加权像 (**G**)。T2 加权像显示肝左叶高信号肿块（箭头端），符合肿块型胆管癌表现。其在动脉期呈典型的环形强化（**E** 图箭头），在门静脉期和延迟期呈渐进性向心性强化（**F** 和 **G** 图箭头）。其他征象包括包膜回缩（分别为 **A**、**E-G** 图箭头端和箭头）和卫星结节（**A** 图箭头）。周边见局限性弥散受限区域（中心纤维化区域，星号）。

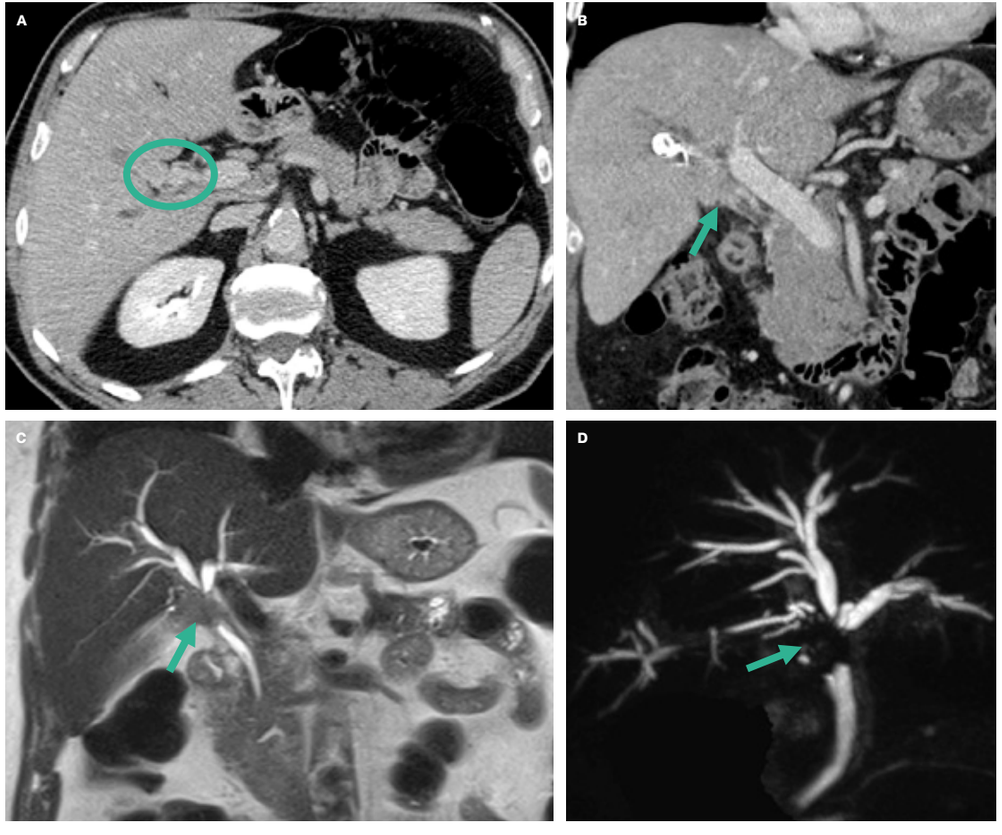

FIGURE 31

Contrast-enhanced CT, MRCP – Periductal Infiltrating type of Cholangiocarcinoma (Klatskin tumour). There is bile duct wall thickening with contrast enhancement (**circle** in **A**, arrow in **B**), compatible with Klatskin tumour, causing dilatation of intra-hepatic biliary ducts. The tumour (**arrows**) invades only the confluence of the right and left hepatic ducts (**C**, **D**) and hence is a type II (Bismuth Corlette classification). The Bismuth-Corlette classification is used to determine the extent of ductal infiltration and assess resectability. It is also important to evaluate the involvement of the portal vein and hepatic artery.

/ Bile Ducts

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/ 胆管

章节大纲：

图 31

增强 CT 及 MRCP 显示胆管周围浸润型胆管癌（Klatskin 瘤）。可见胆管壁增厚伴强化（**A** 图圆圈，**B** 图箭头），符合 Klatskin 肿瘤表现，导致肝内胆管扩张。肿瘤（箭头）仅侵犯左右肝管汇合部（**C**、**D**），属于 II 型（Bismuth Corlette 分型）。Bismuth-Corlette 分型用于确定胆管浸润范围及评估肿瘤可切除性。同时需评估门静脉及肝动脉受累情况。

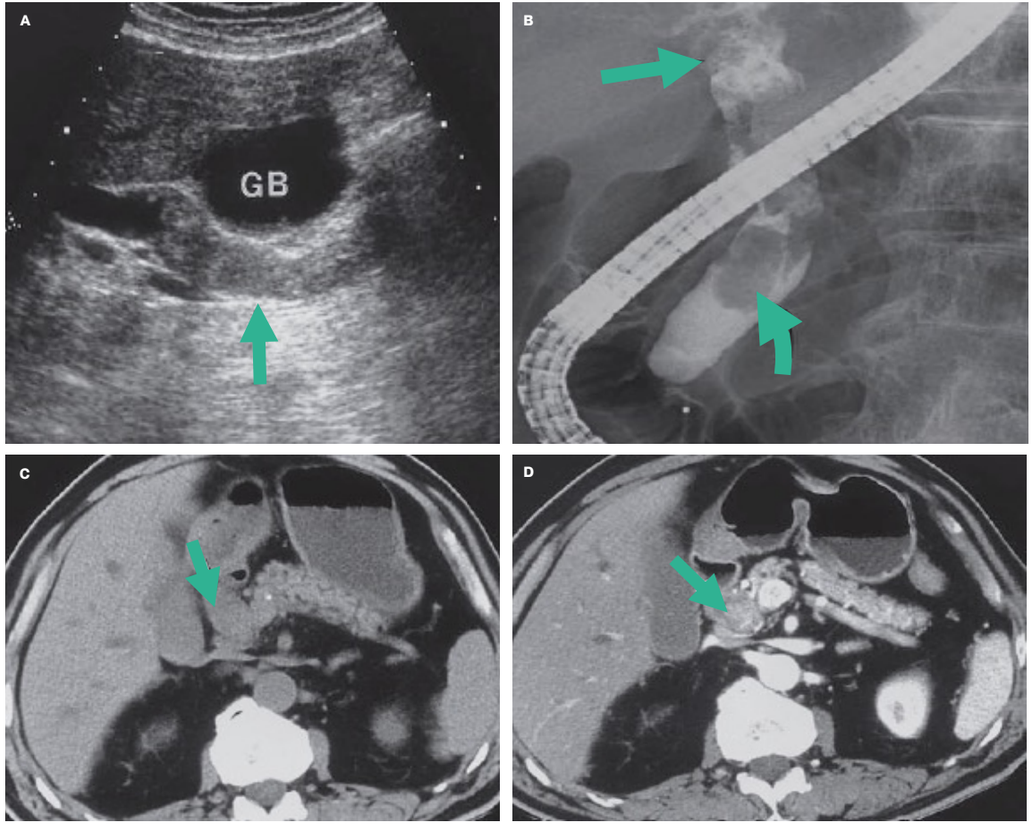

FIGURE 32

Ultrasound (A), ERCP (B), CT (C=non-contrast-enhanced, D=contrast-enhanced images) – Intraductal polypoid cholangiocarcinoma. There is an echogenic filling of the bile duct on US (**arrow**), corresponding to a solid endoluminal lesion with contrast enhancement on CT (**C** and **D**, **arrows**). It appears as a repletion defect on ERCP (**arrows**). Biopsy confirmed the diagnosis of intraductal polypoid cholangiocarcinoma.

/ Bile Ducts

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/ 胆管

章节大纲：

图 32

超声 (A)、ERCP (B)、CT（C = 非增强图像，D = 增强图像）—— 管内息肉型胆管癌。超声显示胆管回声充盈（箭头），对应 CT 增强扫描可见强化的腔内实质性病灶（C 和 D，箭头）。ERCP 表现为充盈缺损（箭头）。活检确诊为管内息肉型胆管癌。

Anomalous junction of the pancreaticobiliary ductal system is defined as a union of the distal common bile duct and the pancreatic duct proximal to the duodenum whose length is greater than 1.5 cm.

The presence of a long common channel may allow **reflux of pancreatic secretions** into the biliary system, possibly resulting in:

<!> ATTENTION

- Bile duct cyst
- Cholangiocarcinoma
- Gallbladder carcinoma
- Choledocholithiasis
- Chronic pancreatitis

<∞> REFERENCE

Bile Ducts

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章节大纲：

胰胆管合流异常定义为胆总管远端与胰管在十二指肠近端汇合，其汇合长度超过 1.5 cm。

存在较长的共同通道可能会导致胰液反流到胆管系统，从而引发：

<!> 注意

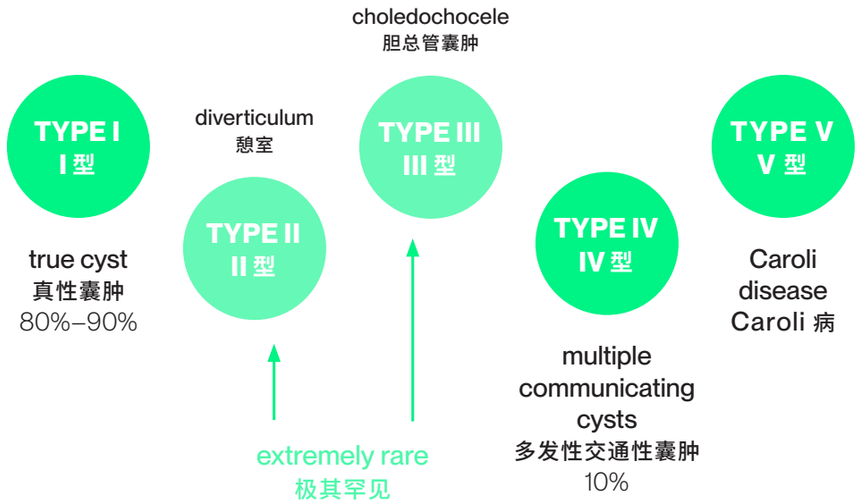
- 胆管囊肿
- 胆管癌
- 胆囊癌
- 胆总管结石
- 慢性胰腺炎

<∞> 参考文献

The **bile duct cyst** is a relatively **rare congenital cystic dilation** of the biliary tree that most commonly involves the **extrahepatic bile duct**.

/ The manifestation of the bile duct cyst in adults is nonspecific, which often leads to a delay in diagnosis. The triad of abdominal pain, right upper quadrant mass, and jaundice is more prevalent in the paediatric population and is reported to occur in 2%-38% of patients.

/ According to the **Todani classification**, there are five types of bile duct cysts:



/ Bile Ducts

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/ 胆管

胆管囊肿一种相对罕见的先天性胆管囊状扩张，最常累及肝外胆管。

章节大纲：

/ 成人胆管囊肿的表现无特异性，常导致诊断延迟。腹痛、右上腹肿块和黄疸三联征在儿童群体中更为常见，据报道在 2%-38% 的患者中出现。

/ 根据 Todani 分型，胆管囊肿分为五型：

/ Bile Ducts

CHAPTER OUTLINE:

The most common type of bile duct cyst (accounting for 80-90%) is a type I cyst.

TYPE I
I 型

Type I cysts can be further subdivided into:

/ Type Ia – dilatation of the entire extrahepatic bile duct.

/ Type Ib – segmental dilatation of the extrahepatic bile duct.

/ Type Ic – fusiform dilatation of the common bile duct (only).

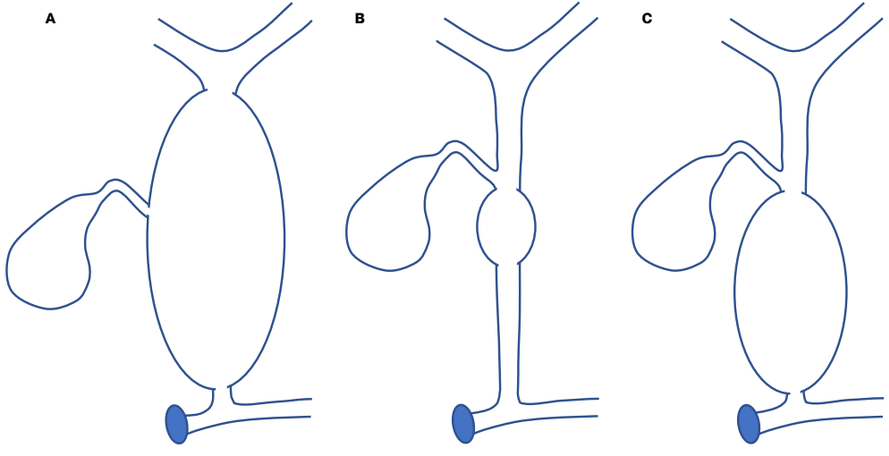

FIGURE 33

A: Bile duct cyst type Ia;
B: Bile duct cyst type Ib;
C: Bile duct cyst type Ic.

/ 胆管

章节大纲：

最常见的胆管囊肿类型（占 80-90%）为 I 型囊肿。

I 型囊肿可进一步细分为：

/ Ia 型 – 整个肝外胆管扩张。

/ Ib 型 – 肝外胆管节段性扩张。

/ Ic 型 –（仅）胆总管梭形扩张。

图 33

A: Ia 型胆管囊肿；
B: Ib 型胆管囊肿；
C: Ic 型胆管囊肿。

TYPE V
V 型

Type V corresponds to the **Caroli disease**, a rare congenital cystic dilatation of the **intrahepatic bile ducts (IBDs)** that may diffusely involve the right and left hepatic ducts. We know now that Caroli disease is thought to be a different type of disease than type I-IV cysts as it is caused by a congenital malformation of the ductal plate (=precursor of intrahepatic bile ducts).

- **Intrahepatic saccular or fusiform dilated cystic structures of varying sizes that communicate with the biliary tree are typical.** The presence of a tiny dot with contrast enhancement within the dilated IBDs ("**central dot sign**") is considered highly suggestive of Caroli disease. This sign is produced by enhancing portal branches surrounded by cystic alterations of the IBDs.
- There is an increased **risk of cholangiocarcinoma**, which develops in 7% of patients.
- Caroli disease is associated with different forms of renal cystic disease.

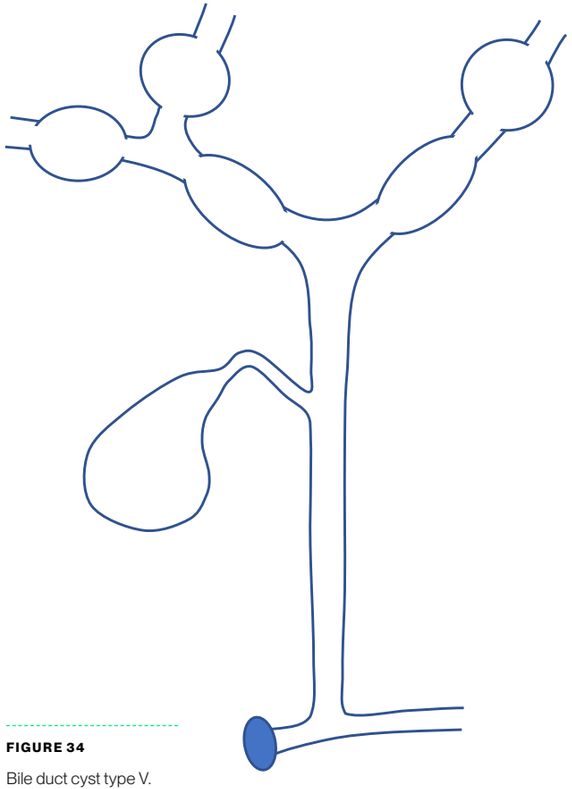

FIGURE 34
Bile duct cyst type V.

Bile Ducts

胆管

CHAPTER OUTLINE:

章节大纲：

V 型对应 **Caroli 病**，是一种罕见的**先天性肝内胆管囊状扩张症 (IBD)**，可弥漫性累及左右肝管。目前认为 Caroli 病与 I-IV 型囊肿不同，是由胆管板（肝内胆管前体）先天性畸形所致。

- **典型表现为与胆道系统相通的、大小不一的肝内囊状或梭形扩张结构。**扩张的 IBD 中出现强化的小点状影（"**中心点征**"）高度提示 Caroli 病。该征象是由被 IBD 囊性改变所包绕的门静脉分支强化形成。
- Caroli 病患者**胆管癌风险增加**，7% 的患者会进展为胆管癌。
- Caroli 病与不同类型的肾囊性疾病相关。

图 34
V 型胆管囊肿。

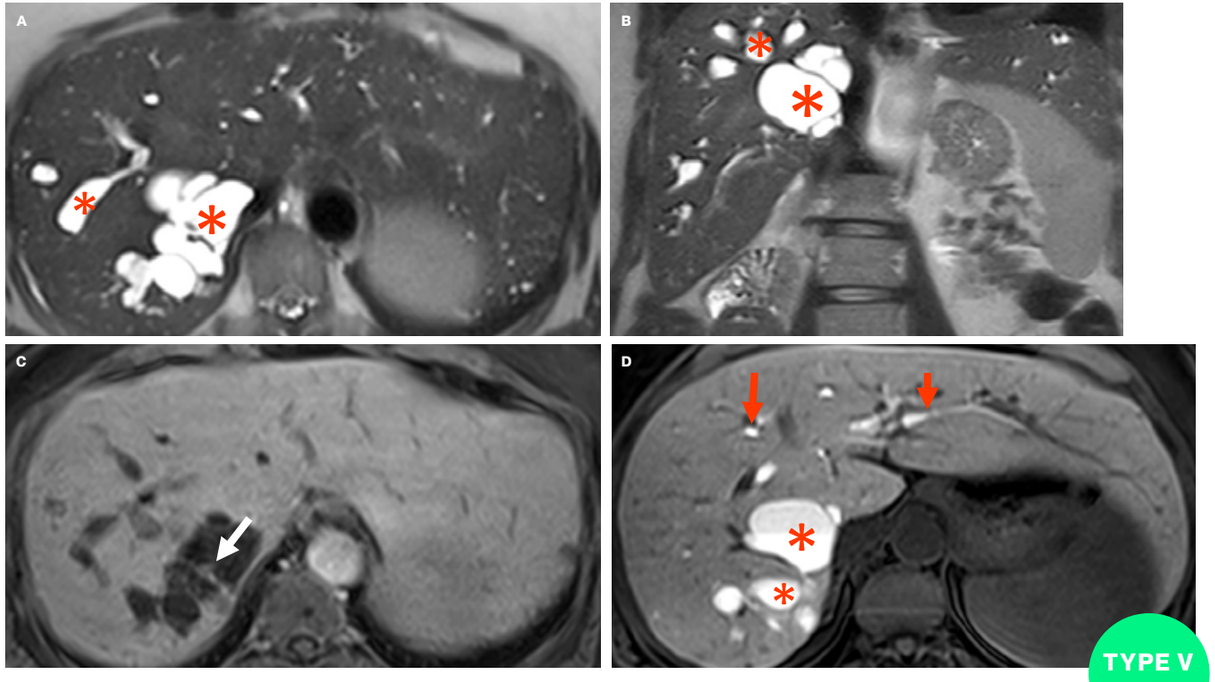

FIGURE 35

Contrast-enhanced MRI (with hepatobiliary contrast) – Caroli disease. Axial T2 fat saturated (FS)-weighted (**A**), coronal T2 FS-weighted (**B**), axial portal phase T1-weighted (**C**), axial hepatobiliary phase T1-weighted (**D**). Several intrahepatic saccular cystic structures (**asterisks**) which communicate with the biliary tree. On image **C** there is a tiny dot (**white arrow**) with contrast enhancement within the saccular biliary dilatation (**central dot sign**). The hepatobiliary phase (**D**) shows excretion of contrast by biliary ducts (**red arrows**) as well as filling the cystic structures (**asterisks**), proving its communication with the biliary system. The fluid-fluid level reflects biliary stasis.

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

图 35

增强 MRI（肝胆对比剂）——Caroli 病。轴位 T2 脂肪抑制 (FS) 加权像 (**A**)、冠状位 T2 FS 加权像 (**B**)、轴位门静脉期 T1 加权像 (**C**) 和轴位肝胆期 T1 加权像 (**D**)。肝内见多发囊性结构（**星号**），与胆道系统相通。图像 **C** 显示囊状扩张胆管内的强化点状影（**白色箭头**）（**中心点征**）。肝胆期 (**D**) 显示对比剂通过胆管排泄（**红色箭头**）以及充盈囊性结构（**星号**），证明其与胆道系统相通。液-液平面提示胆汁淤积。

Interventional Procedures

Bile Ducts

胆管

CHAPTER OUTLINE:

章节大纲：

介入治疗

Bile Ducts

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a diagnostic and interventional procedure technique using both endoscopy and fluoroscopy for examination and treatment of the biliary tree and pancreatic ducts. It consists in passing an endoscope to the descending duodenum and subsequently cannulating the ampulla of Vater, after which contrast can be injected outlining the biliary tree and various therapeutic interventions can be performed.

INDICATIONS:

- Biliary and pancreatic ductal dilatation of unknown cause
- Pancreatitis of unknown cause
- Tissue sampling of ductal system disease
- Manometry for sphincter of Oddi
- Drainage of pancreatic pseudocysts
- Stone removal
- Biliary stenting for strictures and leakage
- Balloon dilation of the duodenal papilla and ductal strictures

CHAPTER OUTLINE:

胆管

经内镜逆行胰胆管造影 (ERCP) 是一种结合内镜和透视的诊断和介入治疗技术，用于胆道系统及胰管的检查和治疗。其操作过程为：将内镜送至十二指肠降部，随后插管至 Vater 壶腹，注入对比剂显示胆道系统，并可进行各种治疗性操作。

适应证：

- 不明原因胆胰管扩张
- 不明原因胰腺炎
- 胆道系统病变组织取样
- 奥狄括约肌压力测定
- 胰腺假性囊肿引流
- 取石
- 胆道支架置入术治疗狭窄和渗漏
- 十二指肠乳头及胆管狭窄的球囊扩张术

章节大纲：

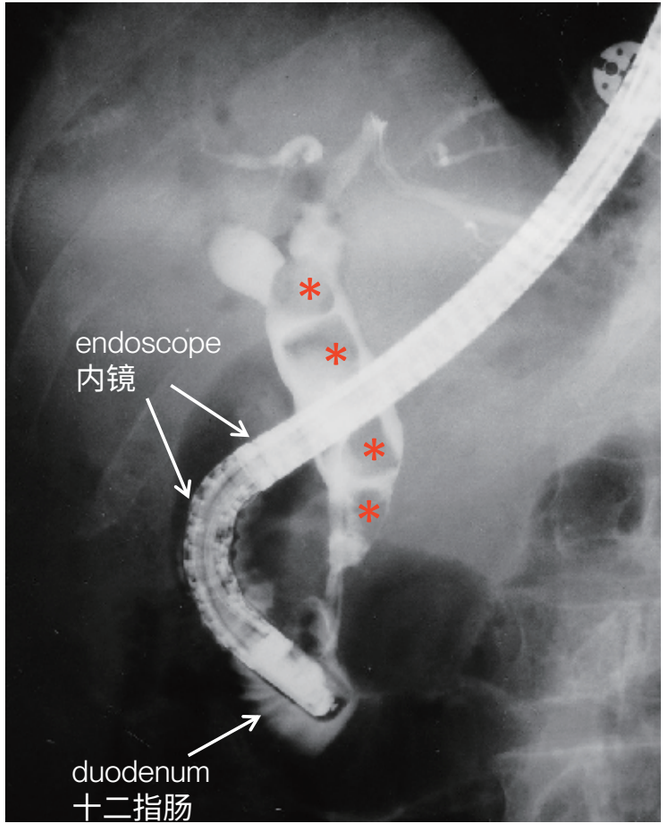

FIGURE 36

Endoscopic Retrograde Cholangiopancreatography (ERCP) showing dilated bile ducts containing multiple biliary stones (repletion defects in the CBD, asterisks).

Complications directly attributed to ERCP in approximately 5-10% of cases:

- Acute pancreatitis (3.5%)
- Haemorrhage (1.3%)
- Infection (e.g., cholangitis) (1.4%)
- Duodenal and biliary perforation (0.6%)
- Other complications (1.3%)

<∞> REFERENCE

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

图 36

经内镜逆行胰胆管造影 (ERCP) 胆管扩张伴多发胆管结石（胆总管充盈缺损，星号）。

ERCP 直接相关并发症发生率约 5-10%：

- 急性胰腺炎 (3.5%)
- 出血 (1.3%)
- 感染（如胆管炎） (1.4%)
- 十二指肠和胆管穿孔 (0.6%)
- 其他并发症 (1.3%)

<∞> 参考文献

Bile Ducts

Percutaneous Transhepatic Cholangiography (PTC) is an interventional radiology procedure to diagnose and treat blockages or narrowing of the biliary ducts. A congested bile duct is probed by percutaneous puncture and a guidewire is introduced into the duodenum/jejunum through the stenosis. An X-ray procedure that involves injection of contrast material directly into the ducts is performed to evaluate the bile ducts.

- PTC is **almost exclusively performed in patients with a malignant obstruction**, such as cholangiocarcinoma, ampullary and pancreatic malignancies, when retrograde access via endoscopic retrograde cholangiopancreatography (ERCP) is not amenable.

INDICATIONS:

- Biliary stent placement or balloon dilatation (in the absence of criteria for surgery)
- Insertion of catheter to drain bile

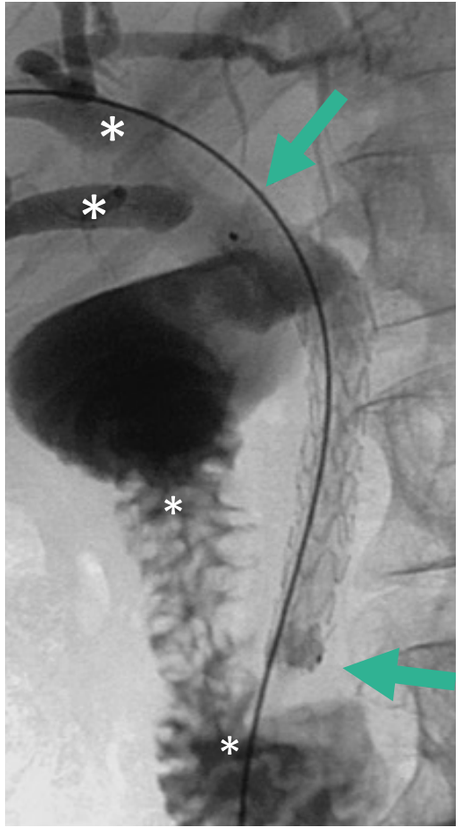

FIGURE 37

Percutaneous transhepatic cholangiography (PTC) depicting a malignant stricture treated by a permanent metallic stent (**upper arrow** points at the trans-hepatic biliary guide wire used to deploy the stent in the CBD, **lower arrow** points at the distal stent extremity). Large asterisks show the dilated contrast-filled biliary ducts. **Small asterisks** show the duodenum outlined by contrast material from the CBD.

CHAPTER OUTLINE:

胆管

经皮肝穿刺胆道造影 (PTC) 是一种介入放射学技术，用于诊断和治疗胆管阻塞或狭窄。该技术经皮穿刺进入扩张的胆管，并将导丝通过狭窄段引入十二指肠/空肠。在 X 线引导下直接向胆管内注入对比剂以评估胆管情况。

- PTC **几乎仅适用于恶性梗阻患者**，如胆管癌、壶腹部恶性肿瘤和胰腺恶性肿瘤，且在经内镜逆行胰胆管造影 (ERCP) 无法实施时采用。

适应证：

- 胆道支架置入或球囊扩张（不符合手术指征时）
- 置管引流胆汁

图 37

经皮肝穿刺胆道造影 (PTC) 显示一处经永久性金属支架治疗的恶性狭窄（**上方箭头**指向用于在胆总管中放置支架的经肝胆道导丝，**下方箭头**指向支架远端末端）。**大星号**表示对比剂充盈的扩张胆管。**小星号**显示由 CBD 对比剂勾勒出的十二指肠。

章节大纲：

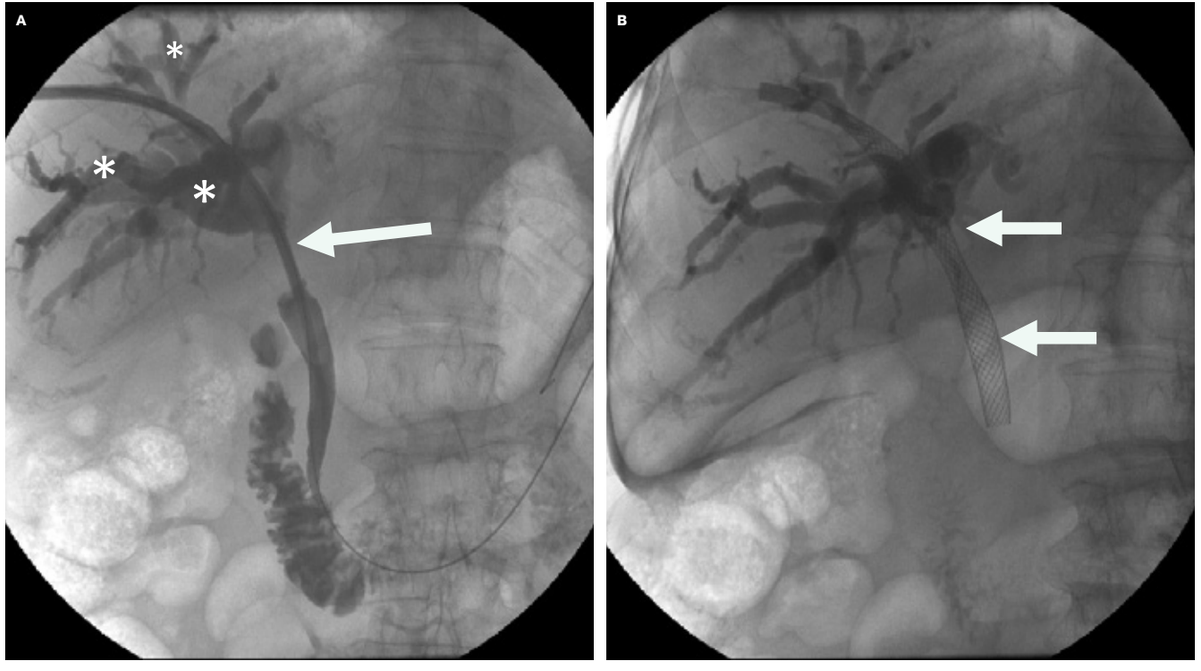

FIGURE 38

Percutaneous transhepatic cholangiography (PTC) depicting the dilated bile ducts (**asterisks**) due to a long stenosis in the extrahepatic duct caused by a cholangiocarcinoma (**arrow** in **A**). In image **B**, after the procedure, it is possible to identify the stent (**arrows**), which was placed through the stricture allowing the bile to drain.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

图 38

经皮肝穿刺胆道造影 (PTC) 显示胆管扩张（星号），这是由胆管癌引起的肝外胆管长段狭窄所致（A 图箭头）。图像 B 显示，手术后，可见支架（箭头）通过狭窄段放置，实现胆汁引流。

/ Take-Home Messages

- Diseases of the gallbladder and the biliary tract are the most common causes of symptoms in the right-sided upper abdomen.
- Biliary imaging often requires a multimodality approach.
- Irrespective of imaging technique, an appreciation of the pathologic basis of biliary disease, combined with careful inspection of the imaging appearances is vital for the correct interpretation of biliary studies.
- Ultrasound is the first-line imaging tool for investigation of suspected biliary obstruction.
- MRI, in particular MRCP is the most sensitive test and has changed our practice.
- ERCP should be reserved for therapeutic purposes.
- The evaluation of biliary strictures or filling defects is best performed with thin-section imaging.
- Smooth, concentric long-segment strictures favour a benign cause, whereas abrupt, eccentric short-segment strictures favour a malignancy.
- A stone is the most common biliary filling defect and may occur in the absence of dilated ducts.

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 核心要点

- 胆囊和胆道疾病是导致右上腹症状的最常见病因。
- 胆道影像学检查通常需要采用多模式联合检查。
- 无论采用何种影像技术，了解胆道疾病的病理基础并仔细观察影像学表现对于正确解读胆道检查结果至关重要。
- 超声是疑似胆道梗阻的一线影像学检查方法。
- MRI（尤其是 MRCP）是最敏感的检查，这改变了我们的临床实践模式。
- ERCP 应仅用于治疗目的。
- 评估胆道狭窄或充盈缺损最好采用薄层成像。
- 光滑、对称的长段狭窄多提示良性病变，而突兀、偏心性短段狭窄多提示恶性病变。
- 结石是最常见的胆道充盈缺损，可不伴胆管扩张。

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Bile Ducts

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章节大纲：

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Test Your Knowledge

Bile Ducts

胆管

CHAPTER OUTLINE:

章节大纲：

知识测试

Test Your Knowledge

<?> QUESTION

1 Anatomical variants of the biliary tree are rare.

- ☐ True
- ☐ False

Bile Ducts

CHAPTER OUTLINE:

知识测试

胆管

章节大纲：

<?> 问题

1 胆道系统的解剖结构变异很罕见。

- ☐ 对
- ☐ 错

Test Your Knowledge

<?> ANSWER

1 Anatomical variants of the biliary tree are rare.

- ☐ True
- ■ False

Bile Ducts

CHAPTER OUTLINE:

知识测试

<?> 回答

1 胆道系统的解剖结构变异很罕见。

- ☐ 对
- ■ 错

胆管

章节大纲：

/ Test Your Knowledge

<?> QUESTION

2 Which is the most common anatomical variant of the intrahepatic bile ducts?

- ☐ Right posterior duct joining with the right anterior duct by its lateral (right) aspect
- ☐ Triple confluence, with the right posterior, right anterior and left hepatic ducts joining at the same point to form the common hepatic duct
- ☐ Right posterior duct draining into the left hepatic duct
- ☐ Right anterior duct draining into the left hepatic duct

/ 知识测试

<?> 问题

2 肝内胆管最常见的解剖结构变异是哪一种？

- ☐ 右后胆管从其外侧（右侧）与右前胆管汇合
- ☐ 三管汇合：右后肝管、右前肝管与左肝管在同一点汇合形成肝总管
- ☐ 右后胆管汇入左肝管
- ☐ 右前胆管汇入左肝管

/ Test Your Knowledge

<?> ANSWER

2 Which is the most common anatomical variant of the intrahepatic bile ducts?

- ☐ Right posterior duct joining with the right anterior duct by its lateral (right) aspect
- ☐ Triple confluence, with the right posterior, right anterior and left hepatic ducts joining at the same point to form the common hepatic duct
- ■ Right posterior duct draining into the left hepatic duct
- ☐ Right anterior duct draining into the left hepatic duct

CHAPTER OUTLINE:

章节大纲：

/ 知识测试

<?> 回答

2 肝内胆管最常见的解剖结构变异是哪一种？

- ☐ 右后胆管从其外侧（右侧）与右前胆管汇合
- ☐ 三管汇合：右后肝管、右前肝管与左肝管在同一点汇合形成肝总管
- ■ 右后胆管汇入左肝管
- ☐ 右前胆管汇入左肝管

Test Your Knowledge

<?> QUESTION

3 What is the best imaging modality to depict cholelithiasis?

- ☐ US
- ☐ CT
- ☐ MRCP
- ☐ EUS

Bile Ducts

CHAPTER OUTLINE:

知识测试

胆管

章节大纲：

<?> 问题

3 显示胆石症的最佳影像学检查方法是什么？

- ☐ US
- ☐ CT
- ☐ MRCP
- ☐ EUS

Test Your Knowledge

<?> ANSWER

3 What is the best imaging modality to depict cholelithiasis?

- ☐ US
- ☐ CT
- ■ MRCP
- ☐ EUS

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

知识测试

<?> 回答

3 显示胆石症的最佳影像学检查方法是什么？

- ☐ US
- ☐ CT
- ■ MRCP
- ☐ EUS

/ Test Your Knowledge

<?> QUESTION

4 What is the most sensitive US finding in acute cholecystitis?

- ☐ Cholelithiasis + gallbladder wall thickening
- ☐ Cholelithiasis + sonographic Murphy sign
- ☐ Gallbladder wall thickening + gallbladder distension
- ☐ Gallbladder distension + pericholecystic fluid

/ Bile Ducts

CHAPTER OUTLINE:

/ 胆管

章节大纲：

/ 知识测试

<?> 问题

4 急性胆囊炎最敏感的超声表现是什么？

- ☐ 胆石症 + 胆囊壁增厚
- ☐ 胆石症 + 超声墨菲征
- ☐ 胆囊壁增厚 + 胆囊扩张
- ☐ 胆囊扩张 + 胆囊周围积液

Test Your Knowledge

<?> ANSWER

4 What is the most sensitive US finding in acute cholecystitis?

- ☐ Cholelithiasis + gallbladder wall thickening
- ■ Cholelithiasis + sonographic Murphy sign
- ☐ Gallbladder wall thickening + gallbladder distension
- ☐ Gallbladder distension + pericholecystic fluid

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

知识测试

<?> 回答

4 急性胆囊炎最敏感的超声表现是什么？

- ☐ 胆石症 + 胆囊壁增厚
- ■ 胆石症 + 超声墨菲征
- ☐ 胆囊壁增厚 + 胆囊扩张
- ☐ 胆囊扩张 + 胆囊周围积液

Test Your Knowledge

<?> QUESTION

5 Which of the following statements is/are correct?

- ☐ US is the most sensitive imaging modality to detect cholecystolithiasis
- ☐ CT is the most sensitive imaging modality to detect cholecystolithiasis
- ☐ US has a limited sensitivity to detect calculi in the common bile duct
- ☐ CT is the most sensitive imaging modality to detect calculi in the common bile duct

Bile Ducts

CHAPTER OUTLINE:

胆管

章节大纲：

知识测试

<?> 问题

5 以下哪一项/多项陈述正确？

- ☐ 超声是检测胆囊结石最敏感的影像学手段
- ☐ CT 是检测胆囊结石最敏感的影像学手段
- ☐ US 检测胆总管结石的敏感性有限
- ☐ CT 是检测胆总管结石最敏感的影像学手段

/ Test Your Knowledge

<?> ANSWER

5 Which of the following statements is/are correct?

- ■ US is the most sensitive imaging modality to detect cholecystolithiasis
- ☐ CT is the most sensitive imaging modality to detect cholecystolithiasis
- ■ US has a limited sensitivity to detect calculi in the common bile duct
- ☐ CT is the most sensitive imaging modality to detect calculi in the common bile duct

CHAPTER OUTLINE:

章节大纲：

/ 知识测试

<?> 回答

5 以下哪一项/多项陈述正确？

- ■ 超声是检测胆囊结石最敏感的影像学手段
- ☐ CT 是检测胆囊结石最敏感的影像学手段
- ■ US 检测胆总管结石的敏感性有限
- ☐ CT 是检测胆总管结石最敏感的影像学手段

/ Test Your Knowledge

<?> QUESTION

6 Which is not a cause of pneumobilia?

- ☐ Recent biliary instrumentation
- ☐ Incompetent sphincter of Oddi
- ☐ Biliary-enteric fistula
- ☐ Infection (e.g. Emphysematous Cholecystitis)
- ☐ Cholangiocarcinoma

CHAPTER OUTLINE:

章节大纲：

/ 知识测试

<?> 问题

6 哪一项不是胆道积气的原因？

- ☐ 近期胆道器械操作
- ☐ 奥狄括约肌机能不全
- ☐ 胆肠瘘
- ☐ 感染（如气肿性胆囊炎）
- ☐ 胆管癌

/ Test Your Knowledge

<?> ANSWER

6 Which is not a cause of pneumobilia?

- ☐ Recent biliary instrumentation
- ☐ Incompetent sphincter of Oddi
- ☐ Biliary-enteric fistula
- ☐ Infection (e.g. Emphysematous Cholecystitis)
- ■ Cholangiocarcinoma

CHAPTER OUTLINE:

章节大纲：

/ 知识测试

<?> 回答

6 哪一项不是胆道积气的原因？

- ☐ 近期胆道器械操作
- ☐ 奥狄括约肌机能不全
- ☐ 胆肠瘘
- ☐ 感染（如气肿性胆囊炎）
- ■ 胆管癌

Test Your Knowledge

<?> QUESTION

7 Select the predisposing conditions for cholangiocarcinoma:

- ☐ Choledochal cyst
- ☐ Caroli disease
- ☐ Primary sclerosing cholangitis
- ☐ Hepatitis B

知识测试

<?> 问题

7 选择胆管癌的易感因素：

- ☐ 胆总管囊肿
- ☐ Caroli 病
- ☐ 原发性硬化性胆管炎
- ☐ 乙型肝炎

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<?> QUESTION

8 Which is not a typical imaging feature of mass-forming type of cholangiocarcinoma?

- ☐ Rim-like enhancement in arterial phase and consequent gradual centripetal enhancement
- ☐ Capsular retraction
- ☐ Satellite nodules
- ☐ Hypointensity on T2-weighted images

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/ 知识测试

<?> 问题

8 哪项不是肿块型胆管癌的典型影像特征？

- ☐ 动脉期边缘强化，随后呈渐进性向心性强化
- ☐ 包膜回缩
- ☐ 卫星结节
- ☐ T2 加权像低信号

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/ Test Your Knowledge

<?> QUESTION

9 Which is not a typical feature of Caroli disease?

- ☐ It is a congenital cystic dilatation of the intrahepatic bile ducts (type V)
- ☐ The dilated cystic structures communicate with the biliary tree
- ☐ “Central dot sign” on CT/MRI
- ☐ It affects both intrahepatic and extrahepatic bile ducts

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9 以下哪项不是 Caroli 病的典型特征？

- ☐ 它是肝内胆管的先天性囊性扩张（V 型）。
- ☐ 扩张的囊性结构与胆道系统相通
- ☐ CT/MRI 上呈“中心点征”
- ☐ 同时累及肝内和肝外胆管

Test Your Knowledge

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Test Your Knowledge

<?> QUESTION

10 Which of the following conditions can be diagnosed or evaluated using Percutaneous Transhepatic Cholangiography?

- ☐ Choledochal cyst
- ☐ Caroli disease
- ☐ Primary sclerosing cholangitis
- ☐ Hepatitis B

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<?> 问题

10 以下哪些疾病可通过经皮肝穿刺胆道造影诊断或评估？

- ☐ 胆总管囊肿
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- [ ] Caroli 病
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- [x] 乙型肝炎

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