



POCKET**RADIOLOGIST**TM

Abdominal Top 100 Diagnoses

Federle

Fishman

Jeffrey

Anne

PocketRadiologist™

Abdominal

Top 100 Diagnoses

Michael P Federle MD

Professor and Chief, Abdominal Imaging
Department of Radiology
University of Pittsburgh
Pittsburgh, Pennsylvania

Elliot Fishman MD

Professor of Radiology and Oncology
Director, Diagnostic Imaging and Body CT
Johns Hopkins Hospital
Baltimore, Maryland

R Brooke Jeffrey MD

Professor and Chief, Abdominal Imaging
Stanford University Medical Center
Stanford, California

Venkat Sridhar Anne MD

Clinical Research Fellow
Abdominal Imaging, Department of Radiology
University of Pittsburgh Medical Center
Pittsburgh, Pennsylvania

With 200 drawings and radiographic images

Drawings: Lane R Bennion MS
Richard Coombs MS
James A Cooper MD
Walter Stuart MFA

Image Editing: Ming Q Huang MD
Danielle Morris
Melissa Petersen

Medical Text Editing: Richard H Wiggins III MD



W. B. SAUNDERS COMPANY
An Elsevier Science Company



A medical reference publishing company

First Edition

Text - Copyright Michael P Federle MD 2003

Drawings - Copyright Amirsys Inc 2003

Compilation - Copyright Amirsys Inc 2003

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or media or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from Amirsys Inc.

First Printing: November 2002

Composition by Amirsys Inc, Salt Lake City, Utah

Printed in China

ISBN: 0-7216-0031-X

袖珍放射专家——腹部的 100 个主要诊断

[美]费德勒 著

Amirsys Inc 出版

上海世界图书出版公司 重印发行

2004 年 4 月第 1 版

上海市尚文路 185 号 B 楼 邮政编码 200010

各地新华书店经销 (限中华人民共和国国内发行)

图字: 09-2004-034 号

ISBN 7-5062-6522-2 /R · 52

定价: 140.00 元

Preface

The **PocketRadiologist™** series is an innovative, quick reference designed to deliver succinct, up-to-date information to practicing professionals "at the point of service." As close as your pocket, each title in the series is written by world-renowned authors. These experts have designated the "top 100" diagnoses or interventional procedures in every major body area, bulleted the most essential facts, and offered high-resolution imaging to illustrate each topic. Selected references are included for further review. Full color anatomic-pathologic computer graphics model many of the actual diseases.

Each **PocketRadiologist™** title follows an identical format. The same information is in the same place - every time - and takes you quickly from key facts to imaging findings, differential diagnosis, pathology, pathophysiology, and relevant clinical information. The interventional modules give you the essentials and "how-tos" of important procedures, including pre- and post-procedure checklists, common problems and complications.

PocketRadiologist™ titles are available in both print and hand-held PDA formats. Currently available modules feature Brain, Head and Neck, Orthopedic (Musculoskeletal) Imaging, Pediatrics, Spine, Chest, Cardiac, Vascular, Abdominal Imaging and Interventional Radiology. 2003 topics will include Obstetrics, Gynecologic Imaging, Breast, and much, much more. Enjoy!

Anne G Osborn MD
Editor-in-Chief, Amirsys Inc

H Ric Harnsberger MD
Chairman and CEO, Amirsys Inc

Notice and Disclaimer

The information in this product ("Product") is provided as a reference for use by licensed medical professionals and no others. It does not and should not be construed as any form of medical diagnosis or professional medical advice on any matter. Receipt or use of this Product, in whole or in part, does not constitute or create a doctor-patient, therapist-patient, or other healthcare professional relationship between Amirsys Inc. ("Amirsys") and any recipient. This Product may not reflect the most current medical developments, and Amirsys makes no claims, promises, or guarantees about accuracy, completeness, or adequacy of the information contained in or linked to the Product. The Product is not a substitute for or replacement of professional medical judgment. Amirsys and its affiliates, authors, contributors, partners, and sponsors disclaim all liability or responsibility for any injury and/or damage to persons or property in respect to actions taken or not taken based on any and all Product information.

In the cases where drugs or other chemicals are prescribed, readers are advised to check the Product information currently provided by the manufacturer of each drug to be administered to verify the recommended dose, the method and duration of administration, and contraindications. It is the responsibility of the treating physician relying on experience and knowledge of the patient to determine dosages and the best treatment for the patient.

To the maximum extent permitted by applicable law, Amirsys provides the Product AS IS AND WITH ALL FAULTS, AND HEREBY DISCLAIMS ALL WARRANTIES AND CONDITIONS, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY (IF ANY) IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, OF FITNESS FOR A PARTICULAR PURPOSE, OF LACK OF VIRUSES, OR ACCURACY OR COMPLETENESS OF RESPONSES, OR RESULTS, AND OF LACK OF NEGLIGENCE OR LACK OF WORKMANLIKE EFFORT. ALSO, THERE IS NO WARRANTY OR CONDITION OF TITLE, QUIET ENJOYMENT, QUIET POSSESSION, CORRESPONDENCE TO DESCRIPTION OR NON-INFRINGEMENT, WITH REGARD TO THE PRODUCT. THE ENTIRE RISK AS TO THE QUALITY OF OR ARISING OUT OF USE OR PERFORMANCE OF THE PRODUCT REMAINS WITH THE READER.

Amirsys disclaims all warranties of any kind if the Product was customized, repackaged or altered in any way by any third party.

PocketRadiologist™

Abdominal

Top 100 Diagnoses

The diagnoses in this book are divided into 7 sections in the following order:

Liver

Biliary

Pancreas

Spleen

Gastrointestinal

Genitourinary

Retroperitoneal

Table of Contents

Liver

Budd-Chiari Syndrome	3
<i>Michael P Federle MD</i>	
Candidiasis	6
<i>Michael P Federle MD</i>	
Cirrhosis	9
<i>Michael P Federle MD</i>	
Echinococcal (Hydatid) Cyst	12
<i>Michael P Federle MD</i>	
Fatty Liver	15
<i>Michael P Federle MD</i>	
Focal Nodular Hyperplasia (FNH)	18
<i>Michael P Federle MD</i>	
Hemochromatosis	21
<i>Michael P Federle MD</i>	
Hepatic Abscess	24
<i>Michael P Federle MD</i>	
Hepatic Adenoma	27
<i>Michael P Federle MD</i>	
Hepatic Cyst	30
<i>Michael P Federle MD</i>	
Hepatic (Cavernous) Hemangioma	33
<i>Michael P Federle MD</i>	
Hepatitis	36
<i>Michael P Federle MD</i>	
Hepatocellular Carcinoma (HCC)	39
<i>Michael P Federle MD</i>	
Fibrolamellar HCC	42
<i>Michael P Federle MD</i>	
Liver Metastases	45
<i>R Brooke Jeffrey MD</i>	

Biliary

Acute Cholecystitis	51
<i>R Brooke Jeffrey MD</i>	
Ampullary Carcinoma	54
<i>R Brooke Jeffrey MD</i>	
Biliary Cystadenoma	57
<i>Michael P Federle MD</i>	
Caroli Disease	60
<i>Michael P Federle MD</i>	
Cholangio Carcinoma	63
<i>Michael P Federle MD</i>	

Cholangitis	66
<i>Michael P Federle MD</i>	
Choledochal Cyst	69
<i>Michael P Federle MD</i>	
Gallbladder Carcinoma	72
<i>R Brooke Jeffrey MD</i>	

Pancreas

IPMT of Pancreas	77
<i>Michael P Federle MD</i>	
Microcystic (Serous) Cystadenoma	80
<i>Michael P Federle MD</i>	
Pancreatic Mucinous Cystic Tumor	83
<i>Michael P Federle MD</i>	
Pancreatic Ductal Carcinoma	86
<i>Michael P Federle MD</i>	
Pancreatic Islet Cell Tumor	89
<i>Michael P Federle MD</i>	
Pancreatic Pseudocyst	92
<i>Michael P Federle MD</i>	
Pancreatitis	95
<i>Michael P Federle MD</i>	

Spleen

Splenic Trauma	101
<i>R Brooke Jeffrey MD</i>	

Gastrointestinal

Pneumatosis Intestinalis	107
<i>Michael P Federle MD</i>	
Small Bowel Obstruction	110
<i>Michael P Federle MD</i>	
Achalasia	113
<i>Michael P Federle MD</i>	
Esophageal Diverticulum	116
<i>Michael P Federle MD</i>	
Gastrointestinal Stromal Tumor	119
<i>R Brooke Jeffrey MD</i>	
Colorectal Cancer	122
<i>Michael P Federle MD</i>	
Adenomatous Colonic Polyp	125
<i>Michael P Federle MD</i>	
Boerhaave's Syndrome	128
<i>Michael P Federle MD</i>	
Appendicitis	131
<i>R Brooke Jeffrey MD</i>	

Table of Contents

Barrett's Esophagus	134
<i>Michael P Federle MD</i>	
Carcinoid Tumor	137
<i>Elliot Fishman MD</i>	
Colonic Volvulus	140
<i>Michael P Federle MD</i>	
Cricopharyngeal Achalasia	143
<i>Michael P Federle MD</i>	
Crohn's Disease (CD)	146
<i>Michael P Federle MD</i>	
Desmoid Tumor	149
<i>Elliot Fishman MD</i>	
Diverticular Disease of Colon	152
<i>Michael P Federle MD</i>	
Esophageal Cancer	155
<i>Michael P Federle MD</i>	
Esophageal Web	158
<i>Michael P Federle MD</i>	
Esophagitis	161
<i>Michael P Federle MD</i>	
Familial Adenomatous Polyposis	164
<i>Michael P Federle MD</i>	
Hamartomatous Polyposis	167
<i>Michael P Federle MD</i>	
Gastric Carcinoma	170
<i>Michael P Federle MD</i>	
Intussusception	173
<i>Michael P Federle MD</i>	
Peptic Ulcer Disease	176
<i>Michael P Federle MD</i>	
Menetrier's Disease	179
<i>Michael P Federle MD</i>	
Mesenteric Ischemia	182
<i>Elliot Fishman MD</i>	
Mucocele of Appendix	185
<i>Michael P Federle MD</i>	
Peritoneal Metastases	188
<i>R Brooke Jeffrey MD</i>	
Scleroderma	191
<i>Michael P Federle MD</i>	
Pseudomembranous Colitis (PMC)	194
<i>Elliot Fishman MD</i>	
Sclerosing Mesenteritis	197
<i>Michael P Federle MD</i>	
Schatzki Ring	200
<i>Michael P Federle MD</i>	
Sprue	203
<i>Michael P Federle MD</i>	

Toxic Megacolon	206
<i>Michael P Federle MD</i>	
Typhlitis	209
<i>Michael P Federle MD</i>	
Ulcerative Colitis (UC)	212
<i>Michael P Federle MD</i>	
Villous Adenoma	215
<i>Michael P Federle MD</i>	
Whipple's Disease	218
<i>Elliot Fishman MD</i>	
Zenker's Diverticulum	221
<i>Michael P Federle MD</i>	

Genitourinary

Acquired Cystic Disease - Uremia	227
<i>Elliot Fishman MD</i>	
Adrenal Adenoma	230
<i>Elliot Fishman MD</i>	
Adrenal Carcinoma	233
<i>Elliot Fishman MD</i>	
Adrenal Hyperplasia	236
<i>Elliot Fishman MD</i>	
Renal Angiomyolipoma	239
<i>Elliot Fishman MD</i>	
Bladder Trauma	242
<i>Michael P Federle MD</i>	
Epididymitis & Epididymoorchitis	245
<i>R Brooke Jeffrey MD</i>	
Hydrocele	248
<i>R Brooke Jeffrey MD</i>	
Medullary Sponge Kidney	251
<i>Michael P Federle MD</i>	
Multilocular Cystic Nephroma	254
<i>Michael P Federle MD</i>	
Adrenal Myelolipoma	257
<i>Elliot Fishman MD</i>	
Neurogenic Bladder	260
<i>Michael P Federle MD</i>	
Renal Papillary Necrosis (RPN)	263
<i>Michael P Federle MD</i>	
Pheochromocytoma	266
<i>Michael P Federle MD</i>	
Polycystic Kidney Disease	269
<i>Michael P Federle MD</i>	
Prostate Cancer	272
<i>Michael P Federle MD</i>	
Pyelonephritis	275
<i>Michael P Federle MD</i>	

Table of Contents

Renal Abscess	278
<i>Michael P Federle MD</i>	
Renal Artery Stenosis (RAS)	281
<i>Michael P Federle MD</i>	
Renal Cell Carcinoma	284
<i>Elliot Fishman MD</i>	
Renal Cyst	287
<i>Michael P Federle MD</i>	
Renal Infarction	290
 Renal Trauma	 293
<i>Michael P Federle MD</i>	
Testicular Torsion	296
<i>R Brooke Jeffrey MD</i>	
Testicular Carcinoma	299
<i>R Brooke Jeffrey MD</i>	
Transitional Cell Carcinoma	302
<i>Michael P Federle MD</i>	
Urolithiasis	305
<i>Michael P Federle MD</i>	
Varicocele	308
<i>R Brooke Jeffrey MD</i>	

Retroperitoneal

Retroperitoneal Fibrosis	313
<i>Michael P Federle MD</i>	
Retroperitoneal Sarcoma	316
<i>Michael P Federle MD</i>	

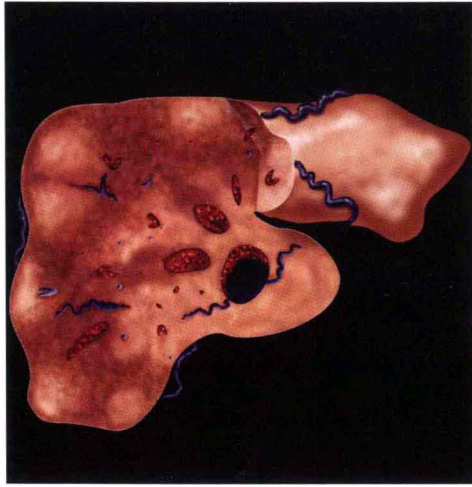
PocketRadiologist™

Abdominal

Top 100 Diagnoses

LIVER

Budd-Chiari Syndrome



The liver is deformed with areas of hemorrhage. Caudate sparing and hypertrophy. Clot within hepatic veins and IVC with intrahepatic and surface collaterals.

Key Facts

- Synonym(s): Hepatic veno-occlusive disease
- Definition: Global/segmental hepatic venous outflow obstruction (at level of large hepatic veins/suprahepatic segment of IVC)
- Classic imaging appearance
 - Absent/reversed/flat flow in hepatic veins & reversed flow in IVC
- Is a rare syndrome
- Primary/secondary based on cause & pathophysiology
- Acute/chronic based on clinical presentation
- Large regenerative nodules are characteristic of Budd-Chiari syndrome

Imaging Findings

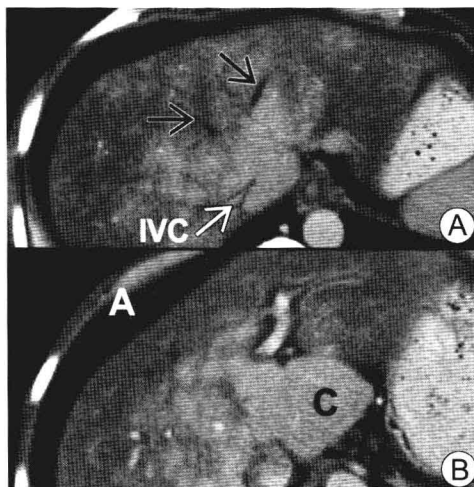
General Features

- Best imaging clue: "Bicolored" hepatic veins (due to intrahepatic collateral pathways) are pathognomonic of chronic Budd-Chiari on color Doppler

CT Findings

- NECT: Acute phase
 - Diffuse hypodense enlarged liver, narrowed IVC + hepatic veins & ascites
 - Hyperdense IVC & hepatic veins (due to ↑ attenuation of thrombus)
- NECT: Chronic phase
 - Diffuse hypodense liver, non-visualization of IVC & hepatic veins
 - Hypertrophy of caudate lobe (ratio of caudate to right lobe > 0.55)
- CECT: Acute phase
 - Classic "flip-flop" pattern is seen
 - Early enhancement of caudate lobe + central portion around IVC
 - ↓ Enhancement peripherally
 - Later ↓ enhancement centrally with ↑ enhancement peripherally
 - Narrowed hypodense hepatic veins & IVC with hyperdense walls
- CECT: Chronic phase

Budd-Chiari Syndrome



(A) Liver is heterogeneous. Inferior vena cava (IVC) is compressed; hepatic veins are thrombosed (arrows). (B) Caudate lobe (C) is relatively spared and is enlarged. Note ascites (A).

- Total obliteration of IVC & hepatic veins
- Enhancing 1-4 cm hyperdense nodules ± hypodense ring
 - "Large regenerative nodules": Nodular regenerative hyperplasia

MR Findings

- T1WI
 - ↑ Intensity of liver centrally with peripheral heterogeneity
 - Narrowed/absence of hepatic veins & IVC
 - Hyperintense nodules & enlarged caudate lobe
- T2WI: Fail to visualize hepatic veins & IVC, iso-/hypointense nodules
- Gradient-echo: Fails to demonstrate flow in hepatic veins/IVC
- Coronal MR image using GRASS sequence
 - Shows patent IVC with narrow segment at level of hepatic veins
- CEMR: Intense homogeneous enhancement of nodules on T1WI

Ultrasound Findings

- Hepatic veins narrowed/not visualized/filled with thrombus
- Reversed flow in hepatic veins; absent/sluggish flow in IVC
- Communicating collateral vessels

Color Doppler Sonography (Sensitivity is 87.5%) Findings

- Absent/flat flow in hepatic veins & reversed flow in hepatic veins/IVC
- Portal vein: Slow hepatofugal flow (< 11 cm/sec); congestion index > 0.1
- Hepatic artery: Resistive index ≥ 0.75

Nuclear Medicine Study: (Tc-99m Sulfur Colloid) Findings

- Hot caudate lobe; ↓ activity peripherally; wedge-shaped focal defects
- Colloid shift to enlarged spleen + bone marrow

Inferior Venacavography, Hepatic Venacavography Findings

- "Spider web" pattern of collaterals- pathognomonic
- Thrombus in hepatic veins/IVC; narrowing + stretching hepatic arteries
- Long segmental compression of IVC in both acute & chronic phases

Imaging Recommendations

- Color Doppler, helical NECT + CECT, MR, and angiography

Budd-Chiari Syndrome

Differential Diagnosis

Hepatic Cirrhosis

- Caudate enlargement and ascites are common; patent hepatic veins + IVC

Pathology

General

- Embryology-Anatomy
 - Primary type: Total or incomplete membranous obstruction of hepatic venous outflow
 - Results from deviations of complex embryologic process of IVC
- Etiology-Pathogenesis
 - Classified as primary/secondary based on cause & pathophysiology
 - Primary: Due to membrane (congenital/injury/infection)
 - Secondary: Usually due to thrombosis; rarely (nonthrombotic)
 - Obstruction of central & sublobular veins-chemotherapy/radiation
 - Obstruction of major hepatic veins: Hypercoagulable states
 - Nonthrombotic causes: Hepatic & extrahepatic masses
- Epidemiology
 - Primary (congenital-membranous type): Common in Asia
 - Secondary (thrombotic): Most common in Western countries
 - Secondary (nonthrombotic): 2nd most common in Western countries
 - F > M

Gross Pathologic-Surgical Features

- Acute phase: Liver enlarged/congestion/occlusion of hepatic veins & IVC
- Chronic phase: Liver nodular/cirrhotic/hypertrophy of caudate lobe

Microscopic Features

- Centrilobular congestion/dilated sinusoids/fibrosis/necrosis/cell atrophy

Clinical Issues

Presentation

- Acute: Abdominal pain/tender liver/vomiting/hypotension/ascites
- Chronic phase: Pain/hepatomegaly/splenomegaly/jaundice/ascites/varices
- Location: Classified into three types
 - Type I: Occlusion of IVC ± hepatic veins
 - Type II: Occlusion of major hepatic veins ± IVC
 - Type III: Occlusion of small centrilobar veins
- Complications: Liver failure/emboli from IVC thrombus/variceal bleeding

Treatment

- Medical management with steroids/nutritional therapy/anticoagulants
- Balloon angioplasty/lasers/stent insertion (for membranous occlusion)
- TIPS (transjugular intrahepatic portosystemic shunt)
- Surgical alternatives: Membranotomy/membranectomy/cavoplasty/liver transplantation

Selected References

1. Brancatelli G et al: Benign regenerative nodules in Budd-Chiari syndrome and other vascular disorders of the liver: Radiologic-pathologic and clinical correlation. RadioGraphics 22: 847-62, 2002
2. Rha SE et al: Nodular regenerative hyperplasia of the liver in Budd-Chiari syndrome: CT and MR features. Abdominal Imaging 25(3): 255-8, 2000
3. Vilgrain V et al: Hepatic nodules in Budd-Chiari syndrome: Imaging features. Radiology 210: 443-50, 1999

Candidiasis



25-year-old man with acute leukemia. Enhanced CT shows innumerable microabscesses within the liver, consistent with candidiasis.

Key Facts

- Definition: A systemic fungal infection
- Classic imaging appearance
 - CT: Multiple well-defined, rounded microabscesses in liver
- Other key facts
 - Most common fungal infection in immunocompromised patients
 - Hepatosplenic candidiasis commonly seen in patients with acute leukemia recovering from profound neutropenia
 - Is termed chronic disseminated candidiasis due to involvement of several tissues

Imaging Findings

General Features

- Best imaging clue: T2WI: Markedly hyperintense small, rounded lesions measuring < 1 cm in liver

CT Findings

- NECT: Multiple small hypodense lesions; scattered areas of calcific density
- CECT: Nonenhancing, hypodense areas with \pm peripheral enhancement

MR Findings

- T1WI: Hypointense
- T2WI fat suppressed spin-echo: Hyperintense
- Short T1 inversion recovery (STIR): Hyperintense
- T1 C+ MR: Non-enhancing hypointense lesions

Esophagram Findings

- Candida esophagitis: Classical "tree bark" appearance

Ultrasound Findings

- Four major patterns of hepatic candidiasis are seen
 - "Wheel within a wheel": Peripheral zone surrounds inner echogenic wheel, in turn surrounds a central hypoechoic nidus (early stage)
 - "Bull's-eye": 1-4 mm lesion with a hyperechoic center that surrounds a hypoechoic rim- seen when neutrophil count returns to normal