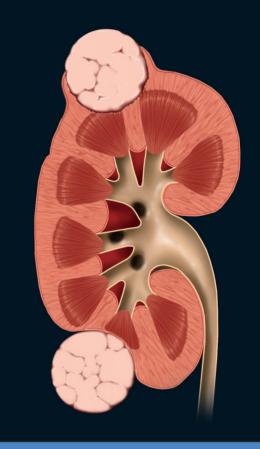
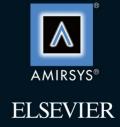
SPECIALTY IMAGING™

PITFALLS AND CLASSIC SIGNS OF THE ABDOMEN AND PELVIS



ELSAYES • SHAABAN

MENIAS



SPECIALTY IMAGING PITFALLS AND CLASSIC SIGNS OF THE ABDOMEN AND PELVIS

SPECIALTY IMAGING PITFALLS AND CLASSIC SIGNS OF THE ABDOMEN AND PELVIS

Khaled M. Elsayes, MD Associate Professor

Associate Professor
Department of Diagnostic Radiology
The University of Texas M.D. Anderson Cancer Center
Houston, Texas

Akram M. Shaaban, MBBCh

Associate Professor (Clinical)
Department of Radiology
University of Utah School of Medicine
Salt Lake City, Utah

Christine O. Menias, MD

Professor of Radiology
Mayo Clinic School of Medicine
Scottsdale, Arizona
Adjunct Professor of Radiology
Washington University School of Medicine
St. Louis, Missouri

ELSEVIER

1600 John F. Kennedy Blvd. Ste 1800 Philadelphia, PA 19103-2899

SPECIALTY IMAGING: PITFALLS AND CLASSIC SIGNS OF THE ABDOMEN AND PELVIS

ISBN: 978-1-937242-18-3

Copyright © 2015 by Elsevier. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Details on how to seek permission, further information about the Publisher's permissions policies and our arrangements with organizations such as the Copyright Clearance Center and the Copyright Licensing Agency, can be found at our website: www.elsevier.com/ permissions.

This book and the individual contributions contained in it are protected under copyright by the Publisher (other than as may be noted herein).

Notices

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our understanding, changes in research methods, professional practices, or medical treatment may become necessary.

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

With respect to any drug or pharmaceutical products identified, readers are advised to check the most current information provided (i) on procedures featured or (ii) by the manufacturer of each product to be administered, to verify the recommended dose or formula, the method and duration of administration, and contraindications. It is the responsibility of practitioners, relying on their own experience and knowledge of their patients, to make diagnoses, to determine dosages and the best treatment for each individual patient, and to take all appropriate safety precautions.

To the fullest extent of the law, neither the Publisher nor the authors, contributors, or editors, assume any liability for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

Publisher Cataloging-in-Publication Data

Specialty imaging: pitfalls and classic signs of the abdomen and pelvis / [edited by] Khaled M. Elsayes and Akram M. Shaaban.

pages; cm

Pitfalls and classic signs of the abdomen and pelvis

Includes bibliographical references and index.

ISBN 978-1-937242-18-3 (hardback)

- 1. Abdomen--Imaging--Atlases. 2. Pelvis--Imaging--Atlases.
- I. Elsayes, Khaled M. II. Shaaban, Akram M. IV. Title: Pitfalls and classic signs of the abdomen and pelvis.

[DNLM: 1. Radiography, Abdominal--Atlases. 2. Abdomen--abnormalities--Atlases.

3. Pelvis--abnormalities--Atlases. WI 17]

RC944 .S64 2014

617.550754--dc23

International Standard Book Number: 978-1-937242-18-3

Cover Designer: Tom M. Olson, BA Cover Art: Lane R. Bennion, MS

Printed in Canada by Friesens, Altona, Manitoba, Canada

Last digit is the print number: 9 8 7 6 5 4 3 2 1





Working together to grow libraries in Book Aid International developing countries

www.elsevier.com • www.bookaid.org

First and foremost, I would like to dedicate this time to the Almighty God, who has guided me to gain this knowledge.

To the memory of my parents.

To my wife and children.

I also take this opportunity to extend my appreciation to those individuals who have been instrumental in my career in radiology and those who have inspired me to complete this project.

To my mentors, friends and all colleagues in:

- -MD Anderson Cancer Center, especially, Chusilp Charnsangavej, Marshall Hicks, Joel Vikas Kundra, Randy Ernst, and Aliya Qayyum
- -University of Michigan, especially, Isaac Francis, Joel Platt, James Ellis, Rich Cohan, and Hero Hussain
- Egypt, especially, Hazem Moharram, Mamdouh Mahfouz, Tarek Eldiasty, Ikram Hamed, Ahmed Samy, Mohamed Moustafa, Moustafa Ismail, Omar Moawyah, Ihab Fathy, and Amr Nasef
- Mallinckrodt Institute of Radiology, especially, Jeffrey J. Brown, Vamsidhar R. Narra, Jay Heiken, and Christine Menias
 - Elsewhere, especially, John Leyendecker (Wake Forest), Rich Baron (Chicago), Haitham Elsamalouty (Toledo), and Akram Shaaban (Utah)

To all contributors of this book.

To all of my medical students and residents.

KME

To my parents, who taught me the value of perseverance & hard work.

To my wife Inji, my son Karim, and my daughters May and Jena, the jewels of my life, thanks for your understanding & tremendous support.

To all my residents and fellows, whose challenging questions made me a better radiologist.

AMS

I'd like to dedicate this book to all my former residents, fellows, colleagues, and teachers, who continue to donate to the "Cooky Jar," and continue to teach me. It has truly been a privilege. This work could not have been completed without them.

COM

CONTRIBUTORS

Miral P. Gupta, MD

Diagnostic Radiology Resident University of Texas-Houston Houston, Texas

Eslam Y. Wassal, MD, MSc

Research Intern
Department of Diagnostic Radiology
The University of Texas M.D. Anderson Cancer Center
Houston, Texas

Hubert H. Chuang, MD, PhD

Assistant Professor
Department of Nuclear Medicine
Division of Diagnostic Imaging
The University of Texas M.D. Anderson Cancer Center
Houston, Texas

Gregory C. Ravizzini, MD

Assistant Professor
Department of Nuclear Medicine
Division of Diagnostic Imaging
The University of Texas M.D. Anderson Cancer Center
Houston, Texas

Yehia M. ElGuindy, MD

Resident Department of Radiology University of Toledo Toledo, Ohio

Rafael Andrés Vicéns, MD

Abdominal Radiologist Department of Radiology Auxilio Mutuo Hospital San Juan, Puerto Rico

Kamran Ali, MD

Associate Professor of Radiology Department of Radiology University of Kansas School of Medicine-Wichita Wichita, Kansas

Eniola F. Mudasiru-Dawodu, MD

Radiologist West Houston Radiology Associates Houston, Texas

Tina E. Sprouse, MD

Women's Imaging Fellow Georgetown University Hospital Department of Radiology Washington, District of Columbia

Ketan Yogesh Shah, MD

PGY3 Radiology Resident Baylor College of Medicine Houston, Texas

Richard L. Baron, MD

Professor of Radiology Department of Radiology University of Chicago Pritzker School of Medicine Chicago, Illinois

Ahmad A. Khan, MD

Fellow, Abdominal Imaging Department of Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas

Ehab H. Youssef, MD, FRCR

Clinical Lecturer of Radiology Department of Radiology University of Michigan Ann Arbor, Michigan

Nicolaus A. Wagner-Bartak, MD

Assistant Professor of Diagnostic Radiology Section of Abdominal Imaging Department of Diagnostic Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas

Veral D. Amin, MD

Diagnostic Radiology, PGY3 Resident Department of Radiology Baylor College of Medicine Houston, Texas

Ravinder S. Legha, MD/MS

Assistant Professor of Radiology Department of Diagnostic Imaging The University of Texas M.D. Anderson Cancer Center Houston, Texas

Kareem F. Ahmed, MD

Research Assistant II Department of Diagnostic Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas

Mohammad K. Eldomery, MD

Postdoctoral Research Fellow of Genetics Department of Molecular & Human Genetics Baylor College of Medicine Houston, Texas

Ajaykumar C. Morani, MBBS, DNB, MD

Assistant Professor of Radiology Department of Diagnostic Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas

Ania Z. Kielar, MD, FRCPC

Department of Radiology Associate Professor, University of Ottawa Ottawa, Ontario, Canada Adjunct Professor, University of Toronto Toronto, Ontario, Canada

Stephen R. Lee, MD

Clinical Fellow in Radiology Abdominal Imaging and Intervention, Department of Radiology Massachusetts General Hospital Boston, Massachusetts

Mohammed S. Al-Natour, MD

PGY5 Radiology Resident Department of Radiology University of Toledo Medical Center Toledo, Ohio

Corey T. Jensen, MD

Assistant Professor of Radiology
Department of Radiology
The University of Texas M.D. Anderson Cancer Center
Houston, Texas

Amit Pandya, MD, RDMS, RVT, RDCS

Assistant Professor of Radiology Department of Radiology University of Michigan Ann Arbor, Michigan

Ahmed Abdelbaki, MD

Surgery Resident Guthrie Clinic/Robert Packer Hospital Sayre, Pennsylvania

Priya Bhosale, MD

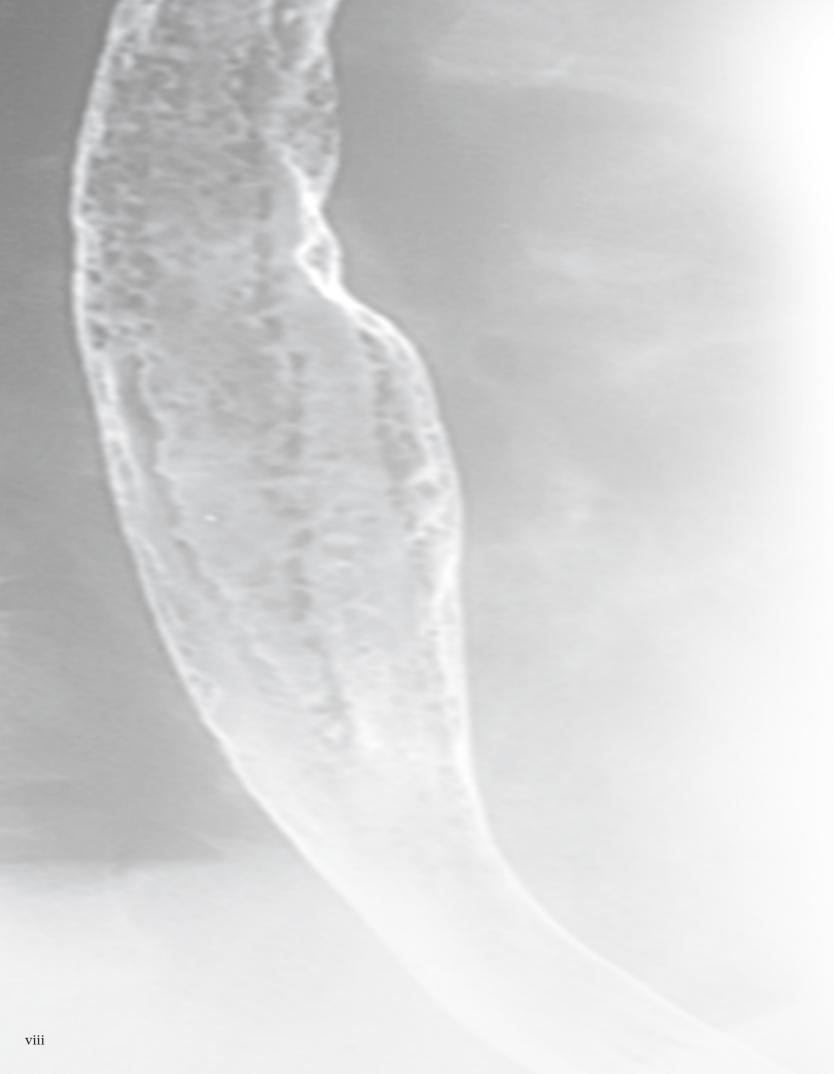
Associate Professor of Radiology Department of Abdominal Imaging The University of Texas M.D. Anderson Cancer Center Houston, Texas

Ahmed M. Zaki, MD

Research Assistant in Abdominal Imaging Department of Diagnostic Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas

Abdelhameed M. Nienaa

Medical Student Alexandria University Faculty of Medicine Alexandria, Egypt



PREFACE

Diagnostic imaging has become widely available and plays an increasing role in clinical diagnosis and therapy. In most practices, there is a wide range of commonly misinterpreted cases in the abdomen and pelvis, mainly because many radiologists are not completely familiar with anatomical, morphological, physiological, hemodynamic, and biological principles as well as a lack of clinical and radiological knowledge. This leads to frequent misinterpretations, which further results in wrong management and potentially negative outcomes.

Addressing these problems starts with understanding the spectrum of basic concepts and principles in a case-based approach. In *Specialty Imaging: Pitfalls and Classic Signs of the Abdomen and Pelvis,* each chapter contains several cases that could be misinterpreted, followed by a thorough discussion of the reason for these misinterpretations, the basic principles, and a systematic approach to help avoid such misinterpretation.

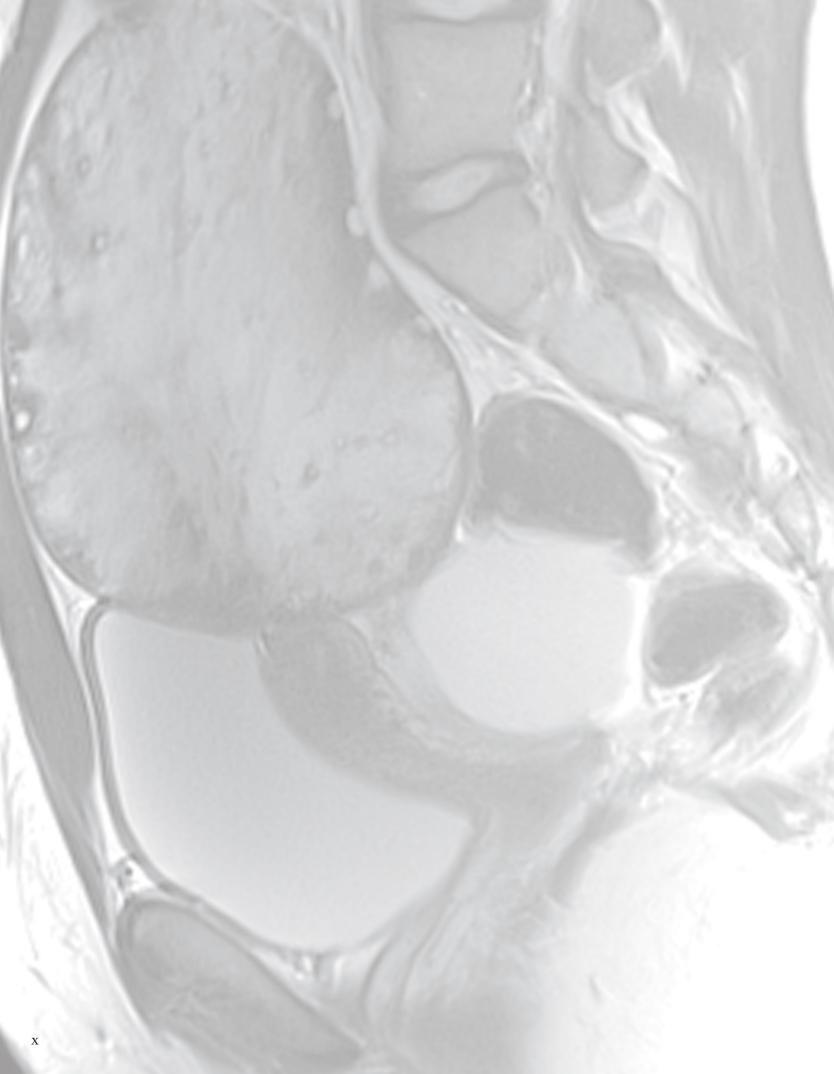
This text provides practicing radiologists and radiology residents with the level of knowledge necessary to avoid misinterpretation and help make precise diagnosis in the presence of certain classic pathognomonic features.

Unlike other texts on the subject, this book treats diagnosis from a practical point of view. The cases walk you through a radiology expert's analysis of imaging pitfalls and classic signs of the abdomen and pelvis. These cases are presented progressively, with the expert's thought process described in detail. The cases highlight clinical presentation, relevant pathology, anatomy, and physiology as well as pertinent imaging features of common disease processes.

As with all Amirsys references, all of the information is distilled into succinct, bulleted text with thousands of images and illustrations. Coupled with a companion eBook, this volume is an irreplaceable textbook for anyone confronted with the challenges of imaging in the abdominal and pelvic areas.

We hope that *Specialty Imaging: Pitfalls and Classic Signs of the Abdomen and Pelvis* will find a handy spot on your library shelf and in your reading room (after the radiology residents have read it in its entirety).

Khaled M. Elsayes, MD Associate Professor Department of Diagnostic Radiology The University of Texas M.D. Anderson Cancer Center Houston, Texas Akram M. Shaaban, MBBCh Associate Professor (Clinical) Department of Radiology University of Utah School of Medicine Salt Lake City, Utah



ACKNOWLEDGMENTS

Text Editors

Dave L. Chance, MA, ELS Arthur G. Gelsinger, MA Sarah J. Connor, BA Tricia L. Cannon, BA

Image Editors

Jeffrey J. Marmorstone, BS Lisa A. M. Steadman, BS

Medical Editors

Behrang Amini, MD, PhD

Illustrations

Laura C. Pliego, MA Lane R. Bennion, MS Richard Coombs, MS

Art Direction and Design

Laura C. Pliego, MA Tom M. Olson, BA

Lead Editor

Angela M. Green Terry, BA

Publishing Leads

Katherine L. Riser, MA Rebecca L. Hutchinson, BA



Names you know. Content you trust.®



SECTIONS

Liver

Pancreas

Gallbladder and Biliary Tree

Spleen

Abdominal Wall, Peritoneum, Retroperitoneum, and Diaphragm

Gastrointestinal Tract

Adrenal Gland

Kidney

Collection Systems, Ureters, and Urinary Bladder

Scrotum

Female Pelvis

PET/CT

TABLE OF CONTENTS

SECTION 1

Treatment-Related Conditions

Liver		Simulating Diseases	
Technique-Related Pitfalls		Omental Packing Mimicking Fatty Liver Lesion Eslam Y. Wassal, MD, MSc Christine O. Menias, MD & Khaled M. Elsayes, MD	1-19
Ultrasound Mirror Image Artifact Akram M. Shaaban, MBBCh Disappearing Liver Lesion on T2WI	1-2 1-3	Ligated Aberrant Right Hepatic Duct Eniola F. Mudasiru-Dawodu, MD & Khaled M. Elsayes, MD	1-20
Khaled M. Elsayes, MD & Richard L. Baron, MD Benign Conditions		Hepatic Radiation Injury Akram M. Shaaban, MBBCh	1-22
Simulating Malignancy		Early Post Liver Transplant Pitfalls	1-24
Inflammatory Pseudotumor Eniola F. Mudasiru-Dawodu, MD	1-4	Khaled M. Elsayes, MD & Amit Pandya, MD, RDMS, RVT, RDCS	
Kareem F. Ahmed, MD & Khaled M. Elsayes, MD Giant Regenerative Cirrhotic Nodule	1-6	Hemostatic Surgical Packing, Case 1 Ajaykumar C. Morani, MBBS, DNB, MD & Khaled M. Elsayes, MD	1-25
Khaled M. Elsayes, MD & Ehab H. Youssef, MD, FRCR Focal Confluent Fibrosis Khaled M. Elsayes, MD & Ehab H. Youssef, MD, FRCR	1-8	Hemostatic Surgical Packing, Case 2 Ajaykumar C. Morani, MBBS, DNB, MD & Khaled M. Elsayes, MD	1-26
Sclerosed Hemangioma Rafael Andrés Vicéns, MD & Khaled M. Elsayes, MD	1-10	Post-Antiangiogenesis Treatment Khaled M. Elsayes, MD	1-27
Siderotic Nodule Mimicking HCC Khaled M. Elsayes, MD & Richard L. Baron, MD	1-12	Fat-Related Pitfalls Hepatic Focal Fatty Infiltration	1-28
Large Regenerative Nodules, Budd-Chiari Khaled M. Elsayes, MD & Richard L. Baron, MD	1-13	Eniola F. Mudasiru-Dawodu, MD & Khaled M. Elsayes, MD	1-20
Hepatic Pseudoaneurysm Khaled M. Elsayes, MD & Richard L. Baron, MD	1-14	Nodular Fatty Sparing Akram M. Shaaban, MBBCh	1-30
Malignant Lesions Mimicking		Perivascular Hepatic Steatosis Akram M. Shaaban, MBBCh	1-32
Benign Conditions Delayed Enhancing Metastasis	1-15	Diffuse Metastasis Ravinder S. Legha, MD/MS & Khaled M. Elsayes, MD	1-34
Khaled M. Elsayes, MD		Vascular-Related Pitfalls	
Cystic Liver Metastasis Rafael Andrés Vicéns, MD & Khaled M. Elsayes, MD	1-16	Transient Hepatic Attenuation Difference Khaled M. Elsayes, MD & Miral P. Gupta, MD	1-36
Pseudocirrhosis of Treated Breast Cancer Metastases Akram M. Shaaban, MBBCh	1-18	Aberrant Right Gastric Vein Drainage Akram M. Shaaban, MBBCh	1-38
		Hemangioma in Cirrhosis Khaled M. Elsayes, MD & Richard L. Baron, MD	1-39
		Hemangioma Changing Morphology Khaled M. Elsayes, MD & Richard L. Baron, MD	1-40