

# **Emergency Medicine Sonography** **POCKET GUIDE** to Sonographic Anatomy and Pathology

## **Dunstan Abraham, MPH, PA-C, RDMS**

Physician Assistant, Department of Surgery, Division of Urology  
Lincoln Hospital and Medical Center, Bronx, New York

Clinical Instructor, Diagnostic Medical Sonography  
School of Health Related Professions, Newark, New Jersey  
University of Medicine and Dentistry of New Jersey, Newark, New Jersey  
Instructor, Institute of Allied Medical Professions, New York, New York

## **Cynthia Silkowski, MA, RDMS, RVT**

Associate Professor and Chairperson, Department of Medical Imaging Sciences

Director, Diagnostic Medical Sonography  
School of Health Related Professions, Newark, New Jersey  
University of Medicine and Dentistry of New Jersey, Newark, New Jersey

## **Charles Odwin, BS, RT, PA-C, RDMS**

Physician Assistant, Department of Obstetrics and Gynecology  
North Central Bronx Hospital, Bronx, New York

Clinical Instructor, Emergency Medicine Residency Training Program  
Jacobi Medical Center, Bronx, New York

Clinical Instructor, Diagnostic Medical Sonography  
School of Health Related Professions, Newark, New Jersey  
University of Medicine and Dentistry of New Jersey, Newark, New Jersey  
Instructor, Institute of Allied Medical Professions, New York, New York



**JONES AND BARTLETT PUBLISHERS**

*Sudbury, Massachusetts*

BOSTON TORONTO LONDON SINGAPORE

*World Headquarters*

Jones and Bartlett Publishers  
40 Tall Pine Drive  
Sudbury, MA 01776  
978-443-5000  
info@jbpub.com  
www.jbpub.com

Jones and Bartlett Publishers  
Canada  
6339 Ormindale Way  
Mississauga, Ontario L5V 1J2  
Canada

Jones and Bartlett Publishers  
International  
Barb House, Barb Mews  
London W6 7PA  
United Kingdom

Jones and Bartlett's books and products are available through most bookstores and online booksellers. To contact Jones and Bartlett Publishers directly, call 800-832-0034, fax 978-443-8000, or visit our website, [www.jbpub.com](http://www.jbpub.com).

Substantial discounts on bulk quantities of Jones and Bartlett's publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones and Bartlett via the above contact information or send an email to [specialsales@jbpub.com](mailto:specialsales@jbpub.com).

Copyright © 2010 by Jones and Bartlett Publishers, LLC

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

This book is to be used only as a supplement to ultrasound education. It is not intended to replace required certified medical training for proficiency in diagnostic ultrasound procedures or interpretation.

The authors, editor, and publisher have made every effort to provide accurate information. However, they are not responsible for errors, omissions, or for any outcomes related to the use of the contents of this book and take no responsibility for the use of the products and procedures described. Treatments and side effects described in this book may not be applicable to all people; likewise, some people may require a dose or experience a side effect that is not described herein. Drugs and medical devices are discussed that may have limited availability controlled by the Food and Drug Administration (FDA) for use only in a research study or clinical trial. Research, clinical practice, and government regulations often change the accepted standard in this field. When consideration is being given to use of any drug in the clinical setting, the health care provider or reader is responsible for determining FDA status of the drug, reading the package insert, and reviewing prescribing information for the most up-to-date recommendations on dose, precautions, and contraindications, and determining the appropriate usage for the product. This is especially important in the case of drugs that are new or seldom used.

**Production Credits**

Publisher: David Cella  
Associate Editor: Maro Gartside  
Editorial Assistant: Teresa Reilly  
Senior Production Editor: Renée Sekerak  
Production Assistant: Jill Morton  
Marketing Manager: Grace Richards  
Manufacturing and Inventory Control Supervisor:  
Amy Bacus

Composition: Publishers' Design and Production  
Services, Inc.  
Cover Design: Scott Moden  
Cover Image: Courtesy of Phillips Image Gallery  
Printing and Binding: Malloy Incorporated  
Cover Printing: Malloy Incorporated

**Library of Congress Cataloging-in-Publication Data**

Abraham, Dunstan.

Emergency medicine sonography : pocket guide to sonographic anatomy and pathology / by  
Dunstan Abraham, Cynthia Silkowski, and Charles Odwin.  
p. ; cm.

Includes bibliographical references and index.

ISBN-13: 978-0-7637-6558-3

ISBN-10: 0-7637-6558-9

I. Medical emergencies—Ultrasonic imaging—Handbooks, manuals, etc. I. Silkowski, Cynthia.  
II. Odwin, Charles S. III. Title.

[DNLM: 1. Ultrasonography—methods—Handbooks. 2. Emergency Medicine—methods—  
Handbooks. WN 39 A159e 2010]

RC86.8.A285 2010

616.07'543—dc22

2009016101

6048

Printed in the United States of America

13 12 11 10 09 10 9 8 7 6 5 4 3 2 1

© Jones and Bartlett Publishers, LLC. NOT FOR SALE OR DISTRIBUTION.

**CONTRIBUTOR**

**Kalani Fernando, BS**

Instructor, Institute of Allied Medical Professions, New York, New York

**REVIEWER**

**Alan G. Dembner, MD**

Medical Director, Diagnostic Medical Sonography  
School of Health Related Professions, Newark, New Jersey  
University of Medicine and Dentistry, Newark, New Jersey

Chief, Diagnostic Ultrasound and CT Scanning  
Saint Barnabas Medical Center, Livingston, New Jersey



---

# CONTENTS

Acknowledgments .....	ix
Introduction .....	xi

## **Chapter 1: Ultrasound Nomenclature, Image Orientation, and Basic**

### **Instrumentation .....** **1** *Cynthia Silkowski*

Ultrasound Nomenclature .....	1
Ultrasound Texture .....	4
Ultrasound Artifacts .....	4
Ultrasound Description of Masses .....	9
Ultrasound Sectional Views .....	12
Sectional Views and Image Orientation .....	12
Image Recording .....	23
Technical Points .....	23
Summary .....	24

## **Chapter 2: The Liver .....** **25** *Dunstan Abraham*

Normal Sonographic Anatomy .....	25
Liver Pathology .....	31

## **Chapter 3: The Gallbladder and**

### **Bile Ducts .....** **47** *Dunstan Abraham*

Normal Sonographic Anatomy .....	47
Gallbladder Pathology .....	47

## **Chapter 4: The Pancreas .....** **71** *Dunstan Abraham*

Normal Sonographic Anatomy .....	71
Pancreatic Pathology .....	71

**Chapter 5: The Abdominal Aorta and**

**Inferior Vena Cava** .....84

*Dunstan Abraham*

Normal Sonographic Anatomy .....84

Inferior Vena Cava .....84

Major Distinguishing Features Between Aorta and  
Inferior Vena Cava on Sonography .....84

Pathology .....85

**Chapter 6: The Kidneys and Urinary**

**Bladder** .....92

*Dunstan Abraham*

The Kidneys .....92

Renal Pathology .....96

The Urinary Bladder .....118

Bladder Pathology .....118

**Chapter 7: The Gastrointestinal System** ...129

*Dunstan Abraham*

Normal Bowel .....129

Normal Appendix .....130

Pathology .....131

**Chapter 8: The Spleen and Lymph Nodes** ...136

*Dunstan Abraham*

Normal Sonography of the Spleen .....136

Splenic Pathology .....136

Malignant Tumors .....143

Lymph Nodes .....144

**Chapter 9: Blunt Abdominal Trauma** .....147

*Dunstan Abraham*

Complications of Blunt Abdominal Trauma Seen on  
Sonography .....147

Sonographic Findings in Blunt Abdominal Trauma ...147

**Chapter 10: The Scrotum and Testes . . . . .157**

*Dunstan Abraham*

Normal Sonography . . . . .157  
 Head of Epididymis . . . . .157  
 Body and Tail of Epididymis . . . . .157  
 Appendix Testis . . . . .157  
 Vasculature . . . . .157  
 Pathology . . . . .160

**Chapter 11: Lower Extremity Pathology . . .179**

*Kalani Fernando and Dunstan Abraham*

Popliteal Fossa Cyst (Baker’s Cyst) . . . . .179  
 Popliteal Artery Aneurysm . . . . .179  
 Calf Hematomas and Abscesses . . . . .179  
 Cellulitis . . . . .179  
 Pseudoaneurysms . . . . .179  
 Foreign Bodies . . . . .180

**Chapter 12: Fluid Collections and  
 Ultrasound Guided Procedures . . . . .183**

*Kalani Fernando and Dunstan Abraham*

Fluid Collections . . . . .183  
 Ultrasound-Guided Procedures . . . . .183  
 Summary . . . . .186

**Chapter 13: The Uterus . . . . .188**

*Cynthia Silkowski*

Normal Sonography of the Uterus . . . . .188  
 Measurement of the Endometrium . . . . .191  
 The Menstrual Cycle—Sonographic Appearances  
 of Endometrium . . . . .191  
 Postmenopausal Endometrium—Asymptomatic  
 Female . . . . .193  
 Uterine Location and Positions . . . . .193  
 Common Congenital Variations Seen on  
 Ultrasound . . . . .193

Pathology .....	197
Summary .....	214

**Chapter 14: The Ovaries and Fallopian**

<b>Tubes (Adnexa) .....</b>	<b>215</b>
-----------------------------	------------

*Cynthia Silkowski*

Normal Sonography of the Ovaries .....	215
Pathology .....	215
Ovarian Torsion .....	234
Fallopian Tubes .....	238
Pelvic Inflammatory Disease .....	239
Endometriosis .....	240
Nongynecological Pelvic Masses .....	243
Summary .....	245

**Chapter 15: First Trimester Normal and**

<b>Abnormal Pregnancy .....</b>	<b>247</b>
---------------------------------	------------

*Charles Odwin*

Sonographic Visualization of Normal Early Pregnancy .....	247
Multiple Pregnancies .....	258
Abnormal First Trimester Pregnancy .....	259
Ectopic Pregnancy .....	264
Summary .....	276
Suggested Reading List .....	279
Index .....	281

---

## ACKNOWLEDGMENTS

The authors thank Mr. Steven Calvin, BS, RDMS (Bronx Lebanon Hospital Center, Bronx, New York) and Ms. Christie Tragno (University of Medicine and Dentistry of New Jersey, Newark, New Jersey) for their time and resources during the preparation of this book.



---

## INTRODUCTION

The widespread availability of ultrasound technology in emergency medicine departments has enabled practitioners to evaluate critical patients more rapidly.

Emergent conditions, such as ectopic pregnancy and hemoperitoneum, can be diagnosed earlier so that decisions regarding management can be made without significant delay.

Obtaining the necessary technical and diagnostics skills to perform sonographic procedures and to interpret these images, however, can be both difficult and challenging. This is especially true for practitioners who lack formal training in this imaging modality.

This pocket guide is ideal for practitioners performing sonography who have at least a basic level of knowledge and technical skills. It covers normal sonographic anatomy in some detail as well as a spectrum of pathologies seen on sonography. The information is presented in a bulleted format and is supplemented with well-illustrated sonographic images. It is user friendly, and its small size makes it a useful source of reference at the bedside.

Although the book will be of great benefit to emergency medicine practitioners, others such as trauma specialists, residents, sonographers, and students may similarly find it quite helpful in clinical practice.

