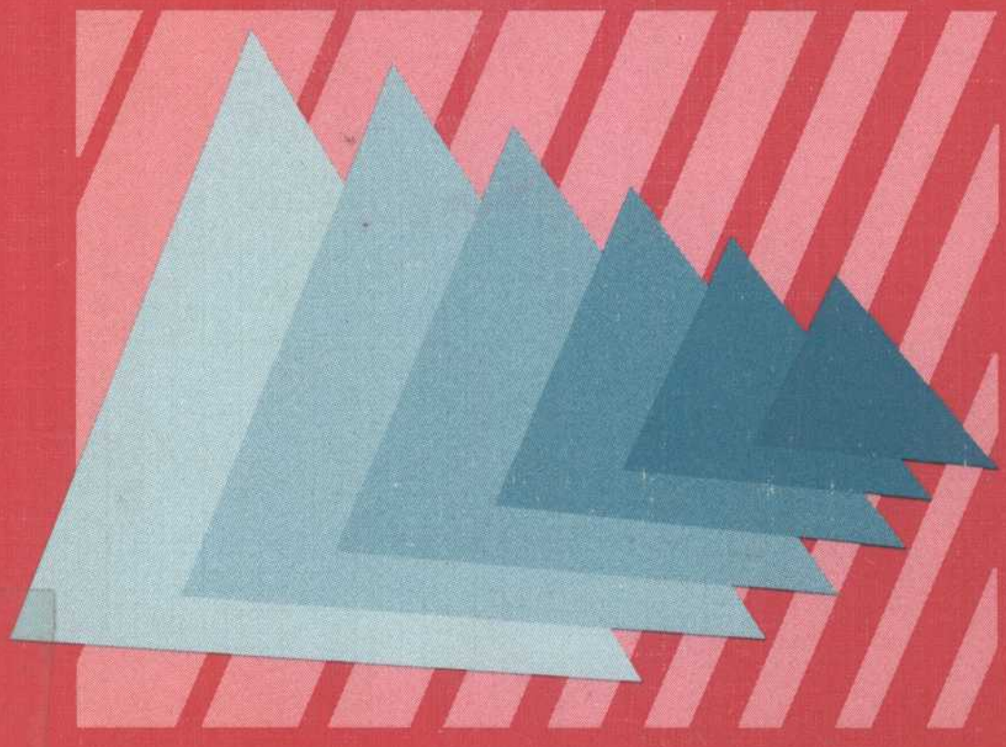
Radiology

POCKET REFERENCE

What to Order When

Ronald L. Eisenberg
Alexander R. Margulis



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What To Order When

Ronald L. Eisenberg, MD
Clinical Professor of Radiology
University of California at San Francisco
University of California at Davis

Chairman of Radiology
Alameda County Medical Center
Oakland, California

Alexander R. Margulis, MD, DSc (hon)
Professor of Radiology
University of California at San Francisco

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Contributors

Peter W. Callen, M.D.
Professor of Radiology,
Obstetrics, Gynecology
and Reproductive Science
University of California
School of Medicine
San Francisco, California

William Dillon, M.D.
Professor of Radiology,
Neurology and
Neurosurgery
Chief of Neuroradiology
University of California
School of Medicine
San Francisco, California

Burton P. Drayer, M.D.
Chairman, Department of
Radiological Sciences
Director of Magnetic
Resonance Imaging
St. Joseph's Hospital and
Medical Center
Barrow Neurological Institute
Phoenix, Arizona

N. Reed Dunnick, M.D.
Professor and Chair
Department of Radiology
University of Michigan
Ann Arbor, Michigan

Ronald L. Eisenberg, M.D.
Clinical Professor of
Radiology
University of California
School of Medicine
San Francisco, California
University of California
School of Medicine
Davis, California

Chairman of Radiology
Alameda County Medical
Center
Oakland, California

Richard M. Gore, M.D.
Professor of Radiology
Northwestern University
Medical School

Chief, Section of
Gastrointestinal Radiology
Evanston Hospital-McGaw
Medical Center of
Northwestern University
Evanston, Illinois

Hedvig Hricak, M.D., Ph.D.
Professor of Radiology,
Urology and Radiation
Oncology

Chief, Abdominal Imaging
Section
University of California
School of Medicine
San Francisco, California

Martin J. Lipton, M.D.
Professor and Chairman
Department of Radiology
The University of Chicago
The University of Chicago
Hospitals
Chicago, Illinois

Alexander R. Margulis, M.D., DSc (hon)
Professor of Radiology
University of California
School of Medicine
San Francisco, California

Charles E. Putman, M.D.
James B. Duke Professor of
Radiology
Professor of Medicine
Duke University Medical
Center
Executive Vice President for
Administration
Duke University
Durham, North Carolina

Donald Resnick, M.D.
Professor of Radiology
University of California, San
Diego

Chief, Osteoradiology Section
Veterans Administration
Medical Center
San Diego, California

Edward A. Sickles, M.D.
Professor of Radiology
Chief, Breast Imaging Section
University of California
School of Medicine
San Francisco, California

Preface

Medical imaging has made spectacular advances in the past fifteen years, reflecting the explosive developments in computers, electronics, and television. New cross-sectional imaging modalities are now widely used for diagnosing a broad spectrum of clinical disorders. Ultrasound is the most available and least expensive of these new techniques, but it is highly operator-dependent and requires rigorous training of technologists and physicians. Computed tomography is extremely versatile and has better signal-to-noise ratios than ultrasound. However, it is more expensive, uses ionizing radiation, and often requires the use of iodinated contrast media. Magnetic resonance imaging is the most sophisticated of these cross-sectional techniques, offering the best soft-tissue contrast resolution and the ability to image directly in multiple planes with a variety of pulse sequences. However, it is the most expensive and time-consuming of these imaging modalities. Nuclear medicine procedures now provide metabolic as well as morphological information, especially when using highly sophisticated tomographic procedures (SPECT, PET). The major disadvantage of nuclear medicine procedures is the need for the handling and disposal, the administration to patients, and in the case of PET, the very high cost of radioactive materials.

The availability of a wide variety of alternative imaging approaches comes at a time when the medical profession is facing severe financial constraints. Thus, it is essential

that the practicing physician and resident-in-training have an understanding of the advantages and limitations of the newer (and the traditional) imaging procedures and a conception of their relative costs.

To meet this critical need, we have developed the *Radiology Pocket Reference* to recommend the most efficient and cost-effective imaging strategies for 300 clinical problems. The book is organized to reflect the two basic situations that the clinician faces when ordering an imaging study. The first part of each section deals with those symptoms and signs that do not permit a single working diagnosis. The second part provides coherent strategies that can be used when there is a working clinical diagnosis to be confirmed, refined, or rejected by imaging procedures. For every symptom or sign, a list of differential diagnoses is offered; for each clinical diagnosis, there is a brief outline of typical signs and symptoms as well as predisposing factors.

Our guiding principle in selecting the order of imaging examinations has been the need to combine cost effectiveness and noninvasiveness with high diagnostic accuracy. However, the reader must always take into consideration such local conditions as the availability and adequacy of equipment and the expertise of the radiologists performing the recommended studies. Therefore, we often suggest alternative approaches to be taken when modern equipment and adequate expertise are not available.

To fit the goal of a pocket-sized book that would receive frequent use, we have used a terse outline approach, choosing to include more clinical scenarios at the expense of long explanations. We intentionally did not burden the reader with detailed statistical information on sensitivity, specificity, accuracy, and positive and negative predictive values, because these figures vary greatly, are often in dispute, and are constantly changing. Similarly, we chose not to include specific references that would have made the book substantially longer without providing any additional practical information. Nevertheless, we have taken a wealth of experimental data into account in selecting those

procedures that provide the highest likelihood of leading to the diagnosis.

To ensure that the information provided to the reader is up to date, each chapter has been edited by a prominent radiologist subspecializing in that area (in most instances the author of a highly regarded textbook in the field). Rather than repeat the same information throughout the book, we have included an appendix that describes the basics of each of the newer sophisticated imaging modalities as well as the relative costs of individual procedures in multiples of the basic chest radiograph.

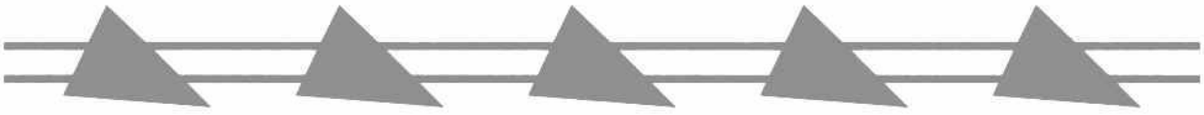
We sincerely hope that the pocket-sized format of the book will make it readily available when it is needed most—in the many clinical situations in which there is not enough time to go to the medical library and consult larger, more encyclopedic texts. We intend to keep this reference book current by adding or deleting information as it becomes available in the literature. To meet our overall goal, we would appreciate receiving suggestions from readers concerning ways in which we could make this pocket-sized reference book even more user friendly.

Ronald L. Eisenberg, M.D.
Alexander R. Margulis, M.D.

Contents

CHEST

Charles E. Putman



▶ SIGNS AND SYMPTOMS

Cough
Cyanosis
Dyspnea
Hemoptysis
Pleurisy
Stridor
Upper Airway Obstruction
Wheezing

▶ DISORDERS

Abscess (Lung)
Adult Respiratory Distress Syndrome
Asbestosis
Asthma
Atelectasis
Bronchiectasis
Bronchogenic Carcinoma
Bronchopleural Fistula
Chronic Bronchitis
Emphysema
Empyema
Hypersensitivity Lung Disease
Infectious Granulomatous Disease
Mediastinal Mass
- Anterior
- Middle
- Posterior
- Superior

Metastases (Pulmonary)
Pleural Effusion
Pneumoconioses
Pneumomediastinum
Pneumonia
Pneumonia in AIDS
Pneumothorax
Proper Tube Placement
Pulmonary Edema
Pulmonary Embolism
Pulmonary Fibrosis
Pulmonary Nodule
Sarcoidosis
Trauma (Blunt Chest)
Wegener's Granulomatosis

Cough

Common Causes

Inflammatory (laryngitis, tracheitis, bronchitis, bronchiolitis, pneumonia, lung abscess)
Mechanical (compression of airway due to neoplasm, foreign body, granulomas, bronchospasm)
Inhalation of particulate material (pneumoconioses)
Chemical (inhalation of irritant fumes, including cigarette smoke)
Thermal (inhalation of cold or very hot air)

Approach to Diagnostic Imaging

▸ **1. Plain chest radiograph**

▸ Preferred screening technique to demonstrate infection, neoplasm, or diffuse pulmonary parenchymal disease

Notes: Additional imaging studies are rarely needed except for appropriate follow-up radiographs (because the overwhelming majority of patients with clinically significant new cough will have pneumonia, bronchitis, or some other acute infectious disease of the respiratory tract).

Because a negative chest radiograph does not exclude a pneumonia (or cancer), especially in the immunocompromised patient, if an antibiotic-sensitive infection is suspected clinically a sputum specimen should be obtained and the patient treated despite the unrevealing film.

Cyanosis

Presenting Signs and Symptoms

Bluish discoloration of the skin or mucous membranes (due to excess of reduced hemoglobin in the blood)

Common Causes

Impaired pulmonary function (pneumonia, pulmonary edema, chronic obstructive pulmonary disease)

Anatomic vascular shunting (congenital heart disease, pulmonary arteriovenous fistula)

Decreased oxygen in inspired air (high altitude)

Abnormal hemoglobin

Approach to Diagnostic Imaging

- **1. Plain chest radiograph**
  - Preferred screening technique to demonstrate underlying pulmonary or cardiac abnormality

Dyspnea

Presenting Signs and Symptoms

Shortness of breath
Difficulty breathing on exertion
Uncomfortable awareness of breathing (increased muscular effort required)

Common Causes

Physical exertion
Hypoxia (high altitude)
Restrictive lung disease (pulmonary fibrosis, chest wall deformity)
Obstructive lung disease (emphysema, asthma)
Congestive heart failure
Pulmonary embolism

Approach to Diagnostic Imaging

- **1. Plain chest radiograph**
  - Best screening technique for identifying an underlying pulmonary or cardiac cause (and any need for appropriate additional imaging studies)

Note: Soft-tissue views of the neck (or fiberoptic examination) may be helpful in patients with suspected acute upper airway obstruction.

Hemoptysis

Presenting Signs and Symptoms

Coughing up blood (resulting from bleeding from the respiratory tract)

Common Causes

Infection (pneumonia, tuberculosis, fungus, lung abscess)
Bronchogenic carcinoma
Bronchiectasis
Bronchitis
Pulmonary infarction (secondary to embolism)
Congestive heart failure

Approach to Diagnostic Imaging

- **1. Plain chest radiograph**
  - Initial screening procedure
  - Normal study does not exclude neoplasm or bronchiectasis as the cause of the bleeding
- **2. Fiberoptic bronchoscopy**
  - Indicated in the patient with a high clinical suspicion of malignancy and a relevant abnormality on the plain chest radiograph
  - Relatively invasive procedure with potential complications (e.g., hemorrhage, pneumothorax, hypoxemia)
- **3. Computed tomography**
  - Indicated in the patient with a normal chest radiograph in whom the clinical suspicion of malignancy is relatively low
  - Indicated if a neoplasm is not detected by fiberoptic bronchoscopy (which is unreliable in locating peripheral tumors demonstrable by CT)

Caveat: Despite a systematic and intensive search, the cause of hemoptysis will not be found in 30–40% of cases.

Pleurisy

Presenting Signs and Symptoms

Pain that is aggravated by breathing or coughing (may be of sudden onset, chronic, or recurring)
Rapid and shallow respiration
Limited motion of the affected side
Decreased breath sounds on the affected side
Pleural friction rub (characteristic finding that is often absent and frequently heard only 24–48 hours after the onset of pain)

Common Causes

Pneumonia
Tuberculosis
Pulmonary embolism
Trauma
Neoplasm
Occult rib fracture
Congestive heart failure
Mixed connective tissue disease
Pancreatitis

Approach to Diagnostic Imaging

- **1. Plain chest radiograph**
  - Preferred screening technique that may demonstrate the underlying pulmonary, rib, or chest wall abnormality as well as a confirming pleural effusion

Stridor

Presenting Signs and Symptoms

Musical sound that is predominantly inspiratory and is loud enough to be heard without a stethoscope at some distance from the patient (heard better over the neck than over the chest)

Common Causes

Upper airway obstruction
Epiglottitis
Croup
Inhaled foreign body
Pharyngeal tumor
Glottic edema
Retropharyngeal abscess

Approach to Diagnostic Imaging

► **1. Plain radiograph of the neck (soft-tissue technique)**
  ► Preferred screening technique to demonstrate narrowing or luminal obstruction of the upper airway (lateral projection is often more valuable than the frontal view)

Note: Laryngoscopy or CT of the neck may be required, especially in older patients in whom malignancy is more common and infection is a less likely cause.