DIAGNOSTIC IMAGING AND ANATOMY IN ACUTE CARE

Edited by

JOSHUA LAUDER
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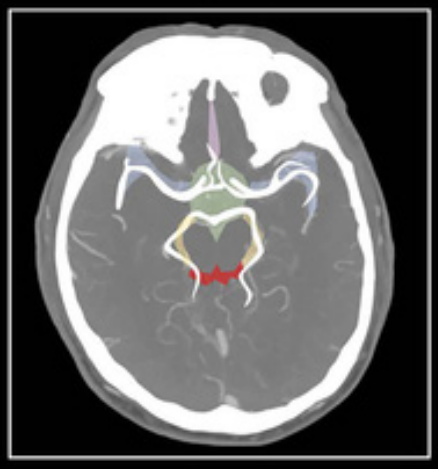

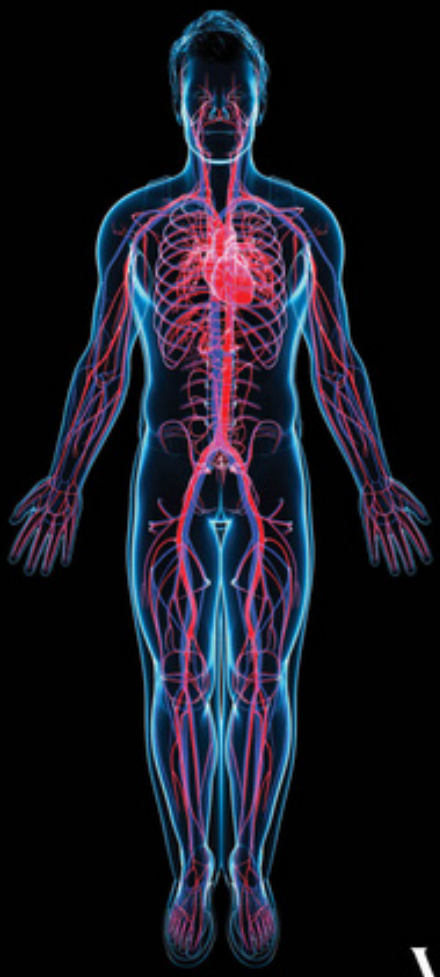

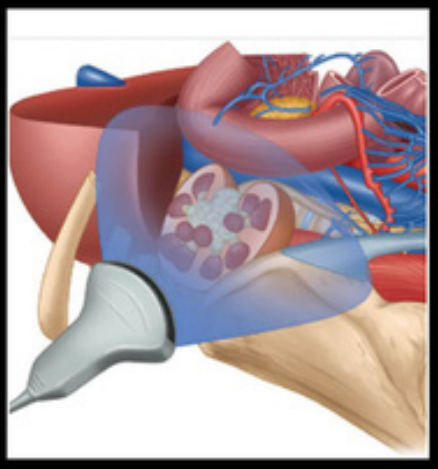

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PREFACE

There is a growing reliance upon imaging in medicine and surgery. Radiology is a rapidly expanding sector and with this expansion comes increasing complexity. This book will give the reader a contemporary overview of the differing radiology modalities: X-ray, CT, nuclear medicine, MRI, ultrasound and interventional. These will be explored using acute cases which commonly present to emergency and urgent care.

You will see there is a focus on pictures, allowing you to compare normal anatomy with pathology. Radiology relies heavily on pattern recognition, which humans are naturally good at. To help you with this natural talent, the images will be annotated with clinically relevant anatomy. As well as radiological images, there will be relevant anatomical images, allowing cross-reference with previous anatomical knowledge.

This book is designed to be accessible to many different readerships. Front-line clinicians involved in acute care should find the array of clinical cases relevant to their practice. Specialty doctors who would like to know more about imaging modalities will find this a useful starting point before more focused specialty-specific resources. Nurses and allied health professionals with an interest in anatomy and imaging will benefit from the variety of pathology and imaging displayed. Students of the above disciplines could use this as a starting point to learn about radiology.

After reading this book, you will have a greater understanding of different radiology modalities, their indications, advantages and limitations. You will also begin to able to recognise pathology on imaging, which you can apply to your clinical practice. Finally, the book will equip you with radiology terminology which will improve your understanding of radiology reports.

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ABBREVIATIONS

Abbreviation	In full
AAA	Abdominal Aortic Aneurysm
ADC	Apparent Diffusion Coefficient
AP	Anteroposterior
AXR	Abdominal X-ray – plain
CT	Computed Tomography
CT KUB	Computed Tomographic Kidney, Ureter and Bladder
CTPA	Computed Tomographic Pulmonary Angiogram
CXR	Chest X-ray – plain
DSA	Digital Subtraction Angiography
DVT	Deep Venous Thrombosis
DWI	Diffusion-weighted Imaging
eFAST	Extended Focused Assessment using Sonography in Trauma
ERCP	Endoscopic Retrograde Cholangiopancreatography
EVAR	Endovascular Aneurysm Repair
FIO_2	Fraction of Inspired Oxygen
FLAIR	Fluid-attenuated Inversion Recovery
HU	Hounsfield Unit
MEWS	Modified Early Warning Signs
MIP	Maximum Intensity Projection
MRA	Magnetic Resonance Angiography
MRCP	Magnetic Resonance Cholangiopancreatography
MRI	Magnetic Resonance Imaging
NICE	National Institute for Health and Care Excellence
PDFS	Proton Density with Fat Suppression
PERC	Pulmonary Embolism Rule out criteria
PET	Positron Emission Tomography
SpO_2	Oxygen Saturation
STIR	Short Tau Inversion Recovery
US	Ultrasound
V/Q	Ventilation Perfusion Scan

ABOUT THE COMPANION WEBSITE

This book is accompanied by a companion website:

www.wiley.com/go/DiagnosticImaginginAcuteCare

This website includes:

- Label the Diagram (Quiz images)
- Annotated Images in PPT format
- Un-annotated images in PPT format

CHAPTER 1

Radiology Introduction

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1.1 Section/Chapter Order

The sections are arranged so they go through the various imaging modalities, starting with plain radiology, then ultrasound, CT and MR. The chapters in each section go from simple to more complex where information from the previous chapters is used.

This introductory chapter provides an overview of the different modalities covered in the book, the rationale for their use and an explanation of common terminology. Our advice is to scan this initially. Then, as you read other parts of the book, you will be encouraged to return to relevant parts in this chapter to refresh your memory.

Each of the remaining chapters starts with a clinical case and the images used in the acute situation. There are then questions asking for a differential diagnosis and preliminary interpretation of the images. The imaging modality is then explained along with a review of the relevant anatomy. The chapter concludes with the questions being reviewed and answers provided.

1.2 Imaging Modalities

Through this book you will develop an overview of each imaging modality and its advantages and limitations. Often, the best way to learn this is using examples of normal anatomy and pathology so you will be referred to relevant images in the other chapters.

Don't get bogged down in the technical aspects of physics and scan acquisition (unless you are particularly interested). Radiology interpretation is primarily pattern based and appreciating the image is the most important bit.

Radiological terminology will be introduced here and throughout the book. It helps to understand what these terms mean as they crop up throughout radiology reports. Being able to link the terminology with what you can see in the image is a vital step in using these investigations appropriately.

1.3 Ionising Radiation

It helps to divide the imaging modalities into those which expose the patient to ionising radiation and those which don't.

Exposure to ionising radiation	No exposure to ionising radiation
	
X-ray	Ultrasound
CT (computed tomography)	MRI (magnetic resonance imaging)
Nuclear medicine	

Ionising radiation is a type of energy released in the form of electromagnetic waves (e.g. gamma/X-rays) or particles (neutrons, beta or alpha). In diagnostic radiology, it is nearly all in the form of high-energy electromagnetic waves. Ionising particles are used more in clinical oncology.

As these waves are high energy, they can displace the electrons from atoms in the body, which causes them to ionise. This ionisation can cause mutations in DNA and has the potential to induce cancers at high doses or cumulative low doses. For this reason, any ionising radiation exposure must be justified.

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