

Imaging in Oncological Urology

Jean J.M.C.H. de la Rosette
Michael J. Manyak
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Editors

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and

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 Springer

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Foreword

The past decade has seen dramatic advances in urology and imaging. These changes are evident in improvements in laparoscopic surgery as well as in the emergence of multidetector CT, with multiplanar reformatting and FDG-PET-CT as routine imaging methods. The new minimally invasive procedures often require more exacting imaging as the surgeon does not have the same visual field of view as was possible with open procedures. Thus, it is appropriate now to provide an update on imaging advances for the benefit of urologists and radiologists alike. The increasing number of innovative imaging approaches to urologic tumors including CT, MRI, PET, SPECT, and endoscopic imaging can be perplexing and lead to over- and underestimations of the capabilities of modern imaging on the part of those who interpret them and those who use the information they provide for patient management. There is a growing “expectations gap” between what is expected and what is possible that needs to be closed. While previous books have focused on the more common urologic tumors such as bladder, prostate, and kidney cancer, none has attempted a comprehensive review of the state of the art of imaging in most of the tumors involved in urologic oncology. *Imaging in Urologic Oncology* addresses these challenges.

In the modern imaging department it is easy to forget how useful conventional plain radiography can be in urologic diagnosis. Much of our current understanding of urologic disease is based on the “classic appearance” on intravenous urograms, cystograms, or retrograde pyelograms. Therefore, conventional imaging provides the first “layer” in our understanding of urologic tumors. The next layer is cross-sectional imaging. The impact of cross-sectional imaging on the detection of renal and adrenal tumors can be seen from the steady decrease in the average size of renal tumors detected today in comparison to 10 years ago. Today subcentimeter tumors can be routinely identified and characterized. This has had important implications for the management of these lesions and the need to biopsy or observe them. Perhaps more profoundly it has shaken the concept of what tumors are, how often they occur, and how often they are occult. For the urothelial tract, CT and MR urography have become the new gold standard for diagnosis. The use of virtual endoscopy—based on CT or MRI data—is opening up new opportunities for early diagnosis with more complete characterization tumor invasion and staging of urothelial tract tumors. The use of MRI for prostate cancer detection continues to evolve with improvements in sensitivity and specificity as new techniques such as spectroscopy, diffusion weighted imaging, and dynamic contrast enhancement are employed. These subjects are reviewed in depth in this book.

The final layer in each section is radionuclide and PET imaging. Although these fields have played a minor role to date in urologic oncology, this situation is changing fast. The potential of these methods is obvious to anyone who experiences the dramatic diagnostic power of an FDG-PET-CT scan when detecting a metastatic lesion that, even in retrospect, was nearly invisible on the CT. Although the role of PET-CT is evolving in urologic oncology, it clearly has a promising future.

The final chapters of this book are appropriately devoted to the future. The editors had to make some difficult decisions about what to cover and they chose well. The insights of the

contributing authors, all of whom are thought leaders in their areas, provide tantalizing insights into what is “around the corner.” Image-guided therapeutic interventions have the potential to improve patient outcome, decrease morbidity, and speed procedure time while reducing costs. New contrast media will provide highly targeted and specific information on the biology of tumors without the need for biopsy. Optical contrast agents may dramatically improve the diagnostic capabilities of “white light” endoscopy, as it is currently performed, as targeted fluorescent conjugates are used to highlight tiny tumor clusters, while they are still completely curable. And finally, in a “back to the future” chapter, elasticity imaging may allow us to not only see cancers more easily but “feel” them as well.

Thus, *Imaging in Urologic Oncology* provides a needed resource to health care providers who are concerned with the diagnosis and management of urologic tumors in patients who suffer from them. It is this last group that stands to benefit most from this work.

Bethesda, MD, USA

Peter L. Choyke, M.D.

Foreword

The advances in urological imaging in the past decade have been considerable. The improvement in existing technology and the introduction of new methods of imaging have helped the clinician in urological oncology. For example, it is now much easier to be certain of the volume of disease and also its whereabouts; biopsy techniques have now become more reliable; interventional procedures to relieve ureteric obstruction have become more routine and certainly less traumatic for the patient. Innovation has been prevalent in the field of imaging in urological oncology and it is essential for urologists to maintain their knowledge of a fast-growing field.

It is often the case that radiologists send their descriptions of new techniques preferentially to their own specialist journals. I know that very frequently now imaging papers are being sent to urological journals, a practice I would thoroughly endorse speaking as editor-in-chief of such a journal. It is a pleasure therefore to introduce a book in which radiologists and urologists, whose main interests lie in urological oncology, have collaborated to produce an excellent textbook of imaging in urological oncology.

Each of the urological cancers is covered using a similar format in every case. The introduction is by a urologist, and the three sections on imaging for each cancer have been written by radiologists (although in some cases they are written by urologists). At the end of each cancer topic the urologists have written a section entitled "Considerations." In this they discuss the impact of imaging technology on the practice of urological oncology. It is a rather novel and in my opinion successful way of covering the subject and I feel that it should be required reading for urologists. Given the excellence of the writers and their high academic standing, I feel that it will be read by radiologists also. With the emphasis nowadays in cancer management on multi-disciplinary approaches, this book embodies that principle and will be a superb addition to the literature.

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Preface

Novel and significant changes in the area of oncologic imaging have had a positive impact on the ability to non-invasively stage bladder, prostate, penile, testicular, adrenal, and renal tumors. Most of these imaging enhancements are closely related and parallel the clinical impact of these tumors: for example as prostate cancer becomes the most common malignancy in men, there is a push to use imaging for both accurate staging prior to therapy and also as a means to follow patients after therapy. Most of the novel and cutting-edge therapeutic techniques being developed to treat these genitourinary tumors are increasingly more dependent on imaging for better tumor delineation and evaluation. The mainstay for imaging used to be conventional imaging techniques with transrectal and transabdominal ultrasound, angiography, and intravenous contrast studies. Significant improvements in image processing and resolution in cross-sectional imaging with computed tomography, magnetic resonance imaging, and now single photon emission computed tomography have brought dramatic changes in our ability to assess genitourinary malignancies of all types. Improvements in contrast agents and superimposition of functional studies with anatomical studies have now made molecular imaging with radionuclides part of our armamentarium for these neoplasms.

What can the expected impact of imaging be on the future of uro-oncology? Although the current orientation for imaging has been anatomic and organ specific, the striking improvements in imaging related to functional activity are now being combined with the anatomic data to give a more complete assessment of the disease process in all stages. The development of new molecular markers and the incorporation of virtual technology will provide a true fusion of technology that is bound to have an impact on our management of oncological problems. We are currently limited by our inability to detect disease at its earliest stages, follow it closely through a course of therapy, and monitor it after treatment. Imaging is a major key to improvements that may make management of cancer similar to that of other chronic diseases such as diabetes or hypertension. This text presents the state of the art for imaging in urological oncology and gives a glimpse of future directions for research in this exciting field.

Jean de la Rosette
Michael Manyak
Mukesh Harisinghani
Hessel Wijkstra

Contents

Part I Adrenal Carcinoma

- 1 **Adrenal Carcinoma: Introduction** 3
G. Alivizatos
- 2 **Cross-Sectional Imaging of Adrenal Masses** 5
T.M. Wah, J.A. Guthrie, and A.D. Joyce
- 3 **Adrenal Carcinoma – Radionuclide Imaging** 29
A. Becherer, G. Karanikas, M. Mitterhauser, W. Wadsak,
G. Zettinig, and G. Rendl
- 4 **Considerations: Imaging in Adrenal Carcinoma** 43
A.D. Joyce, J.A. Guthrie, and T.M. Wah

Part II Renal Cell Carinoma

- 5 **Renal Cell Carcinoma: Introduction** 47
H. Van Poppel and D. Thüer
- 6 **Renal Cell Carcinoma: Conventional Imaging Techniques** 53
B.C. Lucey and C. Ingui
- 7 **Cross-Sectional Imaging of Renal Cell Carcinoma** 61
A.E.T. Jacques and R.H. Reznek
- 8 **Radionuclide Imaging in Renal Cell Carcinoma** 85
A. H. Brouwers and P.L. Jager
- 9 **Considerations: Imaging in Renal Cell Carcinoma** 105
S. Sengupta and M.L. Blute

Part III Urothelial Cell Carcinoma Upper Urinary Tract

- 10 **Urothelial Cell Carcinoma of the Upper Urinary Tract** 115
S. Gudjónsson and W. Månsson
- 11 **Urothelial Cell Carcinoma of the Upper Urinary Tract: Introduction** 121
B.A. Inman, M.L. Blute, and R.P. Hartman

| | |
|---|-----|
| 12 Cross-Sectional Imaging Techniques in Transitional Cell Carcinoma of the Upper Urinary Tract | 145 |
| K.S. Jhaveri, P. O'Keefe, M. O'Malley, and M. Haider | |
| 13 Urothelial Cell Carcinoma in Upper Urinary Tract – Role of PET Imaging | 155 |
| J. Palou, I. Carrió, and H. Villavicencio | |
| 14 Considerations: Imaging in Upper Urinary Tract Urothelial Carcinoma | 161 |
| J. Rassweiler and D. Teber | |
| Part IV Urothelial Cell Carcinoma Lower Urinary Tract | |
| 15 Urothelial Carcinoma of the Lower Urinary Tract: Introduction | 169 |
| M. Manoharan, R. Ayyathurai, and M.S. Soloway | |
| 16 Urothelial Cell Carcinoma in Lower Urinary Tract: Conventional Imaging Techniques | 177 |
| C.Y. Nio | |
| 17 Cross-Sectional Imaging of the Lower Urinary Tract | 185 |
| M.A. Blake and B.N. Setty | |
| 18 Urothelial Cell Carcinoma in Lower Urinary Tract: Radionuclide Imaging | 201 |
| H.R. Ham and C. van de Wiele | |
| 19 Considerations: Imaging in Urothelial Cell Carcinoma of the Lower Urinary Tract | 205 |
| T.M. de Reijke | |
| Part V Prostate Carcinoma | |
| 20 Prostate Carcinoma: Introduction | 211 |
| E.A. Klein | |
| 21 Prostate Carcinoma: Conventional Imaging Techniques – Gray-Scale, Color, and Power Doppler Ultrasound | 221 |
| M. Mitterberger, L. Pallwein, and F. Frauscher | |
| 22 Prostate Carcinoma – Cross-Sectional Imaging Techniques | 229 |
| E. Sala and H. Hricak | |
| 23 Prostate Carcinoma: Radionuclide Imaging and PET | 249 |
| N. Lawrentschuck, A.M. Scott, and D.M. Bolton | |
| 24 Considerations: Imaging in Prostate Cancer | 269 |
| A. Heidenreich | |
| Part VI Testis Carcinoma | |
| 25 Testicular Carcinoma: Introduction | 279 |
| P. Albers and P. Laguna | |

| | |
|--|-----|
| 26 Testicular Carcinoma – Conventional Imaging Techniques | 283 |
| M.A. Saksena and M.G. Harisinghani | |
| 27 Cross-Sectional Imaging Techniques: The Use of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) in the Management of Germ Cell Tumors | 287 |
| M. De Santis, G. Strau, and M. Bachner | |
| 28 Positron Emission Tomography (PET) in Germ Cell Tumors (GCT) | 305 |
| M. De Santis, A. Maj-Hes, and M. Bachner | |
| 29 Considerations: Imaging in Testis Carcinoma | 315 |
| M.A.S. Jewett | |
| Part VII Penis Carcinoma | |
| 30 Penis Carcinoma: Introduction | 321 |
| D.M. Rodin, S. Tabatabaei, and W.S. McDougal | |
| 31 Conventional Imaging in Penis Cancer | 335 |
| M.G. Harisinghani and M.A. Saksena | |
| 32 Cross-Sectional Imaging in Penis Cancer | 337 |
| M.A. Saksena and M.G. Harisinghani | |
| 33 Penis Carcinoma – Radionuclide Imaging and PET | 347 |
| R.A. Valdés Olmos, B.K. Kroon, C.A. Hoefnagel, and S. Horenblas | |
| 34 Considerations: Imaging in Penis Carcinoma | 353 |
| S. Horenblas, B.K. Kroon, R.A. Valdés Olmos, and C.A. Hoefnagel | |
| Part VIII Future Directions | |
| 35 Future Directions in Urological Imaging | 363 |
| H. Wijkstra | |
| 36 Image-Guided Robotic Assisted Interventions | 365 |
| A. Patriciu, M. Muntener, L. Kavossi, and D. Stoianovici | |
| 37 Future Directions – New Developments in Ultrasound | 373 |
| G.A. Schwartz and M.A. Averkiou | |
| 38 Future Directions – Contrast Media | 381 |
| S.D. Allen, C.J. Harvey, M. Blomley, and P. Dawson | |
| 39 Virtual Imaging | 395 |
| M.J. Stone and B.J. Wood | |
| 40 Optical Imaging and Diagnosis in Bladder Cancer | 407 |
| M. Grimbergen, M.C. Aalders, and T.G. van Leeuwen | |

| | |
|------------------------------------|-----|
| 41 Elasticity Imaging | 421 |
| R. Souchon | |
| 42 Future Directions | 429 |
| D. Cosgrove | |
| Index | 433 |

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