
Clinical Ultrasound in Nephrology

Mario Meola
Editor

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Second Edition

 Springer

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Illustrations: Eureka S.r.l., Lucca, Italy. We thank the publisher for granting permission to use them in the English edition.

ISBN 978-3-032-24766-7 ISBN 978-3-032-24767-4 (eBook)

<https://doi.org/10.1007/978-3-032-24767-4>

Translation from the Italian language edition: "Ecografia clinica in Nefrologia" by Mario Meola, © Mario Meola 2025. Published by Mario Meola . All Rights Reserved.

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To my family,

The roots that have given me love, strength, determination, and resilience.

To my children, Chiara and Giulio.

To Ilaria, for her love, dedication, and patience.

Preface

Nephrology is often described as a declining specialty. Fewer young physicians choose it, and its appeal is increasingly undermined by a narrow and misleading perception: nephrology as a discipline devoted almost exclusively to the management of chronic dialysis.

This view is not only reductive—it is profoundly inaccurate.

Nephrology is far more than dialysis. It is the exploration of nephron and tubulointerstitial physiology, the prevention of chronic kidney disease, and the study of renal involvement in systemic disorders. It encompasses assessment of renal masses, inherited and congenital cystic diseases, urolithiasis, secondary nephropathies, and diabetes- and hypertension-related kidney damage. It includes kidney transplantation, the first-line treatment for end-stage kidney disease. It integrates clinical medicine and pathophysiology with diagnostic imaging, including ultrasound, Doppler studies, and multiparametric ultrasound, as well as the management of vascular access and its complications. In essence, nephrology is a comprehensive and intellectually demanding specialty with significant potential for expansion in both research and clinical practice.

Any textbook addressed to nephrologists should therefore aspire to provide modern, structured, and genuinely multidisciplinary knowledge. This need has become even more evident in the era of artificial intelligence. While AI can already deliver vast amounts of information on chronic kidney disease, dialysis, and transplantation—accurate, rational, and well organized—such information remains inherently impersonal. It is the product of a robust algorithm, but one that still lacks the lived human experience of clinical decision-making at the bedside.

The ambition of this book is precisely to bridge that gap. It offers a perspective rooted in everyday clinical practice. It is designed as a practical guide for point-of-care ultrasound and for ultrasound-guided diagnostic and interventional procedures, including renal biopsy, arteriovenous fistula cannulation in the dialysis unit, vascular access mapping and active surveillance, and peritoneal catheter placement. Training in these subspecialties may be among the most effective strategies to rekindle interest in nephrology and to revitalize a discipline facing an identity crisis.

This volume represents the first English edition of a work that has evolved through two previous Italian editions, reflecting decades of experience in clinical and interventional ultrasound, education, and ongoing technological advances. It aims to introduce and accompany both young nephrologists and

experienced specialists in the use of ultrasound and Doppler techniques. Throughout the book, technical principles are consistently integrated with comparative anatomy and pathophysiology to support a truly clinical approach to ultrasound, always interpreted within the broader context of the individual patient.

I hope that this work will contribute to improving the reader's skills and clinical practice, and that it may help restore curiosity, competence, and confidence in the use of clinical ultrasound within nephrology.

Pisa, Italy

Mario Meola

Acknowledgments

I want to express my sincere gratitude to all the authors who contributed to the creation of this book.

I am particularly grateful to Eureka Editore (Lucca) for their professionalism and expertise in the development of the images and diagrams that enrich this volume.

Finally, I wish to thank all the students of the Sant'Anna of Advanced Studies who actively contributed to the English translation of the text.

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