

# Manual of Sperm Retrieval and Preparation in Human Assisted Reproduction

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# Manual of Sperm Retrieval and Preparation in Human Assisted Reproduction

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Every effort has been made in preparing this book to provide accurate  
and up-to-date information that is in accord with accepted standards  
and practice at the time of publication. Although case histories are  
drawn from actual cases, every effort has been made to disguise the  
identities of the individuals involved. Nevertheless, the authors, editors,  
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information provided by the manufacturer of any drugs or equipment  
that they plan to use.

To my father Professor RC Agarwal (late) for instilling the virtues of honesty, dedication, and hard work. To my wonderful wife, Meenu, sons, Rishi and Neil-Yogi, for their unconditional love and support. To Professor Kevin Loughlin (Harvard Medical School), Professor Anthony Thomas (late) (Cleveland Clinic), and Professor Edmund Sabanegh (Cleveland Clinic) for their friendship, guidance, and support, and for making an indelible positive impression on my life. To my associates at work, large number of researchers and students, and most importantly the patients who placed their trust in our work.

Ashok Agarwal

I would like to dedicate this book to my wife, Zeinab, and our two lovely daughters, Sarah and Tala, for their love and support; to my mentors, Dr. Edmund Sabanegh and Professor Ashok Agarwal (Cleveland Clinic), for their guidance and support and for all the opportunities they made possible.

Ahmad Majzoub

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Sandro C. Esteves

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Dr. Majzoub is a consultant at the Department of Urology and Program Director of the Andrology and Male Infertility Fellowship at Hamad Medical Corporation, Doha, Qatar. He is an Arab Board Certified Urologist and has undergone Clinical and Research Fellowship in Andrology at the world-famous Glickman Urological and Kidney Institute and the American Center for Reproductive Medicine at Cleveland Clinic Foundation, Cleveland, USA.

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Dr. Sandro C. Esteves is Medical Director of ANDROFERT, a referral fertility center for male reproduction in Brazil. Dr. Esteves is also Collaborating Professor in the Department of Surgery (Division of Urology) at the University of Campinas (UNICAMP, Brazil) and Honorary Professor of Reproductive Endocrinology at the Faculty of Health, Aarhus University, Denmark. Professor Esteves has published over 300 peer-reviewed scientific papers, authored over 80 book chapters, and served as an editor of 10 textbooks related to male infertility and assisted reproductive technology. He serves on the editorial board of several journals and is Associate Editor of *International Brazilian Journal of Urology* and *Frontiers in Endocrinology (Reproduction)*.

## Preface

The field of male infertility has witnessed major clinical advancements in recent years, and perhaps the most important of these was the development of testicular sperm retrieval procedures that allowed men with azoospermia to father their biological children. Epididymal sperm retrieval procedures were first performed in the 1980s for men with obstructive azoospermia. The realization that men with nonobstructive azoospermia may indeed have focal areas of testicular sperm production together with the documented fertilizing ability of testicular spermatozoa allowed the development of testicular sperm retrieval procedures in the 1990s. Subsequently, testicular sperm retrieval underwent further refinement with the introduction of microsurgery, which improved the sperm retrieval rate and at the same time reduced the potential adverse impact of surgery on testicular parenchyma. Extensive research has been conducted in attempts to study the predictors of positive sperm retrieval, hoping to increase the outcome of surgical sperm retrieval procedures.

This manual presents recent advancements in the surgical management of azoospermia patients. It is divided into three parts: Part I serves as an introduction presenting important anatomic and physiologic aspects of the reproductive tract and demonstrating the ideal methods for evaluating candidates of sperm retrieval. Part II elaborates on the surgical techniques of sperm retrieval in a variety of clinical scenarios.

Moreover, it investigates the predictors of successful sperm retrieval and explores methods for enhancing sperm retrieval outcomes. Finally, Part III focuses on the laboratory handling of retrieved sperm and sperm cryopreservation, and explores future directions aimed at optimizing embryologists' work in the lab.

We are confident that our book will be a useful guide for reproductive surgeons, IVF specialists, embryologists, and other healthcare workers practicing reproductive medicine. In addition, it will be a valuable resource for students and researchers wishing to learn more about this subject. We are greatly thankful to large number of experts who worked hard to contribute the latest, well written, and well researched articles; this book would not be possible without their active support. We wish to express our deep gratitude to the superb organizational and management skills of Camille Lee-Own, publishing assistant at Cambridge University Press, and the overall support and supervision of this project by Nick Dunton, publisher at Cambridge University Press. This book is dedicated to our parents, families, mentors, and patients.

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