The Undescended Testis

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YEAR BOOK MEDICAL PUBLISHERS, INC
CHICAGO • LONDON

Library of Congress Cataloging in Publication Data
Main entry under title:

The undescended testis.

Includes index.
1. Cryptorchidism. I. Fonkalsrud, E. W.
II. Mengel, Wolfgang. [DNLM: 1. Cryptorchidism.
WJ840 U56]
RJ477.5.C74U52 618.92'68 80-19479
ISBN 0-8151-3257-3

To the children of today and tomorrow, from the children of yesterday and from the contributing authors, who have shared their special expertise to provide better care for the young of the future

Foreword

Orchiopexy is the third most common major surgical operation performed by children's surgeons. Two hundred and thirty recently certified pediatric surgeons reported that 5% of some 75,000 operations involved the correction of this poorly understood congenital malformation, which occurs in nearly 1% of the male population. Thus, Fonkalsrud and Mengel's book deals with a surprisingly common problem. Because of the international representation of the authors, this timely volume should provide more standardization in the management of individual children who are born with the "empty scrotum" syndrome. When 22 authors from 12 institutions in 6 different countries converge on the cryptorchid male, the results should be rewarding—and this volume is!

From the Introduction to the concluding Summary, authoritative discussions are presented on the embryogenesis of the malformation, problems in its diagnosis, potential adverse effects, and the methods and results of a wide variety of therapies in different age groups. Although this multiauthored approach leads to obvious overlapping of information and duplication in the bibliography, the repetition, particularly of significant new data, proves to be highly desirable.

The volume reviews the most current available information on the *untreated* cryptorchid infant with unilateral or bilateral disease. Associated endocrinopathies, potential for spontaneous descent, expectation for endocrine function as well as reproductive potential, and the threat of subsequent malignant degeneration are all dealt with. Well documented is the relative effectiveness of exogenous HCG and LH-RH. A variety of well-described surgical procedures for increasingly younger patients is encouraged.

In short, the *selection of timing* for treatment need no longer depend on a few facts, fallacies, and the size of the cord structures. This book stands as a biomedical anatomical resource, emphasizing a "reasonable" approach to individual patients.

What is unique about this book is that it presents to the pediatrician and generalist a single source of the most up-to-date information on

cryptorchidism—a guide for decision making on a matter of great importance to infant patients and their families. For physicians and surgeons, the specifics of recommended treatments and anticipated results are fully discussed and well illustrated.

The authors conclude that patients with impalpable or bilaterally undescended testes or with other major congenital syndromes are individuals who need a "team approach." However, the child with unilateral ectopia or presumably "mechanical" nondescent so often associated with a hernia needs a single surgical procedure, usually during the second year of life. If consideration for treatment has been delayed until the mid or late teens, testicular biopsy to identify dysplastic testes and occult carcinoma is mandatory. In unilateral cases, orchidectomy may be the most conservative approach.

These generalizations are well supported on the basis of anatomical, histologic, and more recent functional follow-up studies. Since the past treatment programs have left much to be desired, the factual information provided in this volume should improve the understanding and management of the cryptorchid male and will undoubtedly encourage further studies and discourse.

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Preface

Cryptorchidism is one of the most common malformations encountered in males, yet there is greater controversy regarding the pathophysiology of the condition and the optimal form of treatment than for almost any other anomaly currently amenable to medical and/or surgical management. A vast amount of information on the subject is available in isolated reports and reviews, often providing somewhat controversial and inconclusive data. Thus it is difficult for the practicing physician to clearly determine which course of treatment is optimal for specific patients with undescended testes.

After a monograph on the subject "The Undescended Testis" was published in *Current Problems in Surgery* in 1978, it became readily apparent that many of the controversial aspects of the malformation should be expanded by authorities in the field and compiled into one volume. Despite the many variable approaches still recommended for the management of cryptorchidism, no other comprehensive volume on the condition has been published during the past decade.

The aim of this book is to provide a foundation of information regarding most aspects of cryptorchidism. Not all of the contributing authors concur on how best to manage children with the anomaly. By presenting information and data supporting the different points of view, it is hoped the reader will become sufficiently well informed to make his own judgment.

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1 / Introduction

ERIC W. FONKALSRUD, M.D.

ONE OF THE EARLIEST recorded accounts of undescended testes is thought to have been written in 1786 by John Hunter,[1] who observed that the testis is located in the abdomen until the seventh month of fetal development and by the ninth month has moved into the scrotum in most normal male infants. He believed that the descent of the testis was directed by a cord or ligament, which he termed the "gubernaculum," although he surmised that the fault of maldescent originated in the testes themselves. He further noted that "when one or both testes remain throughout life in the belly, they are exceedingly imperfect and probably incapable of performing their natural function." Hunter also stated that if the testis has been arrested in its descent in infancy, "I think the completion most frequently happens between the years of two and ten." Although considerable information has been acquired regarding the embryologic development of the testes, the hormonal influences affecting descent, the morphologic features of the undescended compared to the normally descended testis, the function of the undescended testes, and many other pathophysiologic aspects of the anomaly during the 200 years since Hunter's original observations, many of his concepts are still valid.

The word "cryptorchid" comes from the Greek words *cryptos*, meaning hidden, and *orchis*, meaning testis, and thus literally is "hidden testis." This term is frequently applied to all forms of undescended testes, both palpable and nonpalpable, and generally refers to the presence of an empty scrotum. The word "cryptorchidism" is almost interchangeable with the term "undescended testis" except that the latter does not include gonads that may be manipulated into the scrotum, e.g., "retractile testes." The reason for incomplete descent remains somewhat unclear but a thorough knowledge of the embryologic development, as well as an understanding of the hormonal influences on descent and development of the gonad, is essential in planning a rational approach to treatment.

Prior to 1900 a patient with an undescended testis usually was advised to ignore the condition. In those rare circumstances when the patient underwent operation, the undescended testis generally was removed.[2] By 1899 a definite change in the management of the undescended testis was developed when Bevan[2] suggested that orchiopexy should be considered for some adults with testicular undescent. Four years later he expressed confidence in surgical repair for cryptorchidism and recommended operation for most patients during the early teen-age years rather than in adult life.[3] The operative repair, placing the cryptorchid testes into the scrotum, has been refined during the past 75 years, and today it is performed with low risk and high success by most pediatric surgeons. Various operative techniques have been developed to place even the high intra-abdominal testes into the scrotum. Moreover, even testicular transplantation using microsurgical techniques has been performed in certain clinical situations.

There are two main viewpoints regarding the cause of the undescended testis: (1) it is an inherently "sick" testis lacking the capacity for normal development, and its failure to descend into the scrotum reflects this abnormality; and (2) it is a potentially normal testis, hampered in its development by its unfriendly environment, and a satisfactory orchiopexy at the optimal time will restore it to normal function. The implications of the first viewpoint are that orchiopexy neither improves spermatogenesis nor prevents the complications of nondescent, including malignancy. Indications for the operation are therefore limited to the desire to correct an associated clinical hernia or to prevent psychologic disturbances resulting from an empty, undeveloped scrotum. In the absence of these relatively rare complications, clinical observation without treatment might be recommended or orchiectomy might be performed as cancer prophylaxis. On the other hand, those who accept the second viewpoint recommend orchiopexy with or without prior gonadotropin administration. Advocates of this concept have attempted to design operative techniques that will permit proper placement of the testis into the scrotum without injury to its blood supply and function. During the past few decades, there has been a gradual shift of opinion toward the second approach.

Formerly the results of orchiopexy were judged by the postoperative position and size of the testes. Only in the case of bilateral cryptorchidism could subsequent paternity or semen examination be used as an index of the benefit of the operation. The more widespread use of testicular biopsy in the past two decades has provided a direct, objective method of determining the changes caused by orchiopexy. By serial testicular biopsies during and following operation, an accu-

rate kinetic view can now be obtained showing progressive morphological changes in the seminiferous tubules and developing spermatogonia. It is no longer necessary to wait until a child reaches adulthood to evaluate the results of operation, since biopsies will accurately indicate the degree of improvement in tubular structure and spermatogenesis resulting from scrotal positioning of the gonad. Furthermore, comparative histologic study of the undescended and of the scrotal testis at various ages has disclosed more precisely the time at which deleterious effects of cryptorchidism begin. Nonetheless, semen analysis and sperm counts provide the most accurate indication of the effectiveness of orchiopexy in increasing the incidence of fertility.

During the past three quarters of a century since Bevan's original recommendation for orchiopexy, surgical therapy for undescended testes has gained wide acceptance, and there has been a gradual lowering of the recommended age for operative repair. Many patients have had no improvement in histologic appearance of the gonad or spermatogenic function when the repair has been performed after normal growth is underway or has been completed, thus suggesting that orchiopexy be performed before the onset of puberty. Many physicians now believe that the undescended testis that remains elevated in the pubescent male should be treated by orchiectomy rather than by orchiopexy. Certain contraindications for orchiopexy have been described under specific circumstances, although agreement on this issue is not unanimous. Human chorionic gonadotropin (HCG) therapy has frequently been provided for boys with testicular undescent, although the indications for its use and the results following treatment have varied widely in different clinics.

Although a statistically significant correlation exists between undescended testes and the development of testicular malignancy, the exact relationship is not clearly defined. It appears that the more hypoplastic the gonad the greater the likelihood of subsequent malignant change. The therapeutic success of orchiopexy or hormone therapy in preventing malignant change or in achieving normal spermatogenesis has been the subject of considerable speculation and controversy. Despite these unsettled issues, the currently recommended rational therapy for managing cryptorchid testes rests on an extensive background of clinical observation and basic investigation.

The undescended testis is one of the most common anomalies encountered in males, and yet there is greater controversy regarding the pathophysiologic nature of the condition and the optimal form of treatment than for almost any other malformation currently amenable to surgical reconstruction. Furthermore, there is a large volume of infor-

mation available in isolated reports and reviews on the subject, which provides somewhat controversial and inconclusive data, thus making it difficult for the practicing physician to determine clearly which course of therapy is optimal for specific patients. The purpose of this volume, therefore, is to provide a consensus regarding the practical aspects of managing the undescended testes as compiled by several authorities in the field.

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