

Childhood Tuberculosis: Modern Imaging and Clinical Concepts

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Bryan J. Cremin and Douglas H. Jamieson

Childhood Tuberculosis: Modern Imaging and Clinical Concepts

With 141 Figures



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Dedication

To our most important heritage, the children of this world, their continued good health and salvation from infectious diseases. In this we include our own daughters Geraldine, Gabriella and Cristina and grandchildren Lara and Ryan.

BJC and DHJ

Foreword

In 1967 Dr Bryan Cremin arrived in South Africa to head the Department of Diagnostic Radiology at the Red Cross Children's Hospital, and became the first specialist paediatric radiologist on the faculty of the University of Cape Town. Now, in 1994, Professor Cremin is internationally recognised, and, just before his retirement, has, with the support of his colleagues, summarised his 27 years of experience of tuberculosis in southern Africa.

Tuberculosis is an extraordinary infection – ancient, gaining a sinister reputation and at times occurring in disastrous epidemics. By affecting both princes and poets, children and the aged, it has altered the course of history. But, the effects aside, the methods which have been used to treat tuberculosis over the centuries are as remarkable as any in the folklore of medicine. Even in the relatively short period in which radiography has been available, treatment has been, by today's standards, somewhat unusual. For example, it was deemed important to “rest” the diseased lung and to collapse any tuberculous cavity. Lacking CT-, MRI- or ultra-sound techniques, radiologists were nevertheless expert at recognising wax or dental compound which had been blindly injected into a cavity, and in distinguishing ping-pong balls in the pleural space from a pneumothorax with adhesions. If air in the pleura did not collapse the lung (or even both lungs in some patients), then air or gas was used to produce a pneumoperitoneum; to help, the hemidiaphragm was often paralysed temporarily or permanently, depending on the skill of the operator who crushed the phrenic nerve. If all else failed, ribs were shortened and the chest wall was collapsed surgically. All this usually took place in a breezy or chilly sanatorium, often at high altitude. Many patients recovered, but a large number did not, and recurrences or relapses were frequent. In children, the diagnosis of tuberculosis was often a death sentence. Why was it that beautiful, fair-haired 3-year-olds seemed to be so susceptible to tuberculous meningitis? Once diagnosed, parents and physicians knew that they could but watch hopelessly for the 3–6 weeks of life that remained. There was no cure.

Tuberculosis was so nearly conquered when streptomycin and other drugs became available in the 1940s, but the infection persisted and has again become a major cause of ill-health and death, fuelled by malnutrition, migration, addictions and AIDS. In Europe and North America it used to be regarded as a “chronic” disease, but anyone who has worked in Africa (or other similar regions) will have realised that tuberculosis is often an acute, even fulminating, infection which may rapidly affect the lungs, skeleton or any other part of the body. Now AIDS and other causes of immunosuppression have brought this aspect of tuberculosis to all communities.

Professor Cremin and his colleagues have re-emphasised the protean pattern, or indeed the lack of consistent patterns, which is one of the characteristics of tuberculosis. They have described and illustrated superbly what may be expected, both clinically and on imaging. Nevertheless, they will be the first to admit that tuberculosis will continue to surprise even the most experienced, suddenly appearing in ways that are quite out-of-character. This is the message this book so clearly conveys. There are distinct and recognisable profiles of pulmonary or other tuberculous infections, but there are also many other presentations which so closely resemble some other infections, or even tumours, and which are so unlike tubercu-

losis that the imaging and clinical diagnosis is in doubt and the laboratory reports are viewed with disbelief.

The message is simple: do not forget tuberculosis whenever there is something odd in the way an illness progresses. In such cases, as this book illustrates so well, conventional imaging may not be enough, and newer methods may solve a diagnostic impasse. In these days of drug resistance and atypical mycobacteria, time wasted in establishing the correct diagnosis may prove fatal, not only to the patient but also to relatives and contacts. The chronic illness which could be contemplated for a year or two, because time was part of the healing art, is no longer so co-operative.

Professor Cremin and his colleagues have produced an eminently readable and fully illustrated book which will be of immediate assistance to all who must recognise and treat this infinitely changeable infection. Whatever other changes may occur in the saga of tuberculosis, the principles laid down will still guide the choice of the appropriate diagnostic imaging. With the right techniques, much more can be learned quickly and the choice and timing of treatment, including surgery where necessary, can be better judged. But above all else, this book will increase our awareness of the manifold varieties of this ancient affliction, which has once more become of such major importance, especially, but not only, in Africa. It is no exaggeration to say that tuberculosis is once again changing the course of history in many countries. This record of many years of experience has been written at a most appropriate time.

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Preface

I have always been interested in tuberculosis; my father had sanatorium treatment and three members of my class at Medical School contracted the disease. In those days there was some social stigma attached to the disease, and patients had to be isolated from “normal” folk. Although at that time effective drugs had already been discovered, they were not freely obtainable in the post-World-War-II period; famous authors, such as George Orwell (the originator of the sinister “Big Brother”), had to invoke the help of the British Minister of Health to get supplies of streptomycin from the USA. Subsequently a variety of powerful drugs became more freely available and were used in effective combination to treat tuberculosis. With them the belief grew that the disease would no longer present a problem in Western countries. Some of the fallacies of this prediction are mentioned in our introductory chapter to this volume. On the Continent of Africa the disease has always remained a problem and for the 27 years that I have practiced radiology in South Africa, tuberculosis has remained our largest infectious disease problem. The disease has also persisted and expanded in Asia, and we have tried to reflect this situation in our reference survey. Unfortunately, however, some of the literature from countries such as India has not been freely available to us in our libraries.

Another reason for writing is that it has been some years since a book on childhood TB has been written. The two seminal books both entitled *Tuberculosis in Children* were written in 1963 by Lincoln and Sewel¹ and by Miller, Seal and Taylor², and Miller added a further edition to the series *Medicine in the Tropics* in 1982³. Since then radiology and imaging have made huge advances and it is within this framework that this book was gestated with the hope that physicians and radiologists would be helped by descriptions, current imaging technology and illustrations of diagnostic findings. The efficacy of treatment is dependant on early diagnosis, but a misdiagnosis, besides being a human tragedy, can result in serious legal complications. It is hoped that our experience may be of help to physicians in other countries who have less experience of tuberculosis among their patients.

There are many aspects of this age-old disease that are still not understood, particularly in its pathogenesis and human protective mechanisms. Radiologically, I am sometimes puzzled by the fact that there is usually a single pulmonary focus although multiple bacteria must have been inhaled. We have followed the established concept that although the initial lesion is parenchymal, its progression and complications in the lung are mainly lymphobronchial. The words “glands” (from the Latin *glans*, an acorn) and “nodes” (*nodus*, knot) are interchangeable, and as the word “tubercle” derives from the Latin *tuber* (knots or nodules), we have given preference to the term nodes to describe adenopathy. The differentiation between hematogenous and bronchogenic spread is sometimes difficult to establish radiologically and both forms of dissemination may exist at the same time. Moreover, the disease, besides being a morbus miseriae, may be morbus per corpus, wide-spread at an early stage and flaring up in extrapulmonary sites, sometimes well after the initial pulmonary infection has apparently subsided. The relationship between the primary infection and so-called post-primary infection are complex questions that remain largely unanswered and remain as clinical concepts.

I am most grateful to my clinical colleague Professor M. Ehlers for throwing some light on the behaviour and microbiology of *M. tuberculosis* and to both Professors M. Kibel and P. Donald for their contributions and experienced insight into modern diagnosis and treatment. I am also most grateful for the support of all of my clinical colleagues at the Red Cross Children's Hospital, and particularly to the members of my department. I am especially indebted to my co-author Dr D.H. Jamieson for his unbounded enthusiasm in collecting and collating much of the modern imaging material which I hope will be the feature of this book. He has kept me up to date with some of the recent technical advances and without his assistance this book would never have been completed. To Mrs Joyce Green goes my gratitude for her perpetual patience in typing and retyping our often illegible writing.

Finally I would like to acknowledge Dr H. Goodman (Figs 3.30, 3.31) and Dr C. Stoyanov (Fig. 6.9b) for providing illustrations in adolescents. All the other illustrations are from our hospital and concern children under the age of 13 years. We would like to acknowledge the use of illustrations from our own publications, in *Pediatric Radiology* (Figs 3.7, 3.33, 3.36 and 3.37), *British Journal of Radiology* (Figs 5.15, 5.20, 6.21, 6.27 and 6.29) and *British Journal of Bone and Joint Surgery* (Figs 6.5, 6.7 and 6.8).

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Cape Town
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B.J. Cremin

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