# *Textbook of*
# Pulmonary and Critical Care Medicine

# Textbook of Pulmonary and Critical Care Medicine

## Volume 1


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# Foreword

In reading through the *Textbook of Pulmonary and Critical Care Medicine* edited by Professor SK Jindal of the Postgraduate Institute of Medical Education and Research, Chandigarh, my thoughts drifted to a recent best-selling book authored by Thomas Friedman, titled, *The World is Flat: A Brief History of the Twenty-first Century.* The author argues that the world is shrinking from a size small to a size tiny and this has been accompanied by a flattening of the playing field. The dynamic forces of recent globalization give a unique quality to our flat world today—the power of individuals to collaborate and compete globally. Using this 21st century power and the tools of the flat world, namely the personal computer, the fiberoptic cable, and modern publishing house software, Professor Jindal has fostered an outstanding collaboration among experts spanning several continents. He has also produced a practical, authoritative and comprehensive resource for students, physicians in training and seasoned clinicians alike, that rivals any standard textbook on this subject and can compete on equal footing with other educational tools.

However, as globalization flattens the playing field, and countries leap to industrialization, cultural beliefs, natural resources, climate and geography have slowed the pace of development in many parts of the world. Poverty leads to malnutrition, homelessness, lack of education, and poor access to health care. Overcrowded cities and rural underdevelopment are other challenges that impact health in the various parts of the world. Moreover, epidemics of HIV, drug abuse and smoking addiction take a greater toll on the population. Yes, the world is flat, but the terrain is filled with mountains and valleys and local problems demand local solutions. And these local problems need to be explored and presented with a scholarly perspective. The *Textbook of Pulmonary and Critical Care Medicine* has successfully incorporated these sociodemographic factors into the subject matter.

The text is well-written and the chapters are carefully referenced with subjects found in all traditional pulmonary and critical care textbooks, e.g. airway diseases, interstitial lung disease, pleural disease, pulmonary neoplasia, pulmonary infection, sleep and critical care. There are several nontraditional sections as well that are practical and especially helpful to the practicing physician. These include a section on the symptom approach to lung disease, an overview of the pharmacologic agents used to treat lung disease, and a comprehensive review of methods in lung diagnosis from the simple history and physical examination to the latest complex tools of interventional pulmonology. The textbook is especially unique because of the abundance of illustrations, flow charts and tables. Their clarity and at times simplicity make them especially valuable for the novice. There are many radiographic and pathologic reproductions that are especially helpful.

The textbook also offers a unique exposure to the problems in many parts of the world. Tuberculosis, the "number one" treatable condition has been extensively covered; and special topics such as multi-drug resistance, directly observed therapy, TB prevention, nonpharmacologic approaches and extapulmonary tuberculosis are particularly relevant. Many countries are facing a growing burden of noncommunicable respiratory diseases. They have become the second leading cause of death after injuries, and their impact on indirect costs such as loss of work and home productivity is enormous. These problems are addressed and measures of prevention such as smoking cessation are included. Other special challenges including topics such as indoor and outdoor air pollution, climate change, poisoning with pesticides, snakebite toxicity, pulmonary manifestations of tropical infections and industrial accidents such as the tragedy seen in Bhopal, Madhya Pradesh, with methyl isocyanate, have been well covered.

What is most impressive about this textbook is how comprehensive and practical it is for the reader. Topics range from the history of respiratory medicine to the approach to end-of-life issues with critically ill patients. It is hard to think of a topic that is missing. While this textbook will have a special appeal and value to the physicians of the South-Asian continent, clinicians around the globe will benefit from Professor Jindal's extensive efforts.

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# Preface

It was merely a quarter of a century ago when the specialty of Pulmonary Medicine was factually recognized as an important division of Medicine. Until then, the lung diseases were generally dismissed as tuberculosis, or nondescriptive pneumonias and infections. Most of the nontuberculous lung diseases remained either undiagnosed or unknown. Of course, several stalwarts of the sixties and seventies had clearly identified this deficiency and made efforts to define the pulmonary problems and plan their solutions.

It was in 1989 that the first independent, postdoctoral DM Fellowship Program in Pulmonary Medicine was started at Chandigarh. Subsequently, the program was expanded to include the Critical Care as an essential component of the DM training. In addition, there were several postgraduate MD and/or diploma courses in tuberculosis and chest diseases, and/or respiratory diseases at different medical colleges. Unfortunately, most of the postgraduate programs lacked in their curricula especially for nontuberculous diseases and other systemic disorders. Moreover, the on-hand training in diagnostic and treatment modalities had been highly inadequate in the postgraduate courses. It is rather enigmatic that we still continue to lack the dedicated thoracic surgery courses and texts in the various countries.

The increased importance and scope of respiratory and critical care medicine had also necessitated the need to develop the indigenous teaching and training materials including the texts with incorporation of local problems and possible solutions. Undeniably, the science is the same all over the world, but the experiences are different. Excellent texts and reference materials on the subject are available for long which continues to guide the students, the teachers and the practicing physicians. In the present literature, quite a few textbooks of pulmonary medicine have been published and continue to remain available. Ours is one more attempt in this direction to add to the existing literature on lung diseases available worldwide. This book contains contributions by approximately hundred international esteemed pulmonary medicine consultants and teachers.

There are, however, a few important additions in the present textbook. It is fairly comprehensive with contributions from several internationally eminent authors. It includes the basic principles as well as the recent advances related to different subjects. We have also attempted to incorporate allied clinical sciences relevant to the practice of the pulmonologist. A classical example is the critical care which forms an integral component of pulmonary medicine. It also incorporates tuberculosis, other pulmonary infections, environmental and occupational medicines, sleep disorders and general systemic diseases affecting the respiratory system in one or the other way. Although the critical care is relevant to most of the medical and surgical specialties, the pulmonologists have a more vested interest than other specialists. Assisted respiration which forms the core of most critical care lies in the primary domain of pulmonologists.

We have taken care not to forget the need to push forward and meet the goals of excellence in health care. The real test of merit of a book lies in its readership by the students and adoption of its recommendations in clinical practice. Hopefully, the material in the text will benefit a diverse category of people including internists, general physicians, pulmonologists, pediatricians, intensivists, anesthesiologists and others who need to handle patients with respiratory diseases and critical care.

**SK Jindal**

# Acknowledgments

I was greatly encouraged by my friends and colleagues in the department and elsewhere across the world. Almost none had refused my request to participate in this venture and provided best of his/her inputs. I am especially indebted to my Associate Editors and the Section Editors who have put extra efforts to make each section as all-inclusive. Drs PS Shankar, VK Vijayan, R Guleria, SK Chhabra, George D'Souza, and Sundeep Salvi had taken a lot of load on their shoulders. Most importantly, the international contributors had taken a lot of pains to enrich the book, purely for academic and scientific investments. In particular, I am thankful to Drs Om P Sharma, Irwin S Richards, Sidney S Braman, Robert McCaffree, Kalpatha K Guntupalli, Pravin Mathur, Ruby Pawankar, Peter Barnes, Daniel Banks and Suhail Raoof who have not only contributed themselves but also helped in getting the best from many others.

My faculty colleagues, Drs D Behera, Dheeraj, Ashutosh, Ritesh and Navneet, Senior Residents and Pulmonary-Fellows had remained a constant source of assistance. I greatly pay my sincerest appreciation to all of them. Ms Manju Aggarwal, my Secretary had done a remarkable job of refining and typing the manuscripts. I also owe a great deal of gratitude to my wife Umesh and children who have borne with my being busy and helping me in sorting out difficult matters.

Nothing could have been accomplished without the efficient editing and publishing by M/s Jaypee Brothers Medical Publishers (P) Ltd, Delhi who have done an excellent job. Shri Jitendar P Vij, CEO, had taken his personal interest in this publication. Dr Naren Aggarwal and Dr Richa Saxena deserve my special thanks for coordinating the process of publication.

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# From our Archives...

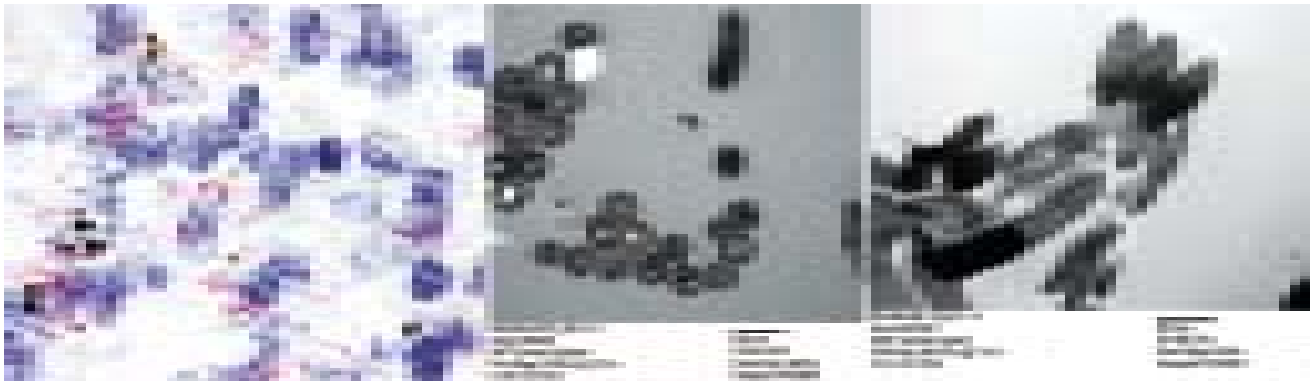

**Fig. 1:** Mycobacteria in the granuloma, engulfed by macrophages and its ultramicroscopic structure

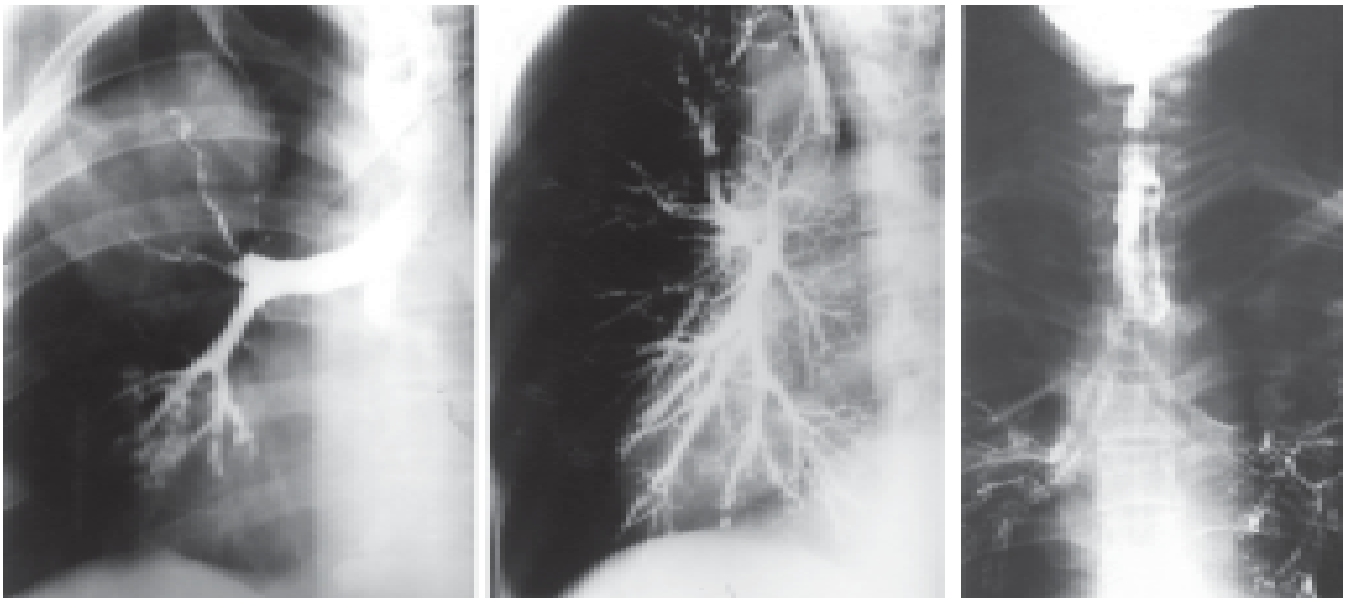

**Fig. 2:** Bronchography with instillation of a radiopaque dye (Dionosyl) with the help of a catheter was a common procedure to delineate the bronchial tree and diagnose lesions such as bronchial masses, bronchiectasis, fistulae and pouches. Endoscopic and scanning procedures have done away with old, gold-standard

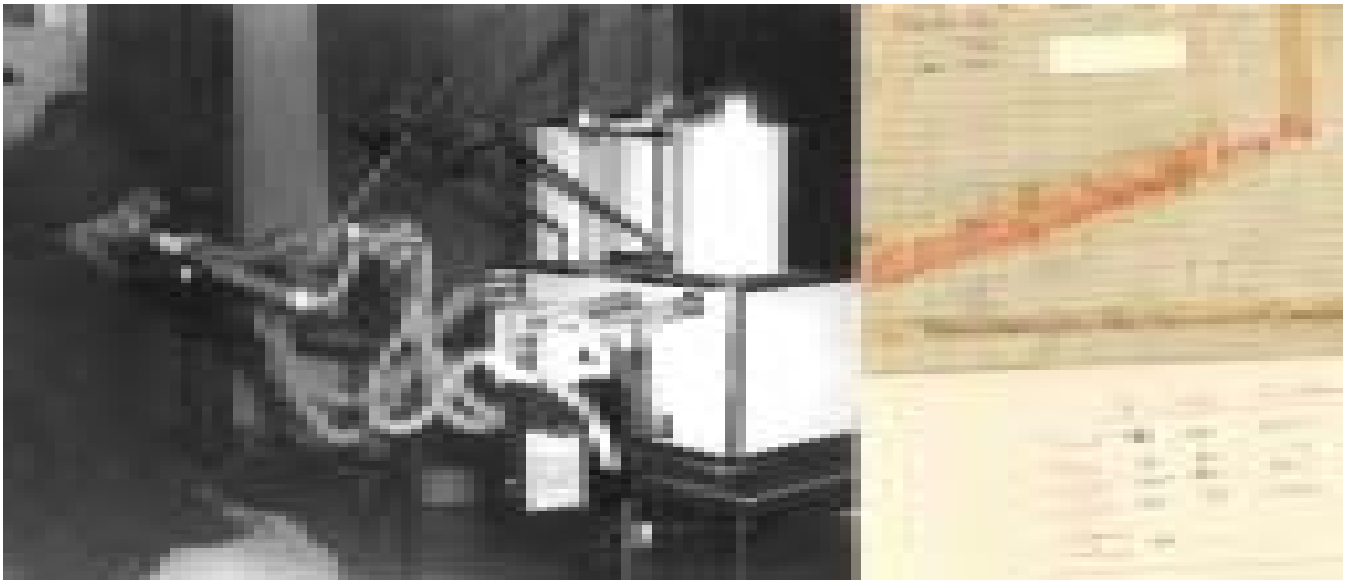

**Fig. 3:** Differential spirometry was used to assess the function of each lung separately. The figure demonstrates the nonfunctional left lung (Right). This was generally performed with the help of a double barrel, volume displacement spirometer (Left)

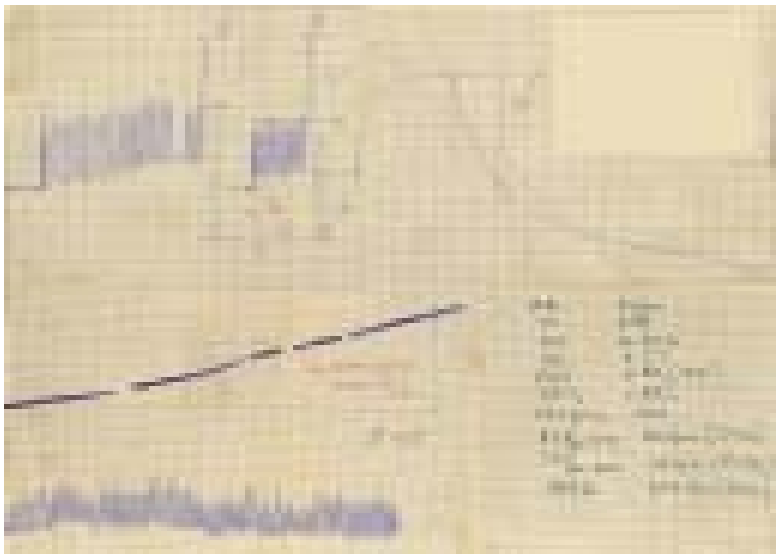

**Fig. 4:** Oxygen consumption obtained with the help of a spirometer by measuring the amount of oxygen required to replace the consumed volume, after absorption of $CO_2$ from the exhaled air using the formula:

$$\text{Oxygen consumption} = VC \times FiO_2 - FeO_2$$

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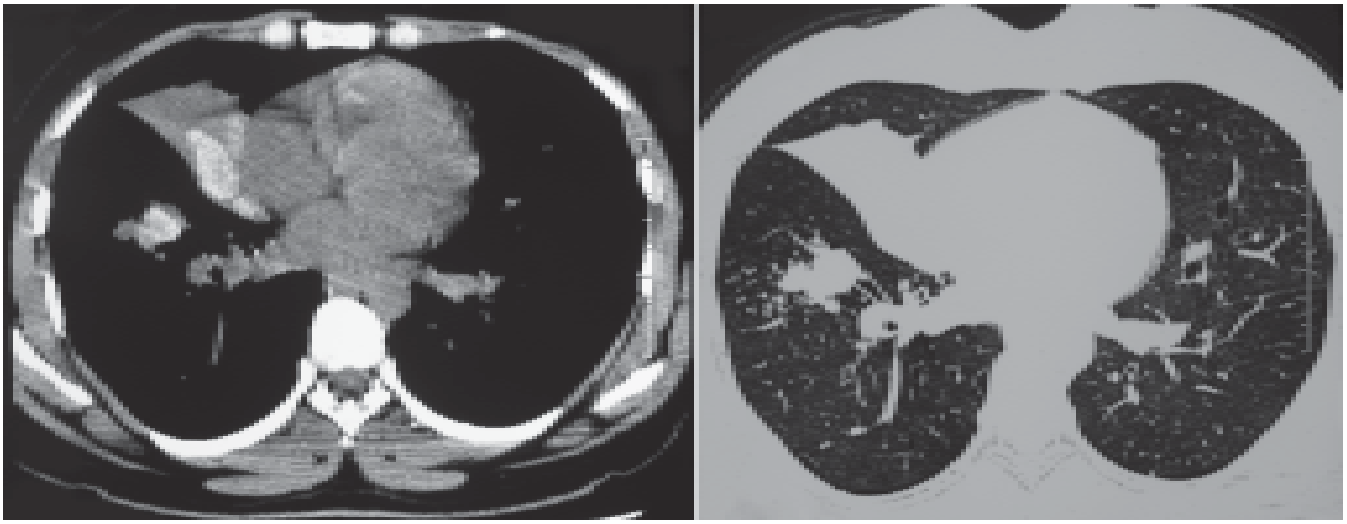

**Fig. 6:** Presence of high attenuation mucus in a patient with allergic bronchopulmonary aspergillosis. The mucus is denser than the paraspinal skeletal muscle

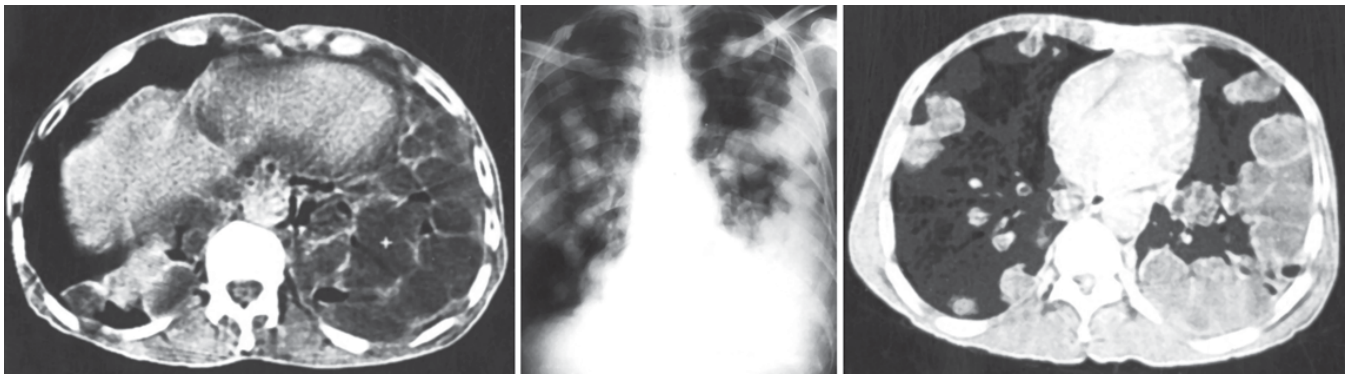

**Fig. 7:** Radiography in a patient with multiple hydatid cysts

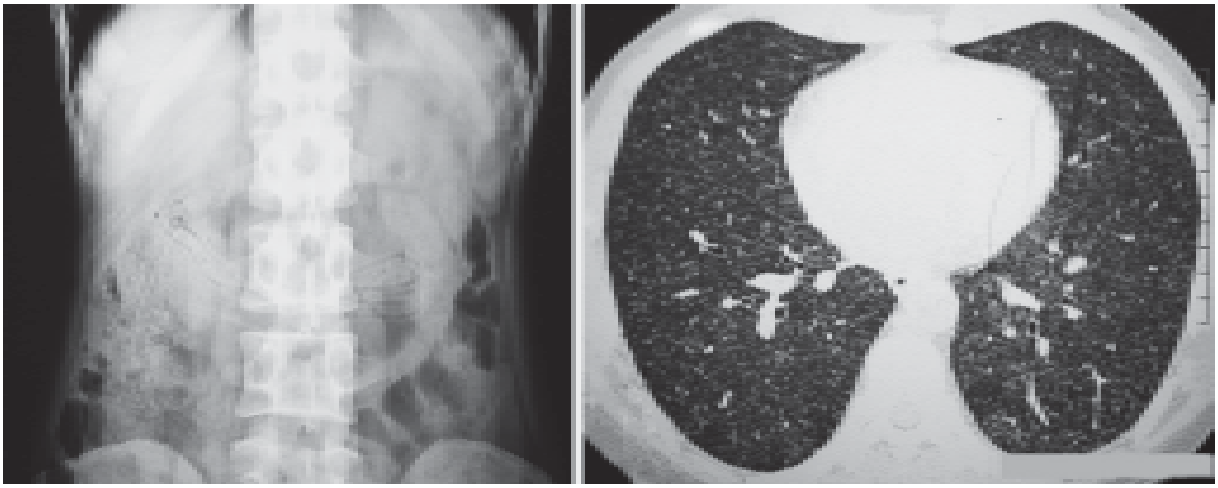

**Fig. 8:** A case of Loeffler's syndrome caused by intestinal round worms. Abdominal X-ray shows the presence of intra-abdominal worms. High-resolution CT of the chest demonstrates ground glass opacities and centrilobular nodules secondary to eosinophilic pneumonia

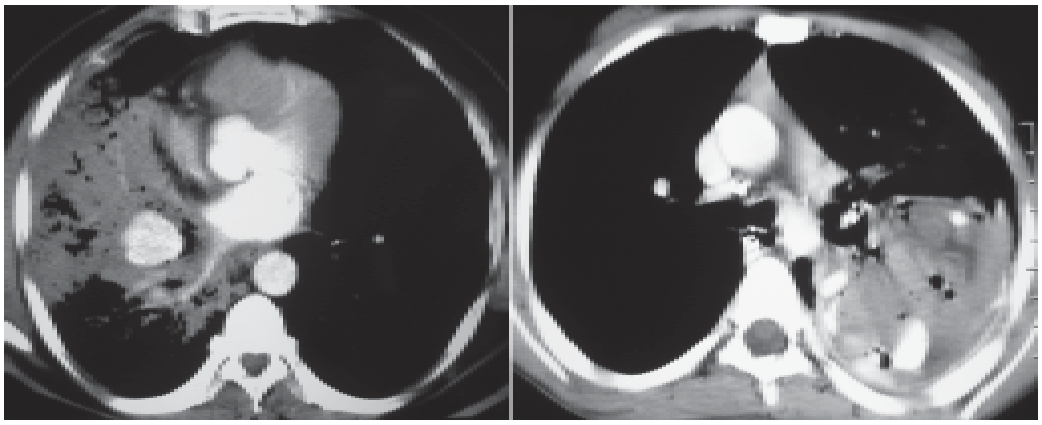

**Fig. 9:** Contrast-enhanced CTs of two different patients with community acquired necrotizing pneumonia demonstrating an uncommon but potentially life-threatening complication of infective pulmonary aneurysm. The CT films show the presence of contrast enhanced densities within the areas of consolidation consistent with the presence of vascular aneurysm

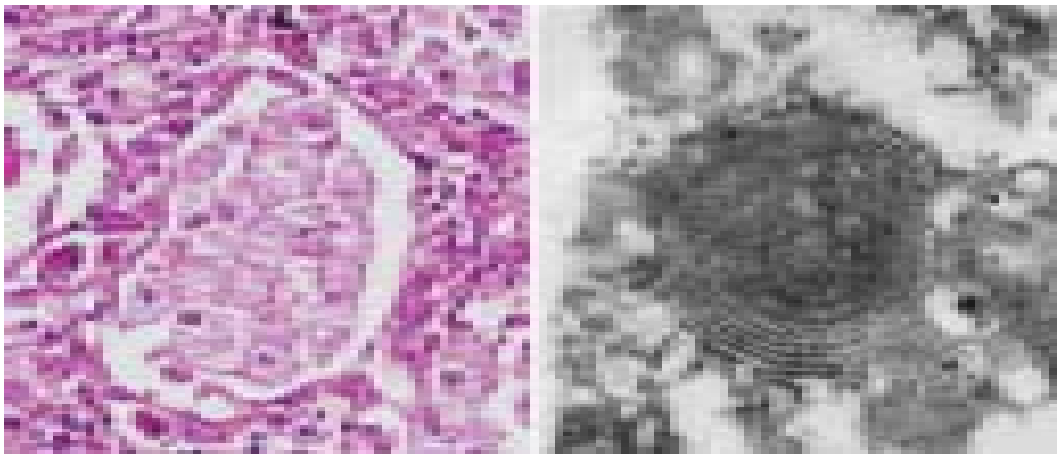

**Fig. 10:** Figure showing foamy macrophage with intracytoplasmic granular material in a case of pulmonary alveolar proteinosis (Hematoxylin and eosin, x200). Electron microscopic image of the same patient showing whorled lamellated surfactant bodies (x6450)

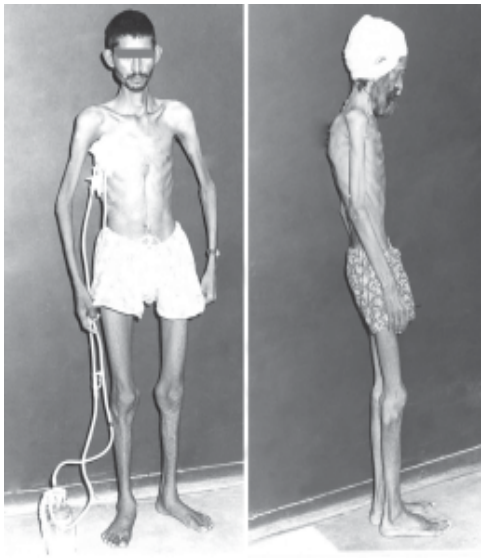

**Fig. 11:** Extreme wasting from tuberculosis (justifying the older terminology of consumption) was common to see in the TB-wards, even in the sixties and seventies. Fortunately, this degree of severity has become rare with the advent of effective chemotherapy and TB Control Programmes