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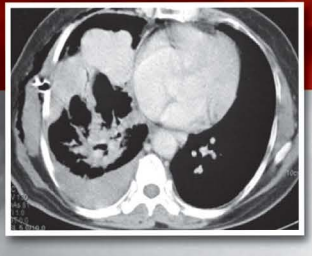
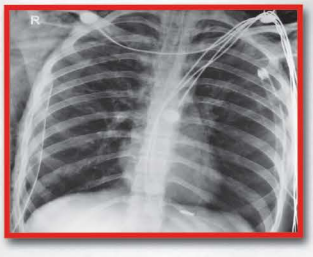
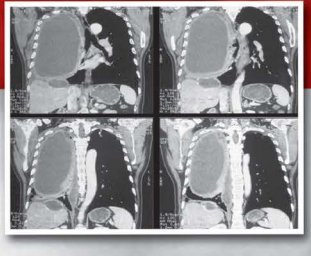
101 CASES IN RESPIRATORY MEDICINE







Supriya Sarkar

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CHAPTER 2

Clinical Data Analysis

INTRODUCTION

The art of medicine is a combination of medical knowledge, intuition, experience, and judgment. Medical decision-making is an important responsibility of physicians and it is essential at each stages in diagnosis and therapeutic process. Clinical data analysis is a systematic effort to achieve a provisional diagnosis and ultimately a final complete diagnosis. The process will help to narrow differential diagnosis to least number of possible probabilities and to plan least number of investigations. Clinical data analysis requires knowledge, experience, analytic skill and most importantly time to spend with patient. Clinical data analysis also requires clinical expertise, a combination of scientific knowledge and problem solving process. For better understanding of the complicated and ill-defined process, I am discussing clinical data analysis in steps. I am hopeful that those steps will help you in day-to-day clinical practice.

FIRST STEP

Collection of Clinical Information

Collection of clinical data from patient and patient's relatives (detail sleep event or daytime sleepiness) is the essential and most important step. It should be informative, complete and perfect; otherwise next steps will be ineffective. It is important to remember that we are dealing with a human being who has sentiment, personality, ego and self-respect. While taking history we may have to ask personal questions. We should not ask personal questions bluntly but make them comfortable by starting with some superficial questions. As patient become comfortable, we can proceed to ask personal questions after explaining the necessity of that information. Always be emphatic and remember that patients have come for help in their time of distress. A good history taking needs a clear knowledge and understanding of diseases. A gentle, emphatic, respectful and charismatic personality is essential for taking a good history. Similarly, during examination we must be careful and should not hurt patients'

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sentiment, privacy and ego. While examining private areas always explain him/her about what, how and why this is done. For better elicitation of physical signs, it is essential that both patient and doctor are comfortable at the time of examination. As for example, important abdominal findings may not be elicited if patient makes his/her abdomen tough.

Chest X-ray is now considered as a part of clinical examination. Many lung diseases, particularly in deep seated lung pathology surrounded by normal lung parenchyma, may not yield any clinical sign. In those situations chest X-ray can give an initial idea about the disease that can suggest future investigation protocol.

It is important to remember that history (questionnaires) has to be taken at least thrice. Firstly, at the beginning usually history is taken to have an idea about the disease. Secondly, after completion of physical examination some question should be asked. As for example, manifestations of pancreatitis in left sided pleural effusion. Thirdly, after completion of investigations some questions or points need to be clarified. As for example, drug history in patients with usual interstitial pneumonia (UIP) pattern in high-resolution computed tomography (HRCT) thorax.

Collection of relevant clinical information as much as possible is essential step before going to next step.

SECOND STEP

Piercing through Individual Manifestation

After collecting informations, next step is to critically analyze each symptom or sign. As for example, a chest pain may arise from chest wall, pleura, mediastinum, myocardium or pericardium. The probable origin of chest pain is to be determined by a detailed review of chest pain. Similarly each sign has to be assessed for its clinical significance. As for example, crepitation may appear from large airways, small airways, alveoli or interstitium, and every effort is to be made to determine the origin of crepitations with some degree of reasonable certainty.

THIRD STEP

Grouping of Clinical Data

After analyzing each manifestation, the next step is to group few symptoms and signs into a meaningful combination that will reflect some pathology. As for example, fever with chill, impaired percussion node without shift of mediastinum, and bronchial breath sound with crepitation indicate consolidation. A combination of cough without expectoration, dyspnea without wheeze and bilateral mainly basal end inspiratory crepitation suggest interstitial lung disease. Similarly a collection of signs and symptoms will indicate pleural effusion or superior vena caval obstruction. Consolidation, pleural effusion, superior vena caval obstruction or interstitial lung disease are not a disease but a pathological change. Identification of pathological change

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is helpful in planning further investigations and it also helps in symptomatic management of patient.

FOURTH STEP

Understanding the Course of Clinical Manifestation

Clinical course means onset, duration, progression, interval and chronology of manifestation. Onset may be acute or chronic. Acute onset when patient can tell when the disease has started like fever for 10 days, and that suggest acute inflammation like pneumonia. Insidious onset means when patient cannot tell when the manifestation started as for example, patient is telling that he has fever for 2–3 months (as if 2 or 3 months is equal), that may suggest chronic inflammation like tuberculosis. Sudden onset is a subset of acute onset when patients can pin-point the moment from where the disease has been started. Examples of sudden onset diseases are pneumothorax or any vascular event like pulmonary thrombo-embolism. Duration-wise, clinical manifestations are classified into acute, subacute and chronic. Cough with purulent expectoration and local crepitations may indicate lung abscess if history is of shorter duration but same manifestations persisting for longer duration will point towards bronchiectasis. Symptoms may be progressive without symptom-free interval with or without episodes of exacerbations as in case of chronic obstructive pulmonary disease (COPD), interstitial lung disease (ILD) cardiomyopathy, etc. On the other hand, disease may be episodic with symptom-free intervals as in case of asthma. Chronology of manifestation is also helpful as for example, a sudden onset pleuritic chest pain, sometimes preceeded by bouts of cough, that is followed by dyspnea is almost suggestive of pneumothorax.

FIFTH STEP

Dealing with Positive and Negative Clues

Proper identification and analysis of every positive or negative clue is an important step. Identification of overt and covert risk factors is a distinctive step. As for example, for the diagnosis of COPD it is essential to take history of smoking (overt clue) and biomass fuel exposure (covert clue). Similarly, in a tuberculosis patient with persistent hypotension, finding of pigmentation of tongue or oral mucosa suggest Addison's disease due to bilateral adrenal gland involvement. Negative clues are equally important. As for example, in a case of pleural effusion the absence of pleuritic chest pain, a sign of pleural inflammation, may point against tuberculosis and favors malignancy. Absence of crepitation including post-tussive crepitation practically rules out lung parenchymal fibrosis. Negative clues should be analyzed with caution as absence of obliteration of Traube's space usually excludes left sided pleural effusion but that does not completely rule out encysted pleural effusion.

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SIXTH STEP

Pattern Identification

When a pathologist examines a slide under microscope, he identifies certain pattern like changes in nucleus, nucleolus, cytoplasm, nuclear-cytoplasmic ratio, cell division, surrounding structures, etc. and arrives at a diagnosis. At that time he is visualizing a cytological/histological pattern where each finding is important but overall pattern is more important. Similarly clinicians also identify clinical pattern where each manifestation is important but overall combined clinical picture is more important. Acute onset of fever with chills and single rigor; pleuritic chest pain; scanty rusty expectoration in a toxic patient with signs of lobar consolidation suggest pneumococcal pneumonia. Scoring systems for diagnosis of certain disease, like allergic broncho-pulmonary aspergillosis, may be considered as scientifically designed form of pattern identification. A male patient with positive diagnostic scoring for rheumatoid arthritis develops pleural effusion; we should consider rheumatoid pleural effusion along with other possibilities. But similar clinical picture in a female patient rarely indicate rheumatoid effusion as pleural involvement in rheumatoid arthritis is less common in female. Pattern identification needs knowledge as well as experience. Experience may be acquired directly by observing cases or may be acquired by reading books or case reports.

SEVENTH STEP

Clinical Setting

Every clinical manifestation should be analyzed on the background of clinical setting. It is not sufficient to identify a clinical pattern but we should interpose the pattern on the background of clinical setting. As for example, a 60 years smoker with superior vena caval obstruction, we should suspect lung malignancy. On the other hand, a 30 years nonsmoker with superior vena caval obstruction with cervical lymphadenopathy points to lymphoma. Hoarseness of voice in an 18 years asthmatic on steroid inhaler should point towards adverse reaction to inhaled steroid; hoarseness of voice in a political leader before election points towards voice abuse and a hoarseness of voice in a 60 years smoker points to recurrent laryngeal nerve paralysis in lung cancer.

Epidemiology of Disease

Epidemiology is not a Para-clinical subject but all physicians are using the epidemiological data as an assisting tool in clinical medicine probably not appreciating its influence. Viral infections are often identified by their epidemiological pattern like influenza, swine flu, hepatitis, etc. A right upper lobe fibro-cavitary disease may suggest tuberculosis in India, melioidosis in Vietnam or histoplasmosis in northern America. Antibiotic selection depends on local epidemiological pattern of organisms and their sensitivity pattern.

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EIGHTH STEP

Application of Clinical Expertise

Clinical expertise is the most complicated thing to explain. Clinical expertise is a combination of scientific knowledge, experience, clinical prudence, analytic and problem solving capability. Clinical expertise requires not only cognitive proficiency, integration of verbal and visual informations but also complex fine motor skills necessary for invasive and non-invasive procedures. Clinical expertise can be acquired through experience. As you come across a disease repeatedly, you acquire experience on that particular disease and subsequent diagnosis will be easier. During a malaria epidemic in Kolkata I have diagnosed a case of ARDS in vivax malaria, an unusual condition. That experience makes me well conversant to diagnose subsequent cases of ARDS in vivax malaria easily and confidently. We learn more from our failures than our successes. Failures should not be ignored but critically analyzed. Successes occupy our conscious domain but failures remain in our unconscious memory. As for example, most of us at least once have wrongly diagnosed left ventricular failure as asthma. That can probably explain, why we are still using the term 'cardiac asthma', a terminology that has been removed from textbooks of medicine.

NINTH STEP

Clinical Reasoning

We know that during clinical examination some incidental findings may be uncovered that is completely unrelated to the clinical problem at hand. Clinical reasoning is the skill for deciding whether a clinical clue is worth pursuing or should be ignored in totality. Every clinical manifestation may not be explained but how much importance that deserves should be appraised properly. In some cases we cannot ignore an apparently insignificant finding and try to explain that finding. As for example, anemia in COPD is usually considered as its systemic manifestation. But in some cases anemia in COPD should be investigated as patient may has bleeding piles or associated hematological problems.

TENTH STEP

Clinical Judgment

It is a process that will help in selecting investigation or treatment protocol. Clinical judgment is a process of weighing whether a proposed test, management protocol or preventive measure entails a greater risk than the disease itself. Whether bronchoscopy will be helpful in a particular hypoxic patient? Whether patient can tolerate open lung biopsy? Whether patient can tolerate chemotherapy? Risk- benefit or cost-effective analysis is a part of clinical judgment. It is an essential skill that every clinician must possess and apply.

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It is important to follow up and keep surveillance over patients. This is another important step to learn medicine. Clinical medicine is a long journey, do not stop earlier.

SOME FUNDAMENTAL GOVERNING THEORIES OF CLINICAL MEDICINE

Clinical Bias

Common diseases occur commonly and rare diseases occur rarely. Consider common disease first and you will be right in most occasions. There is a correlation between pre-test probability and post-test result. Clinical medicine is not an exeption from that rule. Suppose a patient has right upper lobe fibrosis, it can be anything but the chance of tuberculosis will be the highest in our country. A specialist has to deal with cases when others have failed. So, we cannot ignore less common probabilities. We should consider asthma in a 30 years, non-smoker female with cough, dyspnea and wheeze. We cannot ignore the possibility of vocal cord dysfunction, not an uncommon condition in adult female, that can mimic asthma or may be associated with asthma.

In clinical medicine, never be biased and always start unbiased.

Explain by Single Pathology

In clinical medicine the governing rule is try to explain all manifestations by a single disease. So, start with the hypothesis that patient is suffering from a single disease. When explanation of some manifestations is not possible by a single disease then think of associate disease or comorbidities. It is now a well-accepted fact that elderly person may have inflammatory involvement of multiple organs, a condition known as 'inflam-aging'. So, an elderly man may have COPD, ischemic heart disease, diabetes, hypertension and lung cancer. IHD is a common comorbidity of COPD that can determine its outcome. It may be useful to start thinking of a single disease but never be dogmatic.

Diseases Flock Together

Some diseases have inherent friendship and occur together. They may be linked together by same etiology or same pathological process. When one disease is identified then it is mandatory to search for other friendly diseases. A person can suffer from COPD and ischemic heart disease as both are related to smoking. Asthma patients usually have other allergic diseases like allergic rhinitis, allergic skin conditions like eczema/urticaria, etc.

Evidence-based Medicine

Today is the era of evidence-based medicine. Though there are reservations on how and where evidences are generated, we cannot ignore evidence-based medicine in today's world. The process of medical decision-making should be guided by evidences so that patient can be benefited from the available scientific knowledge. But despite the importance of evidence-based medicine,

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some medical decision making relies on clinical judgment, an attribute that is difficult to quantify or even more difficult to assess qualitatively.

CONCLUSION

Clinical medicine is an art of possibilities and probabilities. It is an interesting and challenging job. Clinical medicine is a journey where surprise is waiting for you at every bends. Please enjoy the challenge and learn the art throughout your life as there is no end to the journey. Please remember, 'student life is the best part of your life.' Please remain student throughout your life. When you can combine clinical medicine with modern technologies you will be a good clinician.

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101 CASES IN RESPIRATORY MEDICINE

Salient Features

It is observed that junior doctors are charged with knowledge but they are poor in applying their knowledge. This book will help them in overcoming that deficiency.

- Contains chapter on clinical approach, including history taking and clinical examination, and a chapter on clinical data analysis
- Presents 101 interesting cases, including patients with no symptoms, coming to emergency, admitted in intensive care unit, diffuse parenchymal lung diseases (DPLD), tuberculosis (TB), pleural diseases, thoracic infections and malignancies
- Discusses the clinical approach in steps as the case revealed including the mistakes done during the diagnostic processes
- Highlights the learning material from each case
- Includes enumerable pictures of X-rays, CT scan, other radiological images, microscopic figures and pictures of important clinical signs
- Helpful for residents in pulmonary medicine and general medicine as well as physicians.



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