Handbooks for the General Practitioner

WEINSTEIN

THE PRACTICE OF INFECTIOUS DISEASE

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PRACTICAL ENDOCRINOLOGY

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THE PRACTICE OF INFECTIOUS DISEASE

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PREFACE

This book is written for the practitioner of medicine, many of whose patients present themselves to him with problems of an infectious nature. Despite the availability of potent antimicrobial agents, it is a striking fact that the incidence of many of the common infections has not been significantly reduced. In addition, "new" diseases, mostly due to viruses, are being reported with considerable frequency. Superimposed on the problems of the frequency of "old" diseases and the appearance of "new" ones are the pressing necessity for specific diagnosis, the proper selection and application of chemotherapy, and the fact that the administration of any antibiotic agent is not without danger. It is obvious, therefore, that the field of infectious disease is expanding and not contracting, and that as one group of difficulties becomes manageable, it is replaced by others which are diagnostically and therapeutically perplexing.

When a physician sees a patient with an infectious disease, his attention is usually first directed, on the basis of the history and physical examination, to a particular organ system and not to a specific etiologic agent. This is so because most tissues respond to injury in a limited number of ways and identical syndromes are frequently produced by widely different organisms. Thus, for example, the physician's first impression is of disease of the lungs rather than streptococcal pneumonia, or infection of the nervous system rather than pneumococcal meningitis. The etiology of an infection is usually determined only after special studies have been carried out, but these are practically always selected on the basis of the location of the disease process. For these reasons, the infections discussed in this book have been grouped

together in relation to the organs in which they occur, rather than on the basis of the microorganisms which cause them. It is the hope of the writer that this will, in some measure, lighten the burden of differential diagnosis and facilitate the intelligent selection of treatment.

Limitation of space has precluded the inclusion of descriptions of all of the infectious diseases of man. The writer has discussed, therefore, only those which are observed most frequently in the United States and Europe; even some of these have had to be omitted. "Tropical" diseases, even such common ones as malaria, cholera, and most of the worm infestations have not been described even though they occur at times in the Temperate zone.

None of the statements in this book have been documented by bibliographical references. They are nevertheless the distillate of the observations of a very large number of clinicians and investigators to whom the writer is greatly indebted. He also wishes to express his gratitude to his teachers, medical colleagues, and to the many patients from whom he has learned much of what he has committed to the pages of this book.

Part of this book was written while the author was Associate Professor of Medicine at the Boston University School of Medicine and Chief of the Department of Infectious Diseases of the Massachusetts Memorial Hospitals in Boston, Massachusetts.

L.W.

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CHAPTER I

PRINCIPLES OF THE DIAGNOSIS OF INFECTION

Twenty years ago the establishment of a specific etiologic diagnosis in many infections was of little or no help to the physician or his patient. For example, nothing was gained from the differentiation of pneumococcal, tuberculous, or staphylococcal meningitis because effective therapy was not available, and death was the outcome in all but a rare case. With the present availability of potent and highly effective antimicrobial drugs, however, it has now become of paramount importance to establish an exact etiologic diagnosis as rapidly as possible, so that the proper chemotherapeutic agent can be intelligently selected and treatment instituted. A number of approaches, both clinical and laboratory, are useful in the diagnosis of infectious disease.

Clinical Features of a Disease

In the present enthusiasm for laboratory studies, there is a tendency to overlook the fact that the clinical pictures of some infectious diseases are sufficiently characteristic to suggest their etiologic background. For example, the patient who suddenly develops a chill followed by fever, pleuritic pain, a cough productive of bloody sputum, and abnormal physical findings over one of the lower lobes of the lung, in all probability is suffering from pneumococcal pneumonia. While other types of pneumonitis may have the same onset, it is commonest with pulmonary infection due to the pneumococcus. The patient with stiff neck and back, fever and chills, changes in sensorium, purulent spinal fluid, and

a petechial skin eruption usually has meningococcal meningitis. In these two diseases, as well as in others, the nature of the infectious agent can be suspected on clinical grounds, although it must always be confirmed by laboratory study. Initial therapy may be specific before the causative organisms have been isolated and identified in such instances.

With some of the infectious diseases, however, the syndromes which develop are quite identical, regardless of the nature of the responsible agent. For example, one cannot differentiate clinically the diarrhea produced by the typhoid bacillus, salmonellae, dysentery bacillus, or even viruses. The acute bacterial meningitides in which skin eruptions do not appear also cannot be distinguished, with some exceptions, on a clinical basis alone, because they are all accompanied by signs of meningeal irritation and identical spinal fluid changes. However, the mode of onset of some types of meningitis suggests the etiologic agent. Thus, meningeal infection secondary to disease of the ears or paranasal sinuses is usually due to the pneumococcus, staphylococcus, or streptococcus, and rarely, if ever, the meningococcus. When meningitis follows a pneumonia, it is very often due to the pneumococcus in adults, and *H. influenzae* in children.

Epidemiologic Information

The epidemiologic background of an undiagnosed infection is often very helpful in suggesting its etiology. For example, the season of the year is significant in relation to some specific diseases. Thus, non-bacterial infections of the nervous system occurring in the summer are apt to be poliomyelitis, equine encephalitis, or due to Coxsackie viruses. Information concerning the types of disease present in the community in which a patient resides may be very important. The person with chills and fever, but no localizing signs, who has recently lived in a part of the world in which malaria is endemic should be studied for this disease.

Equine encephalitis should be suspected in individuals with fever and neurologic manifestations if they have been in a vicinity in which horses are known to be suffering with this disorder. A history of contact with a known case of specific infection, streptococcal pharyngitis, measles, varicella, etc. is often sufficient to indicate the etiology of an acute febrile process. Information concerning past experience with infectious diseases may be of help in ruling out certain possibilities; for example, second attacks of the acute exanthemata, pertussis, or meningococcal meningitis are very uncommon. The ingestion of contaminated food or water suggests the possibility of any of the infections transmitted by the oral route, such as the salmonelloses, typhoid fever, bacillary dysentery, amebic colitis, infectious hepatitis, and trichinosis. A story of contact with animals often directs the attention of the physician to specific possibilities. The patient with a severe "virus" pneumonia should be questioned concerning exposure to birds. The appearance of a "pimple" on the skin of a man whose work involves the handling of skin, furs, or hair is suggestive of anthrax. The abbatoir worker with an undefined pneumonitis may have Q fever. The farmer, veterinarian, or meat packer with fever and weakness, but without localizing signs, should be investigated for brucellosis. Inquiry into previous immunizations may aid in ruling out certain disease states. A recently acquired cowpox vaccination scar, for example, makes the likelihood of smallpox in an individual with fever and a diffuse vesicular eruption remote.

Information Derived from Various Stained Preparations

The difficulties associated with attempts to establish specific diagnoses by microbiological methods when patients are seen at home or in an office cannot be belittled. There are, however, certain practical approaches to this problem which give the physician information of great help in establishing a strongly presumptive or even exact etiologic diag-

nosis. A very useful procedure in this regard is the microscopic examination of exudates, discharges, and body fluids by means of properly stained smears. For example, a Gram-stained throat smear obtained from a patient with acute pharyngitis may immediately demonstrate the predominant and probably causative organism. Stained preparations of exudate from abscesses, purulent conjunctivitis, or suppurative otitis media, or from sputum in pneumonia often reveal the responsible bacteria. In some instances, the morphology and reaction to the Gram-stain of an organism are sufficiently characteristic to allow its exact identification; this is often the case in gas gangrene, tetanus, anthrax, and meningococcal, pneumococcal, or staphylococcal infections. Wright-stained blood smears may rapidly clear the confusion of an obscure fever by revealing the presence of malarial parasites. Gram-stains of centrifuged spinal fluid in purulent meningitis frequently disclose the responsible bacteria and allow the initiation of antimicrobial therapy very early in the course of the disease, obviating, in many situations, the necessity of administering treatment empirically. In cases of suspected urinary tract infection, the sediment of urine obtained by the "clean catch" method should always be gram-stained. Such a study yields two valuable pieces of information: (1) The demonstration of organisms in the smear usually indicates the presence of infection, rather than contamination, and (2) the nature of the bacteria—gram-positive or negative, rod or coccus—is revealed. The importance of examination of sputum by means of acid-fast stains when tuberculosis of the lungs is being considered cannot be overemphasized; false-positive results are present, however, in about one per cent of such studies. Properly stained smears of material obtained by aspiration of bone marrow or liver not infrequently establish the diagnosis of miliary tuberculosis some time before clinical or cultural studies, or animal inoculations prove its presence. In some diseases, stained smears are of no value. A good example is

the enteric bacillary infections in which it is impossible to distinguish, on the basis of morphology and staining reaction, the typhoid bacillus, the Salmonellae, and the dysentery bacilli from the gram-negative organisms (*E. coli, Proteus, Ps. pyocyaneus, A. aerogenes*) normally present in the bowel. It must also be stressed that failure to demonstrate bacteria in stained preparations does not necessarily rule out their implication in an infectious process.

Specific Microbiologic Studies

It is usually impossible for the physician practicing primarily outside the hospital to carry out the microbiologic technics necessary to specifically identify disease-producing organisms. This requires considerable equipment and specially trained personnel, and is best done in the hospital, municipal, or state laboratory. Despite the fact that he himself does not carry out the procedures involved in this type of study, the practitioner of medicine must be aware of the situations in which cultures are necessary, the materials which should be cultured, and the methods of obtaining and transmitting them to the bacteriology laboratory.

Blood cultures should be drawn, whenever possible, in any patient with fever. Although bacteremia is detected most often when the temperature is high, organisms may be present in the blood in cases with a low-grade febrile response. The best time to make a blood culture is at the point where the temperature is just beginning to rise or during a shaking chill. A minimum 10 ml. of blood should be withdrawn under the strictest aseptic precautions and inoculated into about 75 to 100 ml. of broth. In addition, it is well to incorporate 1 ml. of blood into an agar pour-plate, in order to estimate the degree of bacteremia and to rule out the possibility of contamination, if growth occurs in the liquid medium. The bacteriologist should be informed of the clinical possibilities being considered, so that proper bacteriologic technics can be carried out.

Any material which can be obtained from an infected area should be cultured; this includes spinal fluid, urine, sputum, exudate from localized areas of infection, stool, bone marrow, blood, and throat secretions. Although it may not always be possible to culture the pharynx of all individuals with "sore throat," such study must never be omitted when a membranous pharyngitis is present because, without it, the diagnosis of diphtheria cannot be confirmed. In instances in which bacterial infections are strongly suspected but organisms fail to grow, the possibility of anaerobic, mycotic, or acid fast disease must be seriously considered and appropriate cultures made.

Most hospitals are at present not equipped with either the means or the personnel for the isolation and culture of viruses. Materials requiring this kind of study must be sent to special laboratories, many of which are conducted by governmental public health agencies. For the practicing physician, clinical findings are of much greater diagnostic help in the early phase of many viral infections than attempts at specific identification of the infectious agents. Some of the diseases in which the virus can be isolated with relative ease are mumps (saliva), influenza (throat washings), viral diarrheas (stool), Coxsackie disease (stool), and poliomyelitis (stool).

Animal inoculation is necessary for establishing the presence of some infections. This is of help in tuberculosis, leptospirosis, anthrax, and other diseases which are discussed in detail in other chapters of this book.

The isolation of a pathogenic organism does not always establish its causal relationship to an infectious process. For example, the recovery of staphylococci from the pharynx does not prove that they are responsible for a sore throat because about 60 per cent of normal people harbor this organism in the upper respiratory tract. A single positive blood culture containing staphylococci does not necessarily indicate the presence of bacteremia but may be due to

contamination from the skin. Beta-hemolytic streptococci may at times be isolated in a throat culture of a patient who has viral pharyngitis. Salmonella or dysentery bacilli may be demonstrated in the feces of patients with diarrhea, but may merely represent the carrier state. Data obtained from bacteriological studies alone, therefore, are of little diagnostic significance; they must always be correlated with the clinical findings, before they can be accepted as indicating the etiology of an infection. That this is so is further illustrated by the occasional case in which "non-pathogenic" organisms produce serious disease. Thus, *B. subtilis* rarely has induced a purulent meningitis, *Alcaligenes fecalis* has been responsible for bacteremia, and *L. acidophilus* has been the causative agent in a case of endocarditis.

Bacteriological Statistics

"Bacteriological statistics" are data concerning the frequency of infection of certain organ systems by specific microorganisms. Such information may be of great help in making an "intelligent guess" of the etiology of an infectious process. For example, infections of the urinary tract most frequently involve *E. coli, Ps. pyocyanea, Proteus, H. influenzae, Staph. aureus,* and streptococci. Acute purulent otitis media in adults is most often due to *Staph. aureus,* pneumococci, or beta-hemolytic streptococci; in children, on the other hand, *H. influenzae* is a very common cause of this disease. *D. pneumoniae* is responsible for many cases of pneumonia in adults; *H. influenzae* produces primary infection of the lungs only very rarely in this age group. The organisms isolated from chronic otitis media are gram-negative rods such as *Proteus* and *Ps. pyocyaneus.* Acute osteomyelitis is produced in the bulk of instances by *Staphylococcus aureus. Strep. viridans* is the causative agent in 95 per cent of the subacute bacterial endocarditides. These are just a few examples of the application of "bacteriologic