Inflammatory Bowel Disease

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Preface

Had Sir Winston Churchill been a physician, he might have described the idiopathic inflammatory diseases of the colon as "a riddle wrapped in a mystery inside an enigma." These diseases, chronic ulcerative colitis and Crohn's disease of the colon, are of unknown etiology, their courses are uncertain and unpredictable, and their responses to medical and surgical treatment are variable. They present one of the greatest challenges to medicine today, a challenge which is intellectual, economic, and emotional because they are chronic diseases which have distressing morbidity and mortality rates.

Despite this somewhat gloomy prologue, is it possible, in 1975, to resolve some of the problems and to define others more clearly? We think that it is, and this book is the result.

Chronic ulcerative colitis has been recognized since at least 1859 and an awareness of Crohn's disease of the colon dates from the 1920's with an increasing appreciation of its existence since the important publication by Lockhart-Mummery and Morson in 1960. Despite this long history, many of the salient facts of inflammatory bowel disease (IBD) remain obscure.

Studies of the epidemiology are in their infancy, but IBD is thought to be more common and more severe in some countries, including Great Britain and the United States of America, than in others, such as Germany, Greece, and Japan. In the United States of America the incidence is approximately 6 to 8 per 100,000 population per year so some 200,000 to 400,000 people are affected and 15,000 to 30,000 new cases are identified each year. It has been suggested that the incidence of IBD is rising in most areas of the world, but precise data to support this are not available. If this increase proves to be real, it would implicate environmental as well as sociocultural and other influences in the pathogenesis. Many questions remain to be answered. Is the high incidence among Jewish patients with IBD (at least in the United States) of etiological significance? If so, how does it relate to the incidence of IBD in Israel? In the first chapter of this book, Mendeloff considers these and other points and discusses the difficulties involved in epidemiologic studies. He describes many of the limitations of methodology and suggests a promising way to proceed in this fascinating area of investigation.

The understanding of the etiopathogenesis of IBD might be improved by the availability of a true experimental model. Melnyk reviews the field of experimental colitis and applies his critical appraisal to the tools that have been used. He dispels some myths, defines the knowledge in this area, and indicates methods by which a successful model might be achieved.

For many years, the role of psychological factors in the etiopathogenesis of IBD has been the subject of considerable debate. Almy discusses this and presents his conclusions, which are based on a review of the literature and on his own extensive experience.

Recently, the possible role of immunologic mechanisms in the etiopathogenesis of IBD has received increasing attention. Indeed, chronic ulcerative colitis has been

classified by some as an "autoimmune" disease—a premature conclusion in the light of the available evidence. Some of the features of IBD have suggested that an infectious agent may be involved and historically this concept has attracted many supporters. Kirsner, Kraft, Shorter, Watson, and Gorbach review the immunologic and microbiological findings and consider some of the related hypotheses which have been developed to explain the mystery of IBD. From these deliberations there emerges a broad and exciting frontier for future investigation, not only of the individual etiology and pathogenesis of ulcerative colitis and Crohn's disease of the colon, but also the possible close interrelationship between these disorders.

A major handicap to an understanding of IBD has been the lack of accepted definitions and criteria. Morson, Whitehead, Wall, and Kirsner define clearly the pathological and clinical features and are aided in this by Marshak, Lindner and Spencer, who present the radiologic and endoscopic findings, and by Roth and Johnson, who consider the differential diagnosis. These chapters provide a strong basis of definitions for use both in future investigative studies and in clinical practice. In addition, Zetzel presents the special features of IBD complicating pregnancy and Davidson reviews those of IBD in the pediatric patient.

The local and systemic complications are described by a number of contributors including Huizenga and Kern, and attention is directed to the increased incidence of colonorectal neoplasms in IBD. It is clear that greater effort should be applied to the study of the premalignant aspects of IBD because it is one of the few, recognized human disease-entities which are demonstrably associated with an increased risk of cancer in the target organ.

Lastly, Wall, Kirsner, Shorter, Silen, Turnbull, Block, Glotzer, and Giuliano present detailed and critical appraisals of the medical and surgical therapy for IBD, and special considerations in children and in pregnancy are described by Davidson and Zetzel. The extent to which current practice is dependent upon hard data and on empiricism is defined and, as in any book with multiple authorship, certain differences of opinion emerge in a few areas of diagnosis and treatment. However, practical methods for the management of patients with IBD are described clearly and concisely and should prove valuable to the practicing physician because they are based on the extensive collective experience of a number of leading authorities. These chapters define clearly many areas which are in urgent need of investigation.

Finally, we quote from the musings of the White Knight: "I was inventing a new way of getting over a gate. . . . I said to myself, the only difficulty is with the feet; the head is high enough already." We hope that the efforts of the authors of this book will provide a key to the gate to IBD or, at least, an effective stepladder.

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Section one

Epidemiology

Chapter one

The Epidemiology of Idiopathic Inflammatory Bowel Disease

A. L. MENDELOFF, M.D., M.P.H., F.A.C.P.

Although there is little doubt that the forms of idiopathic inflammatory bowel disease considered in this book must have existed for centuries, the epidemiologist must look at their occurrence in various populations as if they are newly discovered entities. It is certain that the ability to recognize them as distinct inflammations of the intestine and colon was hampered formerly by inadequate instrumentation, lack of pathological specimens at various stages of their progression, and, most of all, by the overwhelming preponderance of bacterial infections and parasitic infestations which made the lot of earlier man miserable, and caused the deaths of many infants, children, and debilitated and elderly persons through the losses of fluids and electrolytes accompanying the diarrheal phases of those disorders. In most parts of the world today where diarrheal diseases are still prevalent, there is a dearth of information about the chronic inflammations of the gut, both as to their frequency and the details of their course. It is the purpose of this chapter to ask questions about the distribution of these disorders in human populations throughout the world in such a way as to clarify the possible avenues of investigation which might cast light on their causes and management.

I. Serious Problems in Epidemiologic Approaches to Inflammatory Bowel Diseases

A. The Problem of Diagnosis

The ability to differentiate ulcerative colitis and Crohn's disease from each other, and from other so-called etiologically specific inflammations of the gut is not currently uniformly distributed among the health care personnel of the world. Since the proper diagnosis constitutes a prerequisite for the classifying of patients, this failure of agreement on diagnostic criteria is a serious obstacle for those who study the disease as it occurs in various parts of the world. Our experience with amebiasis, shigellosis, and lymphopathia venereum clearly indicates that each of these conditions can on occasion produce inflammatory reactions which may persist for some time after the initial inciting pathogen can no longer be isolated. At some point in this sequence of events it is possible to confuse the clinical, radiologic, proctoscopic, and perhaps even the biopsy appearance of the bowel with the types of responses we usually associate with ulcerative colitis or with Crohn's disease. Not very long ago it was

thought by the most authoritative investigators that chronic ulcerative colitis was a form of "chronic bacillary dysentery," and Crohn's disease some atypical variant of intestinal tuberculosis. Although in this decade we believe we have left most of that kind of confusion behind us, epidemiologic studies which cover a finite period of time must recognize that changes in the diagnostic criteria, and in the nomenclature of the diseases being studied during that period, can provide errors in classification which may seriously mislead and confuse.

Furthermore, it is important to recognize that the tools we employ to help establish diagnosis are not used with equal precision even in the best medical centers, much less elsewhere by many different physicians of varying degrees of competence and experience. We refer particularly to bacterial culture of stools, parasitological identification, sigmoidoscopy, biopsy and interpretation, and radiologic investigations. Some physicians depend very heavily on endoscopy to make the diagnosis of ulcerative colitis, whereas for Crohn's disease they rely heavily on radiology for any diagnostic study. Currently there is not as much agreement on the sigmoidoscopic, biopsy, and radiologic features of these two diseases as one would wish. Because of such uncertainties the epidemiologist tends to give most weight to those studies carried out in highly sophisticated medical centers where the proper diagnosis is most likely to be arrived at. The obverse of this distinction of the medical center is the highly biased patient selection it sees. Thus the epidemiologist must strike some balance between the very best clinical data and the most reliable population data in order to get a clear picture of the total epidemiologic features of these two disorders. In the course of this discussion we shall assume that a large majority of the clinical cases reported represent clear-cut instances of either ulcerative colitis or of Crohn's disease, but that in any large series there is a portion, perhaps as high as 20%, in whom there is some doubt as to their classification into one or the other of these rubrics.

B. The Problem of the Size of the Population at Risk and its Geographical Location

1. Although reports of the existence of the two forms of inflammatory bowel disease have now been recorded from all over the world, this chapter will concentrate on those studies which have made reasonable attempts to define the population at risk in at least some of its demographic characteristics. A number of such studies have defined not only the incidence and prevalence of the diseases, but also have compared the characteristics of the patients with control populations of various types. It is rather remarkable that, during the two decades or less during which such studies have been carried out in both hemispheres, the different investigators have reached so much agreement on many fundamental points.

2. Subjects with chronic disease move from an undifferentiated pool of "normal" into the category of patients carrying a definite "diagnosis." This fact provides the background for the statistical treatment of clinical data which can then be translated into epidemiologic terms. The term "clinical" refers to the bedside, and clinical data refer to manifestations of disease in people who are ill. "Epidemiologic" data refer to the total population, both well and sick; techniques are available for predicting or identifying certain features which are more or less concentrated in the ill as compared to the healthy members of that population. Iversen and his associates[1] have published an excellent example of the use of such an hypothesis for the diagnosis of ulcerative colitis in the entire country of Denmark. It is reproduced with some modifications as Figure 1-1. In Table 1-1 the same authors tabulated the number of cases diagnosed definitely as ulcerative co-

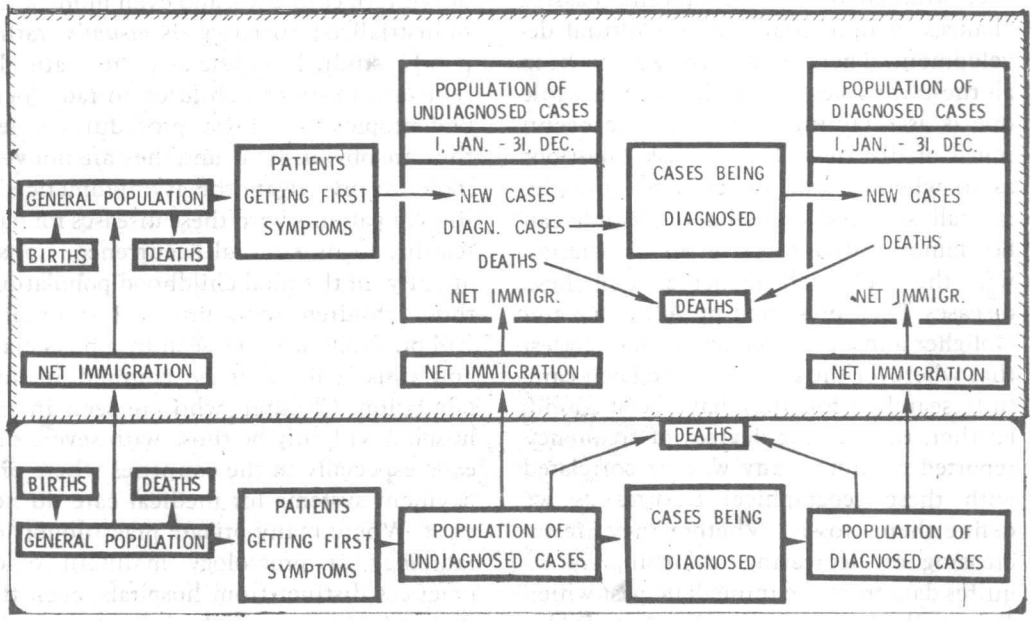

FIG. 1-1. *The population at risk for chronic disease, and the mechanisms by which incidence and prevalence of patients with the disease can be ascertained. Modified from Iversen et al.*[1]

litis per year against the number of years of symptoms preceding the point in time at which the diagnosis was made. Such data can be plotted in a diagram which, when compared with data of the general population, gives one a dynamic concept of the rate of occurrence of this disease per 100,000 persons at risk per year—i.e., *the annual incidence rate.* In this same total population there is, furthermore, a number which represents all the patients afflicted with that disease at any one point in time—i.e., the *prevalence* of the disorder per 100,000 persons at risk. Furthermore, there is a movement *into* the population under study of those persons who have already been diagnosed elsewhere, and there is a movement *out* of the study group of those persons physically emigrating or dying, whether from the disease in question or from other causes.

3. People live in geographical areas, the ecology of which has been changing rapidly in recent decades, during a time period in which large migrations of populations have

TABLE 1-1. *One Thousand Hypothetical Cases of Ulcerative Proctitis and Colitis in Copenhagen County, Denmark, Showing in the Extreme Right Hand Column that Fraction Diagnosed Each Year. After Iversen et al.*[1]

Years After First Symptoms	*Remaining Patients*	*Diagnostication*	*Deaths*	*Diagnostication Rate*
0	1000			
		387	13	0.39
1	600			
		109	9	0.18
2	482			
		75	7	0.16
3	400			
		47	6	0.12
4	347			
		39	5	0.11
5	303			
		89	19	0.07
10	195			
		67	12	0.08
15	116			
		35	8	0.07
20	73			
		22	5	0.07
25	46			
		19	3	0.10
30	24			
		21	3	
Total		910	90	

been stimulated by world wars and massive changes in industrial and agricultural development. There is no easy way to keep all these variables under observation while one is ascertaining changes in the occurrence of diseases. One can ask questions as to whether data on climate, sunlight, rainfall, soil characteristics, or altitude can be demonstrated to have an association with the rise or fall in incidence of these diseases. Data presented by Acheson[2] and Goligher and his associates[3] would suggest that wherever the diseases have been carefully searched for, they have been found. Further, the varying degrees of frequency reported cannot in any way be correlated with these geographical features as we define them grossly. Whether they are increasing or decreasing unfortunately requires data from the immediate past which we usually do not possess, but later in discussion some data will be presented bearing precisely on this point.

However, although climatic and other gross geographical features do not seem to determine the frequency with which these diseases are found, dietary differences among populations, which influence defecatory patterns, the bulk of the stools, and the bacterial flora of the colon, may well contribute to the variable course of these diseases once initiated, and to the development of local complications such as carcinoma and liver disease.

II. The Incidence, Prevalence, and Mortality of Inflammatory Bowel Diseases

A. The Reliability of Published Data on Incidence

One of the most disturbing features of the investigations reported is the imprecise data relating to the population under age 15. This group of children, which makes up from 25% to 35% of the total population of Western countries, and even more of less industrialized societies, is usually rather poorly studied. Physicians are naturally reluctant to submit children to radiologic, endoscopic, and biopsy procedures unless they are obviously ill, and they are not very likely to investigate the asymptomatic siblings of patients with these diseases for data relating to its familial occurrence. Consequently, in the total childhood population, those children with minimal symptoms will probably never be seen by a physician, and thus will never be counted in any tabulation. Children who are seen in the hospital will only be those with severe disease, especially in the countries where prepayment systems for medical care do not exist. Where many private practitioners of radiology or proctology maintain office practices distinct from hospitals, even the diagnosed patients will be difficult to record completely, especially in urban areas where large numbers of people move about inside the cities and from the suburbs to cities and back again. Only better-educated or more affluent parents will insist on follow-up studies or comprehensive surveillance of other siblings. The fatality rates for the diseases in question will reflect the fate of those patients most severely ill, who are often sent to special centers remote from their home towns.

Because of the imponderables associated with the medical care of children with inflammatory bowel disease, one of the largest epidemiologic studies ever carried out and the only one from a large metropolitan center chose to confine its surveillance to those persons over age 20 who had been officially resident in a defined metropolitan area for at least one year.[4] However, most reports, including those with what this author considers to be the most carefully defined population base, have included the entire population as the one at risk, despite the evidence just cited that the same diagnostic criteria may not be equally applied to those under age 15. There are now in the literature many re-

TABLE 1-2. *Selected Reports by Average Annual Incidence of Inflammatory Bowel Disease in Europe, United Kingdom, and United States*

	Average Annual Incidence/100,000					
	Ulcerative Colitis			*Crohn's Disease*		
	M	*F*	*TOT.*	*M*	*F*	*TOT.*
Oxford 1951–60[11]	5.8	7.3	6.5	0.8	0.8	0.8
Baltimore 1960–63[4]	3.9	5.2	4.6	2.5	1.2	1.8
Hospital cases only						
Norway 1956–60[6]	2.0	2.1	2.1			0.25
1961–69[6]	3.2	3.2	3.2	1.00	1.00	1.00
Hospital cases only						
Copenhagen 1961–66[5]	6.7	7.6	7.3			
Aberdeen 1955–61[27]				1.4	1.9	
1962–68				1.6	3.0	
Uppsala 1955–61[26]				1.8	1.8	
1962–68[26]				3.4	2.4	
Minnesota 1935–64[7]			3.4			c.4.5

ports from all parts of the globe as to the incidence and prevalence of inflammatory bowel diseases.[2] Unfortunately, only a very few of these can be considered to have established an adequate population base and rigorous diagnostic criteria which permit the epidemiologist to use with confidence the data reported. In Table 1-2 are compiled selected reports of the average annual incidence of ulcerative colitis and/or Crohn's disease from those studies which can be regarded as precisely defined. It is of considerable interest that these investigations, all carried out within 15 years of each other in a variety of Western populations, are in general agreement—i.e., the annual incidence is, for the sum of both disorders, of the order of five to ten new cases per 100,000 persons at risk. The principal differences arise when one tries to distinguish the milder cases, particularly ulcerative proctitis, from those more likely to cause serious disease, and in particular to warrant hospital admission. The Danish data[5] would suggest that at least 60% of their total ulcerative colitis experience is ulcerative proctitis; in the United States the Baltimore survey would indicate that less than 10% of that proctitic population ever is hospitalized. Thus, most of the variation in the reported series of ulcerative colitis incidence is probably due to whether or not ulcerative proctitis is recognized by the diagnostic facilities doing the reporting. This is not to challenge the ability of the physicians in such facilities, but merely to point out that physicians can only diagnose what they see, and that in some sections of any country large numbers of proctitic patients may never be diagnosed simply because they are never seen or they report to other places which do not submit their data to those collecting the *total* data. Thus the proportion of proctitis to colitis may be crucial to the total incidence of ulcerative colitis; in children the observation of proctitis by a pediatrician or general practitioner may not engender other studies which might establish the existence of more extensive colitis. The studies from Scandinavia[5,6] and from Olmsted County, Minnesota,[7] bear on this subject, and would permit one to estimate that of recorded cases of ulcerative colitis about one-half are ulcerative proctitis. In view of the preceding discus-