

SPECIAL ARTICLE

THE USE OF THE CROSBY INTESTINAL CAPSULE FOR OBTAINING BIOPSY SPECIMENS*

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In 1957, Dr. Rudolf Schindler wrote in his *Synopsis of Gastroenterology* : «Clinical and pathological knowledge of the small intestine will develop properly only when a method can be devised to inspect its mucosa in the living patient. Only then will gastroenterology ascend to the status of a real science.»

This was and still is an accurate statement since, until very recently, the obtaining of adequate material for histologic study of the small intestine has been very difficult. Surgical specimens are frequently damaged by handling and by the clamping of blood vessels and necrotic changes are almost always present due to autolysis. Furthermore such specimens are seldom available. For these reasons accurate knowledge about the living intestine has been almost impossible to obtain until recently. Over the years many attempts have been made, and various methods have been tried, to obtain satisfactory intestinal biopsy material. As a result of this research the Wood and Tomeius, later the Henning and Heinkel, instruments for gastric mucosal biopsy and the Shiner tube for duodenal and upper jejunal mucosal biopsy were developed and have been used successfully. It is now possible to make excellent histological preparations from the specimens obtained with these instruments.

This preliminary report will deal with our experiences in peroral intestinal mucosal biopsy technique using one of the more recently developed instruments, the Crosby intestinal capsule, which was developed by the Walter Reed Army Institute of Research.

The capsule was devised for jejunal biopsy but it can be used to obtain specimens from any site between the oropharynx and the

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ileocecal valve without laparotomy. In our small series we also obtained one biopsy specimen from the esophagus. Although our attempt to reach the stomach failed this time, we will try again.

The Crosby capsule is egg-shaped and made of metal; it is 18 mm. long and 9.5 mm. in diameter and encloses a rotating knife which is spring activated and triggered by suction. (Figure 1.) The suction

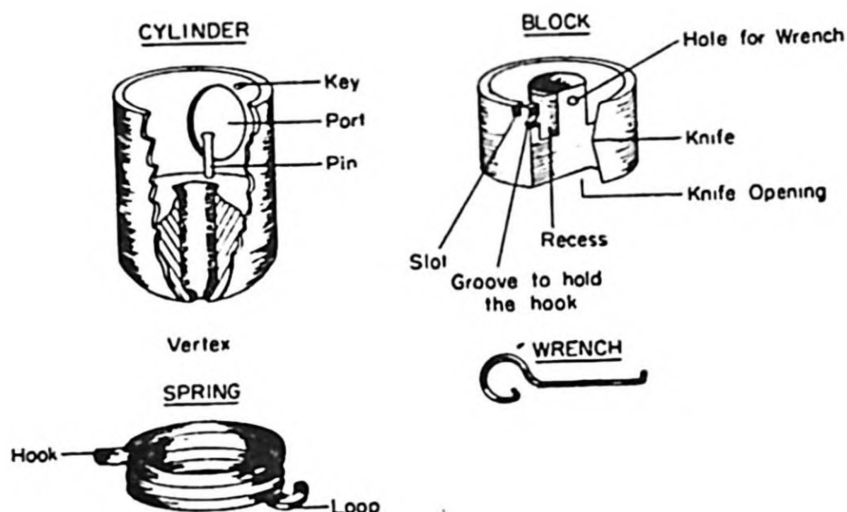


Figure 1.

first draws a bit of mucosa into the capsule and then the knife is sprung. The capsule is attached to a polyethylene tube, 2 mm. in diameter, which transmits the suction impulse and retrieves the capsule.

The specimen removed is a 7 mm. disk of mucosa containing hundreds of villi. Unlike Wood's instrument, this capsule does not remove muscularis mucosae so the muscles contract at the biopsy site and close the opening while the adjacent mucosa promotes healing.

No complications of infection, hemorrhage or perforation have occurred in a large reported series of biopsies. Occasional occult blood was found in the stool of tested patients and some abdominal cramps were reported. In our small series no complications resulted from the tests. The capsule provides a reliable method for obtaining mucosa specimens; the process may be repeated as frequently as necessary and the patient remains comfortable. The amount of tissue removed is entirely adequate for detailed histologic analysis.

As demonstrated in the literature, and by our own experiences, biopsies in patients with functional gastrointestinal disorders invariably showed normal mucosa. However, the definition of normal limits may have to be modified when more research has been com-

pleted. The definite changes resulting from enteritis and atrophy of the mucosa can be readily distinguished from normal mucosa with this method.

As we have owned a Crosby capsule only since the middle of July 1961, our experience is limited. We have obtained specimens from 12 adult and child patients in Gülhane and Hacettepe Hospitals. We failed in only one attempt which occurred when we tried to get a specimen from a patient whose condition had been diagnosed as cancer of the stomach. The capsule is not designed for use in an organ with as large a lumen as the stomach but we feel that, another time, we may have more success.

All the patients, even the children, swallowed the capsule with ease. They suffered no discomfort during the entire proceeding. Figure 2 is a roentgenogram of one of our subjects after he had

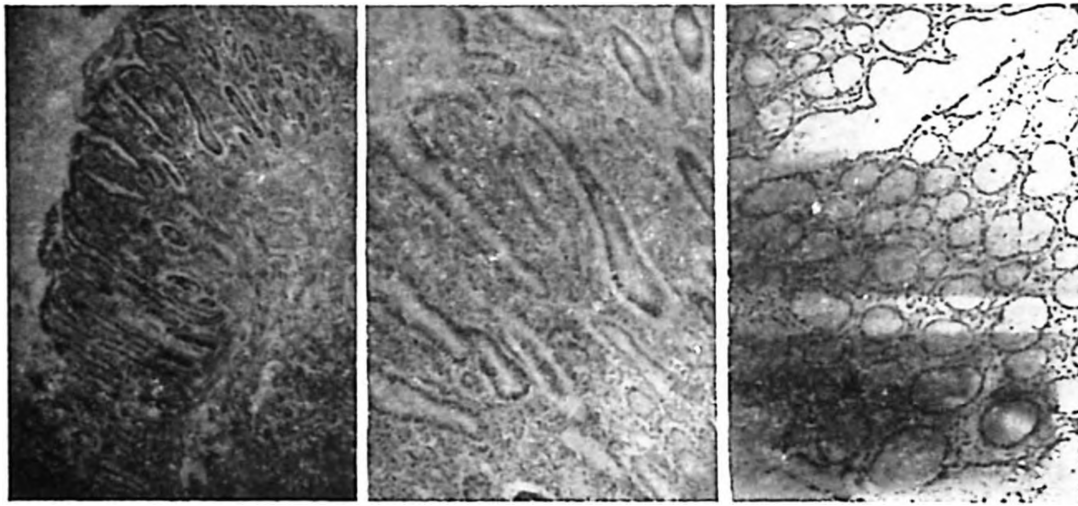


Figure 2.

swallowed the biopsy capsule. Radiopaque material has been introduced into the polyethylene tube. In seven of our cases the biopsy specimens appeared normal in structure. (Table 1, Figs. 3, 4 and 5.) The other five specimens showed pathological changes. (Table 2.)

Findings in these five cases were as follows :

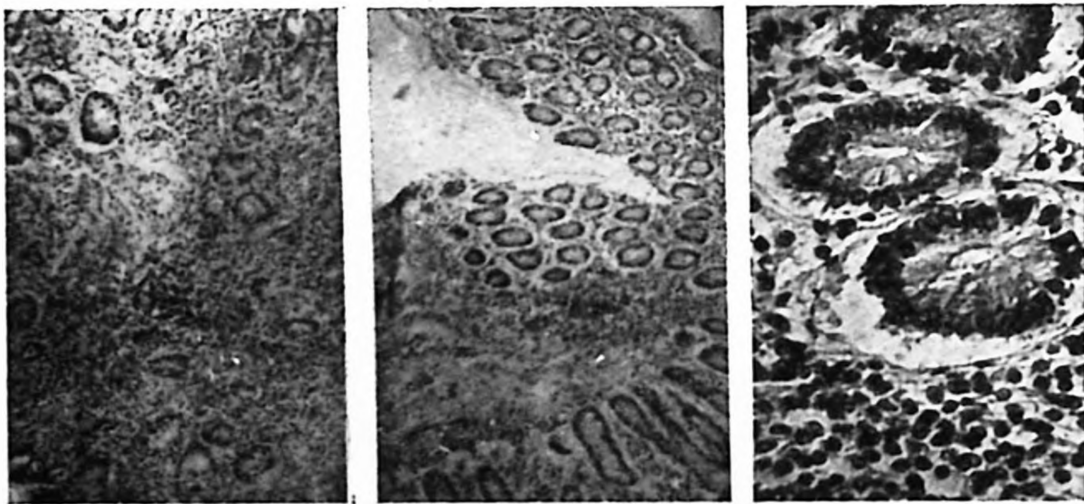
Case 8. The clinical picture in this case was of a nonspecific enteritis, a diagnosis which was confirmed by the biopsy. Fig. 6 shows that the glands of



Figures 3, 4, 5.

the mucosa and the submucosa have been destroyed in some places. The submucosa is infiltrated by round cells and the vessels are distended.

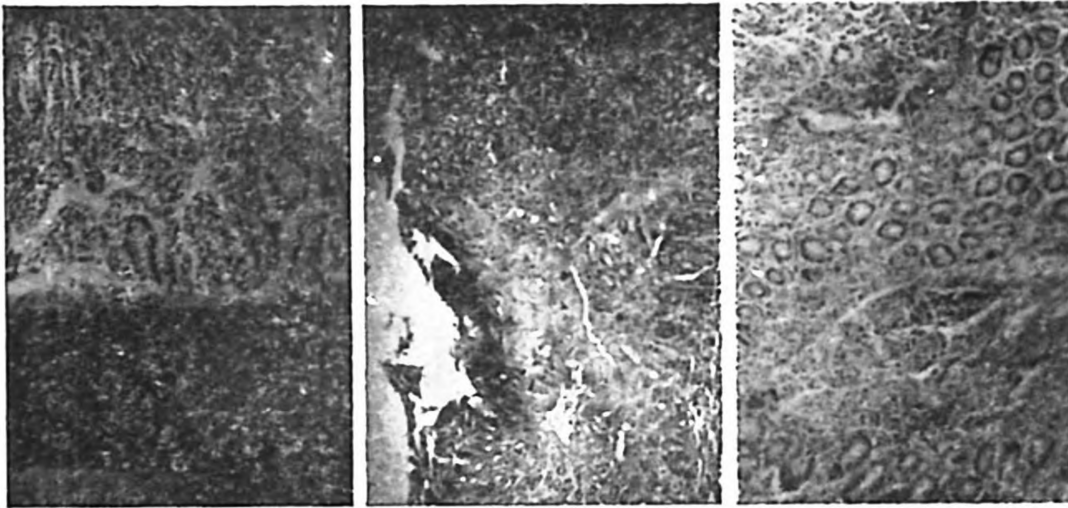
Case 9. This patient, an 8 year old boy, was seen in the Gülhane Pediatric Clinic and his condition was diagnosed, without endoscopic or radiological examinations, as ulcerative colitis. The biopsy showed lymphocytic infiltration around the glands and in the submucosa. The submucosa was edematous and the vessels distended. (Figures 7 and 8.) The peripheral area of the



Figures 6, 7, 8.

glands was markedly infiltrated with lymphocytes and other inflammatory cells. In this case the biopsy corrected the clinical diagnosis quickly and without further examination, proving the patient to be suffering from enteritis.

Case 10. The clinical diagnosis in this case was chronic enteritis which was confirmed by examination of the biopsy specimen. (Figure 9.)



Figures 9, 10, 11.

Case 11. This patient, an emaciated old man who complained of severe dysphagia, was admitted to the gastroenterologic clinic. The clinical picture was one of stricture in the upper third of the esophagus but the result of the esophagoscopy was not clear. With the capsule technique, acanthosis of the superficial epithelium of the mucosa was observed. A tentative diagnosis of malignancy was made.

Case 12. An 8 year old boy admitted to the pediatric clinic at Gülhane Hospital complained of vomiting and a pain in his abdomen. A mass on the left side of the umbilicus was palpated. The intestinal biopsy showed that the mucosa had separated and that an ulcer was present. Fibrin and necrotic granulated tissue on the floor of the ulcer were detected. (Figures 10 and 11.) An inflammatory infiltration of the submucosa and mucosa could be seen. A diagnosis of ulcerative enteritis was suggested. Later, a roentgenogram of the small bowel showed an organic narrowing segment of the upper part of the ileum. After roentgenography, the diagnosis of a benign or malignant hyperplasia of the intestinal mucosa due to infection was made. Laparotomy was performed and a segment (20 cm.) of the intestine was removed. (Figure 12.) The examination of this



Figure 12.

specimen revealed that the lesion in the middle part of the ileum was a lymphoblastic lymphosarcoma. In this case, the Crosby capsule technique did not give a full picture of the disease but did point to the need for further examination.

Conclusion

Although our experience with this technique is limited we find ourselves in accord with other authors. This type of biopsy is of the greatest value in diagnosing diffuse intestinal disease. The fact that in all functional gastrointestinal diseases examination of the biopsy specimen reveals a normal picture helps to establish a diagnosis. The test is simple, with no untoward effects, and is urged in any case where diffuse intestinal disease is suspected.

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TABLE 1

BRIEF CASE REPORTS (from July 15, 1961 to August 30, 1961)

Case No.	Name	Sex	Age	CHIEF COMPLAINTS	PHYSICAL EXAMINATION	MAIN LABORATORY FINDINGS	CLINICAL DIAGNOSIS	INTESTINAL BIOPSY	FINAL DIAGNOSIS
1	M.G.	M	49	Diarrhea, fullness, distention, gurgling in abdomen	Generalized abdominal distress, tenderness	Normal proctoscopy, hyperirritability on colon x-ray	Irritable Colon	Normal small intestinal mucosa	Same as clinical diagnosis
2	H.B.	M	44	Diarrhea, epigastric pain, anorexia, hoarseness, excessive weight loss	Cachectic, a small hard nodule on the left side of the neck, hepatomegaly and nodules on liver	Anemia, high sedimentation rate, hypoalbuminemia, anacidity, positive biopsies from nodule on the neck and liver at laparotomy	Aberrant lateral thyroid tumor and metastases in liver	Normal small intestinal mucosa	Same as clinical diagnosis
3	M.E.	F	12	Loss of appetite	Undernourished	Normal	Anorexia nervosa	Normal small intestinal mucosa	Same as clinical diagnosis
4	N.B.	M	11	Pain and swelling of the joints of fingers	Undernourished swollen tender joints	Anemia, leucocytosis, high sedimentation rate, positive x-ray and serological tests	Rheumatoid arthritis	Normal small intestinal mucosa	Same as clinical diagnosis
5	Z.T.	M	8	Puffiness of the face, hematuria headache	Slight hypertension, bouffissure	Microscopic hematuria, casts and proteinuria	Acute glomerulonephritis	Normal small intestinal mucosa	Same as clinical diagnosis
6	M.C.	F	29	Nausea, vomiting diarrhea, gaseousness in the abdomen, loss of weight weakness	Undernourished anemia, dehydrated, hypotensive, atrophic papillae of tongue	Anemia, hypoalbuminemia, anacidity, fecal culture and others negative	1. nutritional anemia 2. diarrhea due to anacidity	Normal small intestinal mucosa	Same as clinical diagnosis

TABLE 2
GASTROENTEROLOGIC CASES

Case No.	Name	Sex	Age	CHIEF COMPLAINTS	PHYSICAL EXAMINATION	MAIN LABORATORY FINDINGS	CLINICAL DIAGNOSIS	INTESTINAL BIOPSY	FINAL DIAGNOSIS
7	I.K.	M	35	Periodic fever, vomiting, abdominal pain, anorexia, weakness	Normal	All normal except some irregularities in the ileum	Ileitis(?)	Normal small intestinal mucosa	Periodic peritonitis
8	T.B.	M	18	7-8 watery stools daily, abdominal weakness, loss of weight	Undernourished, rumbling in the abdomen, clubbing	Anemia, leucocytosis, fecal examinations normal, x-ray of small intestine revealed enteritis	Nonspecific enteritis	Enteritis	Enteritis
9	M.T.	M	8	5-6 bloody mucous stools daily, abdominal cramps and tenesmus	Undernourished	Anemia, fecal examinations negative	Ulcerative colitis	Enteritis	Enteritis
10	S.U.	F	27	Abdominal pain in lower right quadrant, nausea, vomiting	Tenderness in the lower right quadrant	Anemia, x-ray coloptosis, spasm, rapid passage	Chronic enteritis	Enteritis	Enteritis
11	A.C.	M	65	Dysphagia, weight loss, pain and distention of abdomen	Undernourished, emaciated	Anacidity, stenosis of the upper third of the esophagus on endoscopic and x-ray examination	Stricture of the esophagus, etiology undetermined	Biopsy of esophagus revealed acanthosis of the squamous epithelium	Probably malignant mechanical obstruction
12*	A.C.	M	8	Nausea, vomiting abdominal pain, periods of diarrhea and constipation	A tender fixed mass on the left side of the umbilicus	High sedimentation rate, x-ray revealed stricture of the jejunum, probably with external mass	Tumoral mass in abdomen	Ulcerative enteritis	Regional Enteritis

* Laparotomy was performed; 20 cm. infiltrative and narrowed segment with its hypertrophied ganglia were extirpated.