L. Demling M. Classen P. Frühmorgen

Atlas of Enteroscopy

Endoscopy of the Small and Large Bowel Retrograde Cholangio-Pancreatography

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With the Collaboration of
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with the Assistance of H. Pease

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Foreword

It is my pleasure to introduce you to this new Atlas by Professor DEMLING and his colleagues on the very timely subjects colonoscopy, duodenoscopy and endoscopic cannulation of the bile and pancreatic ducts. Professor DEMLING, unlike many others who carry his teaching and administrative burdens, continues to be very personally involved in performing endoscopies. His clinic is one of the best organized and best equipped in the world. Professor DEMLING and his colleagues have been instrumental in introducing to the European continent these new techniques of duodenoscopy, colonoscopy and bile duct cannulation which were originally developed in Japan. They have added significant contributions of their own and now present to the reader a clear, concise, very well illustrated description of these methods.

Dr. CLASSEN is one of the pioneers in endoscopic cannulation. He has been kind enough to come to the United States and share his expertise with us at several Post Graduate Education programs. The students in these courses have been most enthusiastic about his presentations. Through this text he makes his extensive experience available to all endoscopists. The beginner at cannulation will find the illustrations of the various shapes the papilla may assume most helpful.

I had the pleasure this summer of teaching a course in Brazil with Dr. FRÜHMORGEN. Very few physicians have concentrated on colonoscopy to the extent that he has. Though he has been involved with the method for a relatively few years, he writes from an experience of more than 1 500 cases. He has gathered together the largest and clearest collection of colonoscopic photographs that I have ever seen. Even the experienced colonoscopist will learn from his well illustrated presentation on colonoscopic technique.

This text compliments Professor DEMLING's earlier Atlas on the Endoscopy of the Upper Gastrointestinal Tract. The English reader is indebted to Dr. KONRAD SOERGEL for his excellent translation of the text into English.

Madison, 1975 JOHN F. MORRISSEY

Preface to the German Edition

The Atlas of Enteroscopy represents a venture into new territory by describing the advances of modern gastroenterologic endoscopy in the examination of the small intestine, from duodenum to ileum, and of the entire colon. Until three years ago, large areas of the intestinal tract were not accessible to direct inspection. Today, the entire organ system, from esophagus to anus, can be visualized and biopsied, either by a combination of enteroscopy and coloscopy, or by peroral enterocoloscopy. It is now possible to inspect inflammatory and peptic lesions, tumors, diverticula, and stenotic areas and to detect their histologic features.

Another new development is the filling of the biliary and pancreatic duct systems with radiopaque contrast media by endoscopic intubation of the papilla of Vater. The pancreatic ducts have now become accessible to preoperative radiologic evaluation; this examination can be combined with selective mesenteric arteriography. Retrograde endoscopic filling of the bile ducts represents a significant advance in the differential diagnosis of obstructive jaundice: it carries a lower risk than percutaneous and laparoscopic cholangiography.

Operative endoscopy of the small and large intestine is yet another *terra nova* which has recently been entered. It includes the removal of foreign bodies, topical treatment of circumscribed lesions, coagulation of bleeding sites, and the removal of polyps with the diathermy snare.

The primary purpose of this atlas is to demonstrate the future possibilities for new clinical procedures which are based on advances in endoscopy, alone or in combination with radiologic procedures. The number of instances where the impact of these new methods can already be demonstrated is large, but a systematic description of all diseases now accessible to diagnostic and therapeutic intervention is not yet possible. The atlas represents an attempt to illustrate the giant strides taken by gastroenterologic endoscopy during the years 1970–1973. It is directed at gastroenterolo-

gists, internists, surgeons, pathologists and all those physicians who have maintained an active interest in the broadening scope of contemporary medicine.

Erlangen, Spring 1974 L. DEMLING

Contents

1. Instruments

1.1 Endoscopic Instruments

The achievement of technical perfection, as well as the development of a universal endoscope, is limited by the anatomic configuration of the organs which have to be negotiated and inspected. The commercially available duodenoscopes and coloscopes differ in specifications and design. The endoscopist has to consider their optical and mechanical qualities in choosing his instruments.

Adequate duodenoscopes and coloscopes should meet the following criteria in light of recent technical developments.

Mechanical: a tip with continuous deflection in two planes (at least 120°); durable construction; convenient arrangement and easy manipulation of external controls; automatic suction, irrigation and air insufflation; ability to obtain precisely located biopsies and material for cytologic examination even with the instrument tip deflected.

Optical: fiberoptic, high-intensity cold light source; good resolution and definition of detail; provisions for technically simple documentation by still-photography and movies, including adequate illumination.

General Design

a) Duodenoscopy: for evaluation of mucosal abnormalities in duodenal bulb and postbulbar area, forward viewing optics with good resolution even at low target distance should be used.—For retrograde pancreato- and cholangiography and for examination of certain types of scarred duodenal bulbs, the instrument should offer side-viewing optics, a directable catheter and a tip which can be deflected in two planes.

b) Coloscopy: Forward viewing optics; the instrument tip should be deflectable in 2 planes, by more than 90°.

Duodenoscopy

Bulboscopy (Table 1)

ACMI (American Cystoscope Maker, Inc., 8 Pelham Parkway, Pelham Manor, N.Y. 10803) esophago-gastro-duodenoscope, FO-7089, types J, JJ, P and F-8 (Fig. I). Forward viewing 70° (75°; F-8), fixed focus.

The instruments differ in the development of their mechanical components. All offer an extremely small tip deflection radius of 2 cm. The tip of type J can be deflected upwards by 180° and downwards by 100°. The polydirectional deflection of type P and F-8 represents a further refinement (Fig. II): the tip can be deflected by about 180° in all directions by a single lever control and describes, therefore, a hemispheric excursion. This facilitates the inversion maneuver and few blind areas remain in the stomach. Type JJ differs from type J by an additional slight bend in the distal flexible portion; it is supplied only by special order.

The optical resolution is suboptimal for photographic documentation and could be improved. The optical field of 70° (75°) with fixed focus provides a good survey view but limits the recognition of fine detail. Unfortunately, the biopsy forceps cannot be introduced when the tip is maximally deflected. Air insufflation and suction are controlled by convenient push buttons but irrigation requires attachment of a separate syringe.

Table 1. Technical data of bulboscopes

Technical data	ACMI FO-7089 A/J/JJ/P/F-8	Olympus GIF-D2	Wolf		Storz Fiberscope
			7877	7883	
Working length	1050	1110	1300	1025	1120
Diameter (mm)					
Rigid tip	12.7	13.0	12.0	13.5	13.0
Flexible part	11.4 (F-8:12.0)	12.0	11.8	12.5	12.0
Length of rigid tip (mm)	44.0 (A, J, JJ); 55.0 (P) 42.0 (F-8)	22.0	23.0	20.0	40.0
Tip deflection					
Upwards	120° (A); 180° (J, JJ); 180° (P, F-8)	150°	90°	140°	130°
Downwards	120° (A); 100° (J, JJ); 180° (P, F-8)	150°	90°	140°	110°
To right	Ø (A); Ø (J, JJ); 180° (P, F-8)	100°	90°	Ø	90°
To left	Ø (A); Ø (J, JJ); 180° (P, F-8)	100°	90°	Ø	90°
Biopsy forceps deflection	Ø	Ø	90°	Ø	Ø
Focal depth (mm)	6–100	5–∞	5–50	5–∞	3–∞
Optical field	70° 75° (F-8)	75°	70°	70°	60°
Direction of view	180°	180°	100°	180°	150°
Variable focus	Ø	+	Ø	+	+

The F-8 Panendoscope represents the latest improvement of type FO-7089P. The optical field is 75° and the biopsy forceps can be introduced at full deflection to 180°. The focal depth is 6–100 mm.

These instruments are well suited for esophago-gastro-bulboscopy. Use of the proper technique allows inspection of the base of the duodenal bulb. An additional side-viewing instrument needs to be used only in some cases of scarred duodenal bulbs. An instrument channel is provided for obtaining bioptic and cytologic specimens and for the introduction of instruments used for operative endoscopic procedures.

Olympus Optical Corp. of America (2 Nevada Drive, New Hyde Park, N.Y. 11040): esophago-gastroscope EF-L, forward view, 60°, working length 865 mm, fixed focus (Fig. III).

Because of its shortness and the tip deflection in only one plane of 90°, this instrument is not suited for bulboscopy. It has been replaced by type EF-B2 for esophagoscopy (working length 715 mm; deflection of 50° in the lateral and 90° in the vertical plane) and by type GIF for bulboscopy.

Gastrointestinal fiberscope GIF-D2 (Fig. IV). Forward viewing, 75°; working length 1110 mm, variable focus.

This instrument fulfills most of the requirements for an esophago-gastro-bulboscope. It possesses very good optical and mechanical qualities. Air insufflation, irrigation and suction can be conveniently controlled by two trumpet valves. The variable

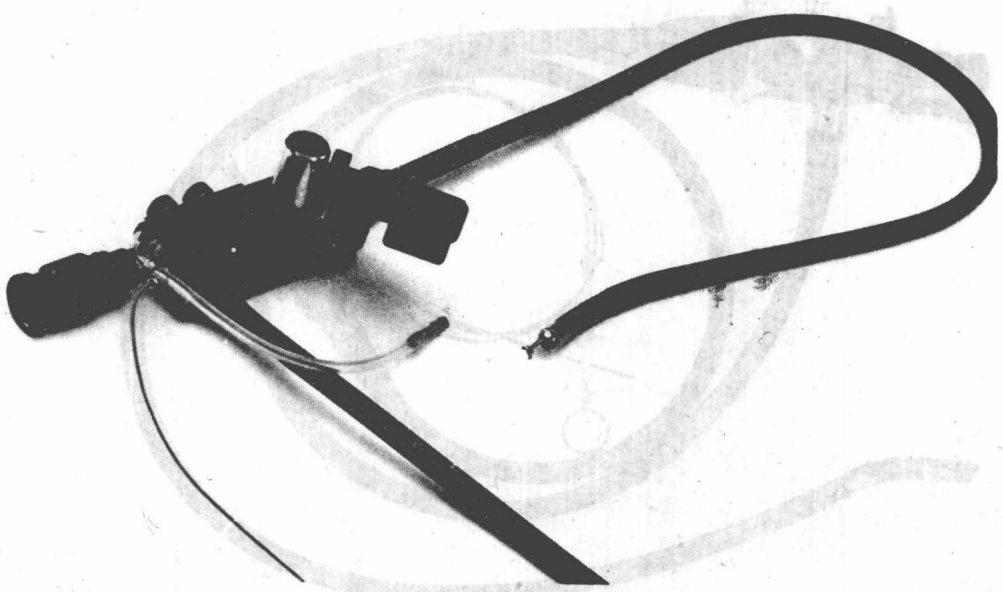

Fig. I. Panendoscope F-8 (ACMI, Inc., Pelham Manor, New York, 10803) with biopsy forceps

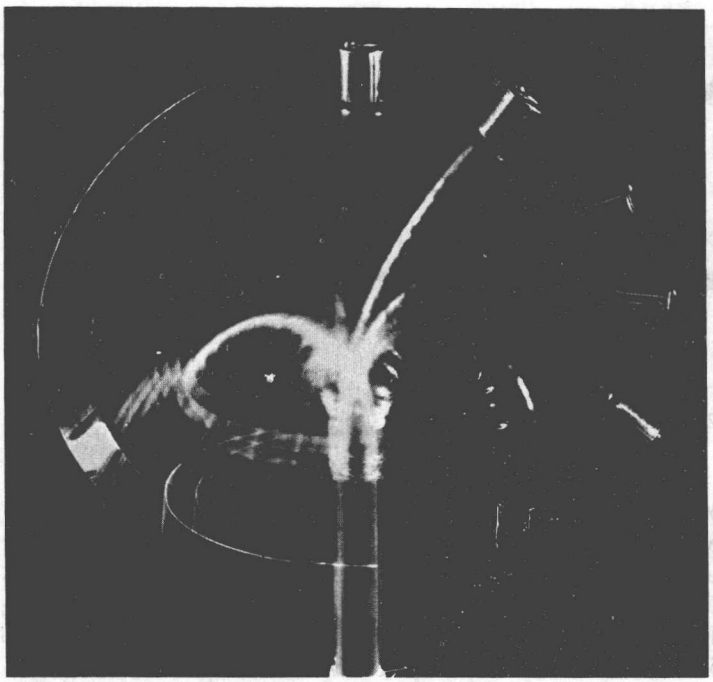

Fig. II. Polydirectional deflection of panendoscope FO-7089 P and F-8 (ACMI)

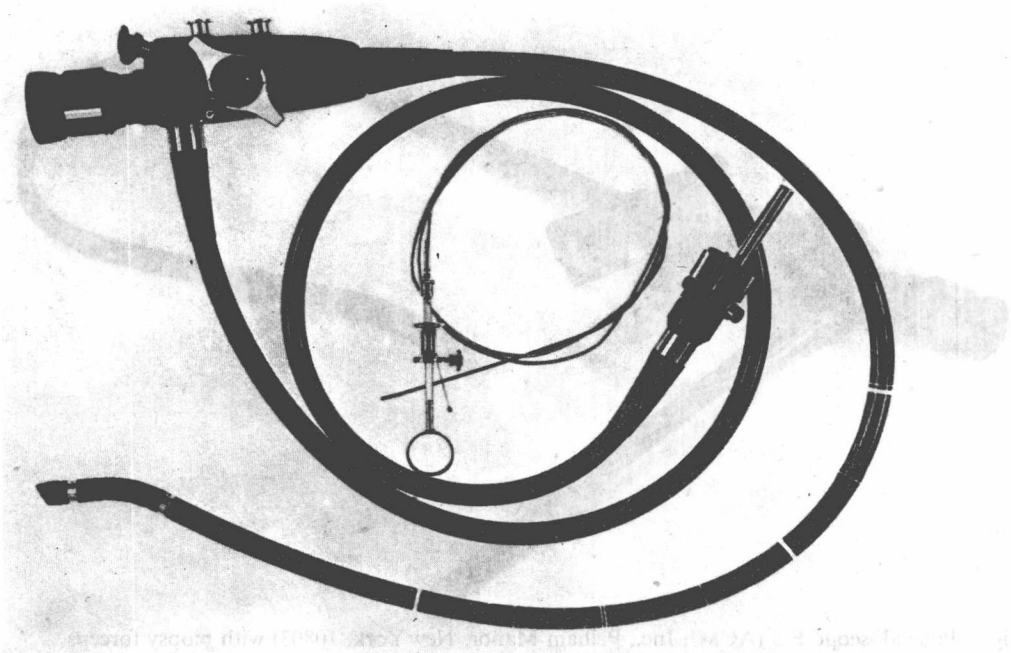

Fig. III. Esophagoscope EF-L (Olympus Optical Corp. of America, New Hyde Park, New York, 11040)

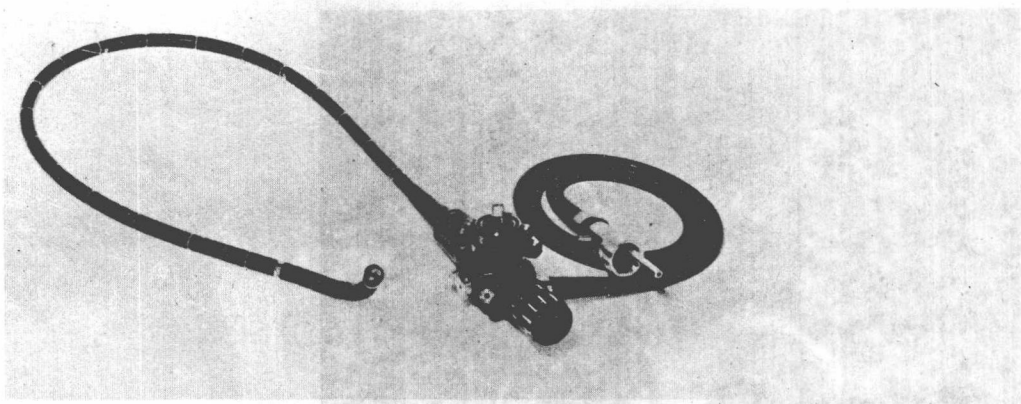

Fig. IV. Panendoscope GIF-D2 (Olympus)

focus permits excellent optical resolution and magnification when close to the target, a characteristic which is particularly valuable for inspection of the duodenal bulb. Intragastric viewing is facilitated by tip deflection in two planes, by 150° and 100°, respectively. Occasionally, however, certain parts of the stomach are viewed poorly or not at all; a side-viewing instrument should be available for such cases. The inability to direct the biopsy forceps radially is compensated by the mobility of the instrument tip in two planes. It is difficult and often impossible to introduce the biopsy instru-

ment while the tip of the endoscope is deflected maximally.

Fa. Karl Storz (Tuttlingen, Germany): fiberscope (Fig. V). Direction of view 150°, optical field 60°, working length 1120 mm, variable focus.

Automatic air insufflation is conveniently controlled by a push-button on the instrument handle. Irrigation and suction are provided by a separate pump. A second channel serves for the introduction of flexible accessory instruments. The instrument tip can be deflected in two planes by 130° and 90°. To date, little working experience has accured with this new instrument; it is not sold in the U.S.A.

Wolf (Knittlingen, Germany): fiber duodenoscope 7877 (Fig. VI). Direction of view 100°, optical field 70°. Working length 1300 mm, fixed focus.

Air and water insufflation and aspiration are controlled by valves located on the instrument handle. A separate channel allows the introduction of flexible accessory instruments. The maximal tip deflection of 90° in two planes must be considered unsatisfactory, especially for examination of the stomach. The additional mobility of 90° of biopsy and other instruments as they emerge at the tip facilitates very precise localization of the biopsy site under direct vision.

Fiber esophago-gastro-bulboscope 7883 (Fig. VII). Forward viewing optics, 70°, working length 1025 mm, variable focus.

The instrument tip can be deflected by 140° in one plane. The biopsy forceps can be introduced at maximal tip deflection. Automatic air insufflation, irrigation and suction are controlled by conveniently arranged valves, as with type 7877. Due to limited personal experience, this instrument cannot yet be evaluated objectively. These two instruments are not sold in the U.S.A.

Deep or Postbulbar Duodenoscopy (Table 2)

Forward or side viewing endoscopes manufactured by Olympus, Machida, and ACMI are available for deep or postbulbar duodenoscopy. Forward viewing optics are recommended when the examination is

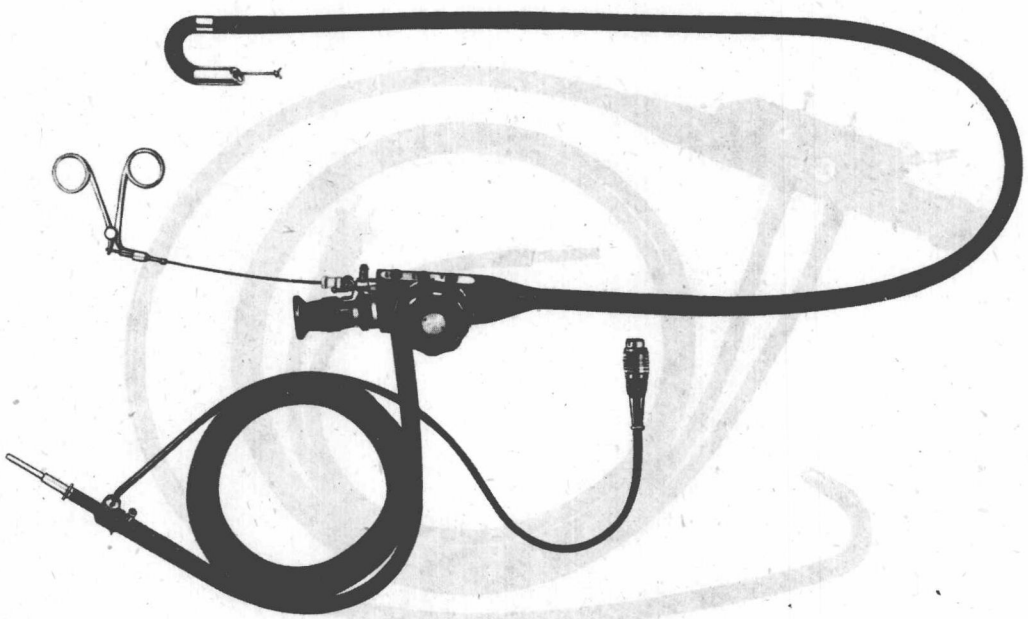

Fig. V. Fiberscope with biopsy forceps. (Storz, Tuttlingen, Germany). Not available in the United States

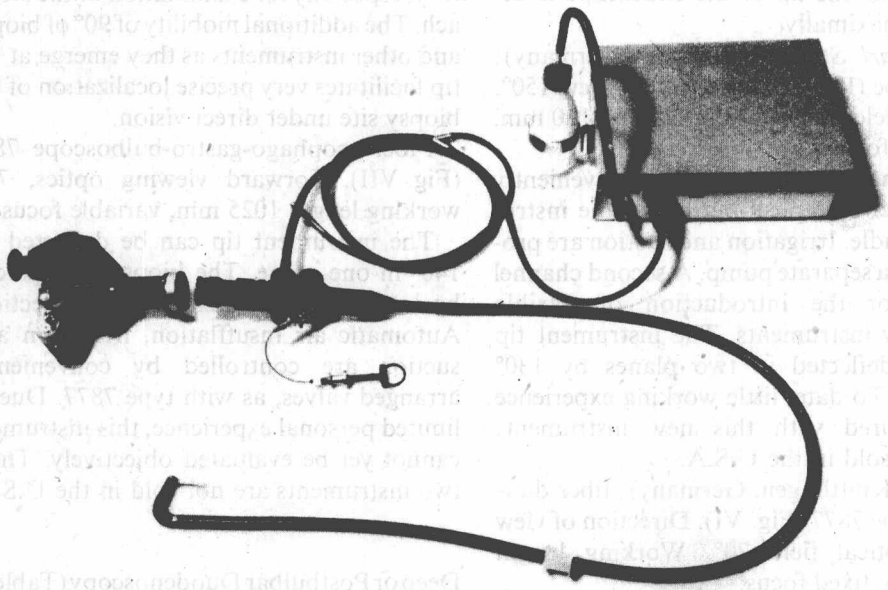

Fig. VI. Fiber duodenoscope 7877, Fa. Wolf, Knittlingen, Germany. Not available in the United States

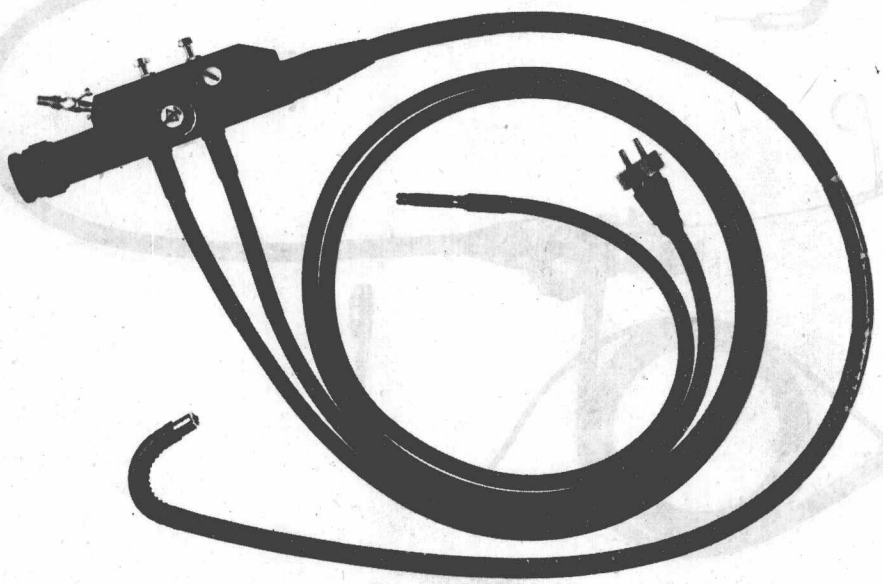

Fig. VII. Panendoscope 7883, Fa. Wolf, Knittlingen, Germany. Not available in the United States