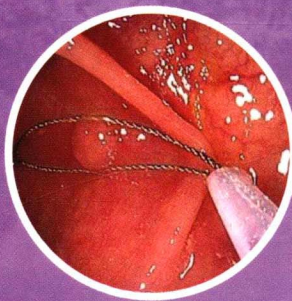
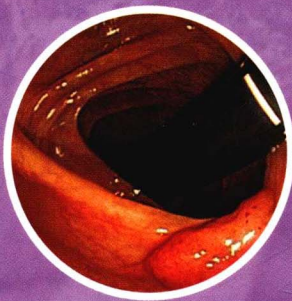



PRACTICAL COLONOSCOPY

Jerome D. Wayne, James Aisenberg, Peter H. Rubin
with Shannon J. Morales



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Practical Colonoscopy

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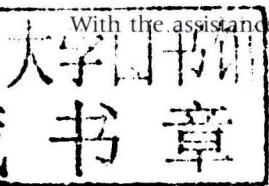
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List of Video Clips

All videos are accompanied by audio commentary.

Video Clip 7.1 Melanosis coli with polyp see page 69

An adenoma is hidden behind the ileocecal valve in the setting of melanosis coli.

Video Clip 7.2 Squamous papillomas in the rectum see page 70

Multiple diminutive papules are seen near the dentate line during careful retroflex examination.

Video Clip 7.3 Diverticular colitis see page 71

Prominent polypoid red folds seen in a patient with sigmoid colon diverticular disease.

Video Clip 7.4 Segmental colonic ischemia see page 72

A segment of sigmoid colon is involved with moderate to severe ischemia.

Video Clip 7.5 Solitary rectal ulcer syndrome see page 72

Endoscopic findings of solitary rectal ulcer syndrome include ulceration, erythema, edema, and exudate.

Video Clip 7.6 Radiation proctopathy see page 72

Angioectasias in the rectum treated with argon plasma coagulation therapy.

Video Clip 7.7 Cobble-stoning in chronic ulcerative colitis see page 73

Severe edema, erythema, and ulceration in a patient with active ulcerative colitis.

Video Clip 7.8 Small carcinoma in chronic ulcerative colitis see page 74

Small carcinoma detected during surveillance in chronic ulcerative colitis. Extensive mucosal scarring is also seen.

Video Clip 7.9 Large carcinoma in chronic colitis see page 74

Large carcinoma in colitis, mucosal bridging is seen and snare biopsy technique is used.

Video Clip 7.10 Dysplasia in ulcerative colitis see page 74

The spray catheter is used for chromoendoscopy, which reveals a dysplastic plaque.

Video Clip 7.11 Nodular carcinoma arising in ulcerative colitis see page 74

Small, nodular carcinoma detected during surveillance in patient with chronic ulcerative colitis.

Video Clip 7.12 Chromoendoscopy in colitis surveillance see page 74

Areas of flat dysplasia are detected during chromoendoscopy in colitis surveillance.

Video Clip 7.13 Sessile dysplasia in chronic ulcerative colitis see page 74

Large area of villiform, sessile dysplasia is seen in chronic ulcerative colitis.

Video Clip 7.14 Giant inflammatory polyp see page 76

Giant inflammatory polyp identified in chronic colitis.

Video Clip 7.15 Dysplastic polyp in ulcerative colitis see page 76

Identification and snare resection of flat, dysplastic polyp in chronic ulcerative colitis.

Video Clip 7.16 Bleeding angioectasia see page 78

Detection and cauterization of ascending colon, bleeding angioectasia.

Video Clip 7.17 Pinworms see page 79

Live pinworms seen during colonoscopy.

Video Clip 7.18 *Ascaris* see page 79

Live *Ascaris* worm seen during colonoscopy.

Video Clip 7.19 Flat adenoma in microscopic colitis see page 80

Large flat adenoma seen in ascending colon in a patient with microscopic colitis. The colitis has caused edema and a mosaic pattern, which is atypical for this disease.

Video Clip 10.1 Sessile serrated adenoma/polyp see page 101

Multiple examples of identification and resection of sessile serrated adenomas/polyps are provided.

Video Clip 10.2 Resection of sessile serrated polyp see page 101

Sessile serrated adenoma/polyp identified and resected with saline lift followed by piecemeal snare polypectomy.

Video Clip 10.3 Giant lipoma see page 101

Giant, pedunculated lipoma with erythema related to trauma.

Video Clip 10.4 Ileal carcinoid see page 101

Intubation of the ileum reveals a 1.5-cm submucosal carcinoid.

Video Clip 11.1 Detachable loop and pedunculated polypectomy see page 117

The detachable loop is used to promote hemostasis before resection of this large, pedunculated polyp.

Video Clip 11.2 Piecemeal polypectomy, argon plasma coagulation, and net retrieval of fragments see page 120

The sequence of saline injection, piecemeal polypectomy, and argon plasma coagulation and net retrieval of polyp fragments is used to eradicate this 3-cm adenoma.

Video Clip 11.3 Piecemeal resection of sessile adenoma see page 120

Large sessile adenoma removed piecemeal following saline lift.

Video Clip 11.4 Saline-assisted polypectomy see page 122

Multiple injection sites are used to elevate the polyp with methylene blue and saline.

Video Clip 11.5 The non-lifting sign see page 123

This polyp does not lift with saline injection, suggesting the presence of malignancy.

Video Clip 11.6 Giant villous adenoma see page 126

This enormous sigmoid adenoma occupied the entire lumen and is debulked. Water immersion is used to examine the defect for signs of residual polyp, which are ablated with the argon plasma coagulator.

Video Clip 11.7 Cecal retroflexion with polypectomy see page 127

A large, right-colon polyp is hidden behind a fold and identified and removed in retroflexion.

Video Clip 11.8 Flat right colon polyp see page 127

A flat right-colon polyp is seen and resected in retroflexion.

Video Clip 12.1 Familial adenomatous polyposis see page 133

Innumerable adenomas seen in a patient with familial adenomatous polyposis.

Video Clip 12.2 The Non-Lifting Sign see page 134

3 cm malignant polyp in ascending colon which exhibits the non-lifting sign upon sub-mucosal saline injection.

Video Clip 12.3 Malignant sessile polyp see page 134

A 2-cm sessile malignant polyp removed with saline injection and snare polypectomy.

Video Clip 13.1 Dilation of strictured anastomosis see page 142

Strictured ileocolic anastomosis dilated with a through-the-scope balloon.

Video Clip 13.2 Foreign body in sigmoid see page 145

A chicken bone is identified embedded in the colon wall, and is removed with the snare.

Video Clip 14.1 Giant rectal polyp with bleeding see page 154

Snare resection of giant rectal polyp complicated by post-polypectomy hemorrhage, managed colonoscopically.

Video Clip 14.2 Immediate postpolypectomy bleeding: sessile polyp see page 154

Arterial bleeding seen following snare polypectomy. Clip placement used to achieve hemostasis.

Video Clip 14.3 Immediate postpolypectomy bleeding: pedunculated polyp see page 154

Bleeding from pedicle of polyp is controlled with compression and with clip placement.

Video Clip 14.4 Delayed postpolypectomy bleeding see page 155

Unprepped colonoscopy used for identification and treatment of bleeding site several days following ascending colon polypectomy.

Video Clip 18.1 Narrow band imaging see page 181

Narrow band imaging is used extensively to enhance visualization during resection of this minimally elevated adenoma.

Preface

Approximately 15 million colonoscopies are conducted annually in the USA. This widespread uptake, mirrored in other nations, reflects the power of colonoscopy as a diagnostic and therapeutic tool. Most notably, it is the leading means of preventing death from colorectal cancer, the second leading cause of cancer-related deaths in the USA, and is a first-line test in the management of gastrointestinal bleeding and colitis.

Colonoscopy continues to evolve, owing to enhancements in scope design, image processing, and data management that are offshoots of the modern technology revolution. Novel insights into colonic diseases from contemporary molecular and cell biology are also rapidly advancing the field.

Despite its attributes, colonoscopy remains imperfect. It is a costly, inconvenient, and unpopular procedure that carries some risk. In the USA, at least 50% of adults for whom screening colonoscopy for colon cancer is recommended never receive it, whereas others undergo colonoscopy more frequently than is recommended in expert guidelines. And “interval” colorectal cancer—i.e. cancer detected within 3 years of a “clearing” colonoscopy—is reported in some analyses to occur in as many as 1 in 150 individuals.

Recent studies have underscored the inconvenient truth that colonoscopy quality (safety and effectiveness) varies considerably among practitioners. Accordingly, leaders in the field are promoting quality enhancement measures such as mid-career provider education, implementation of validated quality benchmarks, continuous peer review, and implementation of financial incentives such as pay-for-performance.

Practical Colonoscopy is written with this context in mind. Our goal is to create a succinct, easily readable volume, enhanced by drawings, photos, and videos, which communicates the “nuts and bolts” of high-quality colonoscopy practice. Drawing from our collective experience of over 100 years in the private practice of colonoscopy and gastroenterology, we share the principles and “pearls” we have found most useful. We integrate ideas presented in the recently published, comprehensive, second edition of *Colonoscopy: Principles and Practice*. We share insights derived from our teaching and research as Professors of Medicine at The Mount Sinai Medical Center in New York. Finally, we present our expectations for forthcoming developments in colonoscopy. Of course, our ultimate hope is that readers will gain an enhanced ability to prevent and treat colonic diseases.

Practical Colonoscopy provides an overview of colonoscopy, while focusing on the practical aspects of quality, indications, and technique. Our objective during the planning and writing of this book was to bring new, practical information to trainees, mid-career colonoscopists, endoscopy assistants, nurses, pathologists, anesthesiologists, and to the motivated lay person who is curious about the science and art of our craft.

The authors wish to acknowledge the use and adaptation of images from *Colonoscopy: Principles and Practice*, edited by Jerome D. Waye, Douglas K. Rex, Christopher B. Williams. 2nd edition. Blackwell Publishing Ltd; 2009. We thank our medical and surgical colleagues, from whom we have learned so much, and especially the endoscopy staff at the Gastrointestinal Endoscopy Unit at The Mount Sinai Hospital in New York, the staff in our office endoscopy units, our practice partners, patients, and students. Ms. Rebecca Sweeney and Ms. Jennifer Kolb (Icahn School of Medicine at Mount Sinai, Class of 2014) provided invaluable assistance with preparation of the manuscript and videos. We are also grateful to our expert collaborators at Wiley-Blackwell, in particular Ms. Elisabeth Dodds, Mr. Oliver Walter, and Ms. Rebecca Huxley. We thank Jane Fallows and Roger Hulley who have expertly

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May 2013

About the companion website

Companion website

This book is accompanied by a website:

www.wiley.com/go/waye/practicalcolonoscopy

The website includes:

- 41 videos showing procedures described in the book
- All videos are referenced in the text where you see this logo



Contents

List of Video Clips, vii

Preface, x

About the companion website, xii

Section 1: Pre-procedure

1 The Endoscopy Unit, Colonoscope, and Accessories, 3

2 The Role of the Endoscopy Assistant during Colonoscopy, 16

3 Indications and Contraindications for Colonoscopy, 24

4 Preparation for Colonoscopy, 30

Section 2: Basic Procedure

5 Sedation for Colonoscopy, 39

6 Colonoscopy Technique: The Ins and Outs, 46

7 Colonoscopic Findings, 69

8 Diagnostic Biopsy, 83

Section 3: Operative Procedures

9 Thermal Techniques: Electrosurgery, Argon Plasma Coagulation, and Laser, 91

10 Basic Principles and Techniques of Polypectomy, 99

11 Difficult Polypectomy, 116

12 Management of Malignant Polyps, 132

13 Therapeutic Colonoscopy, 140

14 Complications of Colonoscopy, 147

Section 4: Current and Future Considerations

15 Quality in Colonoscopy, 161

16 Teaching and Training in Colonoscopy, 167

17 Computed Tomographic Colonography (“Virtual” Colonoscopy), 175

18 Advanced Imaging Techniques, 178

19 The Future of Colonoscopy, 186

Index, 191

Plate section can be found facing page 52

SECTION 1

Pre-procedure

CHAPTER 1

The Endoscopy Unit, Colonoscope, and Accessories

Introduction

Colonoscopy is performed in the hospital, the ambulatory surgical center, or the physician office. Endoscopy units range in size from 1 to 10 or more procedure rooms, and in staffing from one or two to over 50 persons. Regardless of size, staffing, and location, the endoscopy unit must promote safe, efficient, cost-effective, high-quality patient care. A pleasant, comfortable endoscopy facility promotes staff productivity and alleviates patient anxiety. The modern gastrointestinal endoscopy unit is constructed specifically for endoscopic procedures. Specific design concerns include: smooth patient flow; patient privacy; patient safety; spacious procedure rooms; adequate preparation and recovery space; and a pleasant, reassuring environment. The materials must be durable and sanitary, yet aesthetically attractive.

In broad terms, the facility is divided into the administrative area—which is used for patient intake, scheduling, billing, and record maintenance—and the clinical area—which contains the dressing rooms, the pre-procedure area, the procedure rooms, a clean equipment storage area, a cleaning and disinfection zone, and a recovery room. Amenities such as physician–patient consultation rooms, a procedure reporting area, and staff lounge and dressing rooms enhance the quality of the unit.

When building a facility, careful planning and close collaboration between the endoscopists and an architect who possesses expertise in endoscopy unit design is encouraged. The unit design should conform to the practice styles of the endoscopists and the procedure mix and demographics of the practice. Unit construction requires patience (it may take a year to design and construct a new unit), attention to detail, experience, foresight, and cost-sensitivity. As modern endoscopy units are increasingly digitized, specialized expertise in information technology, cabling, and connectivity is essential.

If the facility is built as an ambulatory surgical center or within a hospital, many of the specifics, such as the size of the rooms and

Optimizing the work environment

- Proper ventilation
- Appropriate temperature
- Adjustable lighting
- Free of trip hazards
- Workspace fastidiously cleaned between cases and especially at the end of the day
- Free of distractions such as sounds from other rooms
- Adequate workspace for each member of the team

corridors, will be regulated. Office-based endoscopy in many states must now meet the criteria of one of the national accrediting organizations. In general, a circular flow of patients works well: the patient moves from the waiting and intake area to the pre-procedure assessment/changing area, to the procedure room, to the recovery/dressing area, and then back to the intake area, where billing and/or new appointment scheduling is completed. The interdependent areas (e.g. procedure and recovery, procedure and scope washing) should be located close to each other. The number of procedure rooms should be projected from the procedure volume of the practice, and will drive the number of overall square feet and all other architectural decisions. The procedure rooms contain the complex, expensive equipment and are the most heavily staffed rooms in the unit. Therefore, the entire facility must be designed to keep the procedure rooms busy with active procedures, rather than also having to serve as recovery rooms.

The procedure rooms

In the USA, licensing laws generally mandate that the procedure room have a net area of at least 19 m². This excludes areas occupied by built-ins, such as cabinets or equipment towers, but not area occupied by movable equipment, such as an endoscopic equipment tower. The room must accommodate the equipment and the patient stretcher, and still allow free movement and clear sight lines for the physician, assistant, anesthesiologist and other participants. Because of the amount of equipment required for endoscopy, vertical arrangement of components on towers or carts or in built-in cabinets is generally desirable.

In a modern video-endoscopy room, the central architectural design point is the “physician tower,” which holds the endoscopic light source and image processor. The endoscope is plugged into the processor, and the endoscopist stands immediately in front of the tower. The patient stretcher must be within easy reach of the endoscopist. The distance from the front of the tower to the edge of the patient stretcher should be between 66 and 81 cm, as determined by the length of the scope’s universal cord (Fig 1.1). It

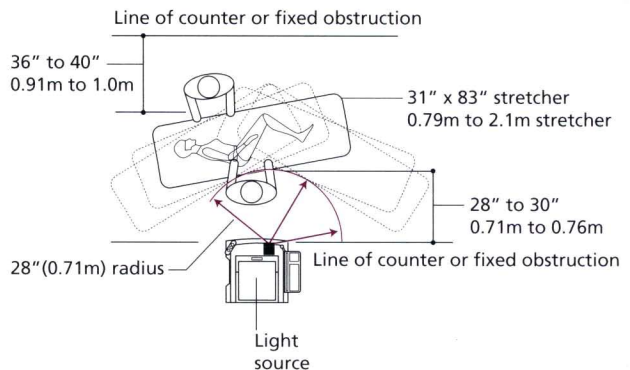


Fig 1.1 Basic clearances in the procedure room.

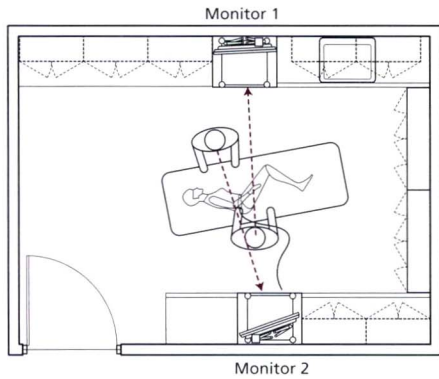


Fig 1.2 Position of monitors for the colonoscopist and assistant.

is most efficient for the assistant to stand on the opposite side of the stretcher from the endoscopist (Fig 1.2); this location promotes easy access to the patient (e.g. to give abdominal pressure and to monitor respirations), the endoscopist (e.g. to provide a snare for polypectomy), and the other equipment (e.g. the cautery device).

Once the positions of the tower and stretcher are established, then the other equipment is located. One video monitor is situated directly across from the endoscopist, establishing a comfortable, clear sight line. The monitor should be mounted at least 1.8m above the floor. A second endoscopy video monitor is positioned behind the endoscopist for the assistant. The assistant should have clear visual access to the patient, the monitor, and the cardiopulmonary monitoring equipment.

An endoscopic reporting system is often integrated into the room design. This allows nurses and physicians to chart immediately, increasing both accuracy and efficiency. The equipment and electrical cabling must be laid out with forethought: it is unsafe and unkempt to have wires running across the floor. Often an overhead cabling conduit will keep the room tidy but a series of floating ceiling booms will also (expensively) solve the problem. The ancillary equipment should be carefully positioned and handy for the endoscopy assistant. Lighting must be purposeful: the patient's face and chest should be visible, allowing the assistant to monitor the patient's color and respiratory pattern, but the ambient lighting should be minimal, to encourage the team to focus on the endoscopic image. The room must be well ventilated with continuous air exchange and adequately soundproofed, and the temperature must be controlled by an independent thermostat.

Ancillary equipment and built-ins

- Suction machine (unless wall suction is available)
- Water irrigation pump
- Location to place the scope before and after the case
- Counter space for gloves, lubricant, and other accessories
- Cabinetry for accessories, medications, and miscellaneous small equipment such as catheters and saline
- Counter space for the assistant to process specimens and perform charting
- Ancillary monitoring devices, such as machines for obtaining vital signs (blood pressure and pulse), and perhaps capnography
- At least one sink
- Oxygen and perhaps CO₂ tanks

The non-procedure areas

The waiting and recovery areas also merit careful planning. The total number of required seats in the waiting area depends on the

projected case volume of the unit, as well as the procedure and recovery room turnover time. Each patient brings one or more companions; thus, for each patient, at least two seats are required in the waiting area. In general, at least six waiting spaces should be provided for every busy procedure room—two for the patient in recovery, two for the patient in the procedure, and two for the pre-procedure patient. The gastrointestinal endoscopy patient waiting area must be aesthetically pleasant, comfortable, and served by adequate, private bathroom facilities.

The patient changing and pre-procedure areas should be private, secure, and convenient to the procedure area. Depending on the workflow, this area may contain seating for a physician or staff member to perform the pre-procedure interview and obtain informed consent. In some units, the patient walks to the procedure room; in others, the patient lies on a stretcher in the pre-procedure room and intravenous access is obtained in this area.

The recovery bed capacity is a notorious bottleneck in endoscopy units. If colonoscopy takes 45 minutes and recovery takes 45 minutes, one recovery bed will be required per procedure room. In general, this ratio is desirable. The recovery room must permit close patient monitoring and be adequately served by restroom facilities. In some units, patients recover in individual rooms, whereas in others, patients recover in separate “bays” within a larger recovery room.

The administrative area should accommodate all reception, scheduling, filing and record-keeping, and billing/insurance functions. The reception area should promote face-to-face interactions between patients and staff, but also accommodate private conversations regarding sensitive matters. Adequate, well-marked toilet facilities must be nearby. Many waiting rooms include artwork, wi-fi access, telephones, television monitors, water coolers, reading materials, or music. Computer- and telephone-equipped staff workstations should be available. Staff foot traffic should move unimpeded. Cabinets for patient record storage should be adequate, although the transition to electronic records may diminish this requirement. Depending on the characteristics of the practice, an on-site billing area may be included.

The colonoscope

The modern video colonoscope combines state-of-the-art electronic imaging technology and sophisticated mechanical engineering. Its fragile components—glass illumination fibers, angulation cables, and suction and air/water channels—are packed within a water-tight tube that is 130–168 cm in length but only 9–13 mm in diameter. The column must be strong enough to permit the endoscopist to push it through the 1.8-m-long colon, flexible enough to bend around the sharp turns, and elastic enough to return to a straight shape when the scope is pulled back. It must transmit the hand actions of the endoscopist from the proximal shaft down to

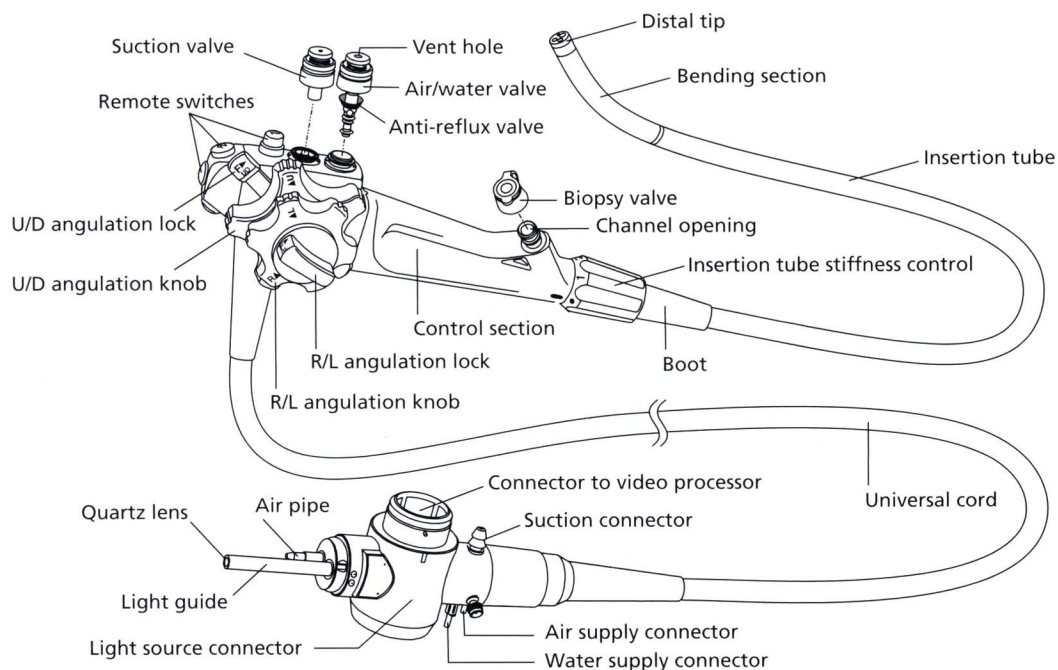


Fig 1.3 The design and parts of a typical video colonoscope.

the tip. The scope must be sturdy enough to withstand the repetitive and diverse stresses that occur during thousands of procedures and cleaning cycles, yet delicate enough to provide impeccable tip control and visualization.

The scope is divided into several sections (Fig 1.3). The long connector tube that runs from the scope head to the light source is called the “universal cord.” The universal cord is plugged into the light source, which also has connections to the video processor, the suction, and the air/water supplies. The head of the instrument contains endoscopist-operated switches and valves that control many scope functions. The “insertion tube” is the long, straight tube that intubates the colon. At the distal end of the insertion tube is a 10-cm bending section, which is controlled by the angulation wires using two control wheels. The variable stiffness control, if present, is located at the junction where the control section meets the insertion tube. The distal scope tip contains the channel openings, the air–water nozzle that allows insufflation and lens cleaning, the objective lens, and the light guide lens. The charge-coupled device (CCD) is a small chip (camera) that is located just behind the objective lens and that electronically captures the images and transmits them through electrical wires to the video processor