

Review article

## Intraoperative sigmoidoscopy in gynecologic surgery

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### KEYWORDS:

Proctosigmoidoscopy;  
Endometriosis;  
Laparoscopy  
complications;  
Bowel injury

**Abstract.** Intraoperative sigmoidoscopy is underused by the majority of practicing gynecologists and is not widely taught in obstetrics and gynecology training programs. In this report, a step-by-step approach is provided in order to perform sigmoidoscopy. Indications for use, along with various intraoperative applications, are discussed. Results from our center's experience with its use during laparoscopic treatment of adhesions, endometriosis, and associated disease of the bowel also are provided. Intraoperative sigmoidoscopy is a safe and efficacious procedure that can aid in the evaluation and treatment of pelvic pathology and facilitate identification and management of bowel injuries. It should be considered a valuable adjunct when such cases are encountered by gynecologic and pelvic surgeons. © 2005 AAGL. All rights reserved.

Bowel injury is recognized as one of the most serious complications of laparoscopy.<sup>1</sup> Prevention of bowel injury is dependent on several factors: the surgeon's experience meticulous dissection, and adequate familiarity with the physical properties of the various instruments and cutting modalities; complete inspection of all areas of enterolysis; and, in case of doubt, tests to uncover occult injuries.<sup>2,3</sup> Based on recent studies, the risk of gastrointestinal injuries occurring during gynecologic laparoscopy is between 0.6 and 1.6 per thousand.<sup>2,4-7</sup> However, most of these injuries (69%) are not recognized at the time of the initial surgery.<sup>8</sup> Intraoperative detection and treatment of such injuries is essential, and such detection may be greatly enhanced by the use of proctosigmoidoscopy.

Gynecologic laparoscopy involving the sigmoid colon and/or the rectovaginal septum commonly is performed during the treatment of severe pelvic endometriosis and

adhesions. Intraoperative proctosigmoidoscopy assists in the determination of proper planes of dissection, avoidance of bowel injuries, and prompt recognition and treatment of injuries. It also can be used to evaluate the extent of invasive endometriosis and bowel integrity following procedures involving the colon and/or rectovaginal septum. Intraoperative proctosigmoidoscopy is a very useful adjunct to operative laparoscopy in these situations, but remains underused by gynecologic and pelvic surgeons.

Rigid proctosigmoidoscopy has been shown to be a safe procedure with a risk of bowel perforation between 0.002% and 0.09%.<sup>9-12</sup> Sigmoidoscopy, in general, commonly is performed by internal medicine physicians and residents, and requires minimal training.<sup>13</sup> Additionally, performing sigmoidoscopy in the anesthetized patient under direct laparoscopic guidance provides a very safe setting for becoming proficient in its performance. This proficiency can translate into increased use of sigmoidoscopy by gynecologic surgeons. One study<sup>14</sup> has shown that physicians trained to perform sigmoidoscopy during residency are likely to use the procedure in their practice. Residents in obstetrics and gynecology trained in sigmoidoscopy also could gain valu-

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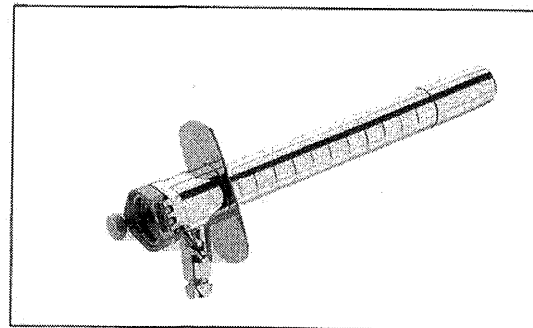
able experience by using it during other endoscopic procedures when indicated. However, the procedure still is not taught routinely in obstetrics and gynecology residency programs. It is also not used by the majority of practicing gynecologic surgeons.

A survey of major gynecologic texts revealed no mention of the use of intraoperative proctosigmoidoscopy. However, a study published in 1980<sup>15</sup> provided a complete description of the technique used to demonstrate rectosigmoid integrity following repair by laparotomy. This technique is referenced elsewhere.<sup>16</sup> Another study<sup>17</sup> describes a laparoscopic approach using a similar technique. In order to demonstrate rectosigmoid integrity, direct visualization of the repaired site must be achieved with a sigmoidoscope using a 360-degree transanal view. Then, the pelvis should be filled with saline, at which point air is injected through the sigmoidoscope into the rectum and sigmoid colon while compressing the colon proximal to the site of repair. If a defect is present, bubbles will emerge, and the exact site is then identified and repaired.<sup>15,16</sup>

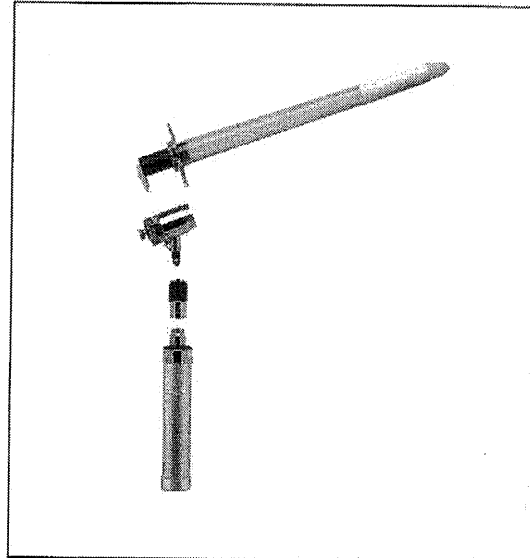
A literature search regarding the same topic was performed from the period of 1980 to the present using PubMed. The following key words were used in the search: all combinations of "sigmoidoscopy," "rigid sigmoidoscopy," "proctosigmoidoscopy," and "intraoperative sigmoidoscopy/rigid" "sigmoidoscopy/proctosigmoidoscopy" with "gynecology," "endometriosis," "anastomosis," "complications," "bowel injury," "laparoscopy," and "bubble test." All publication types written in English were included. The literature revealed one reference where intraoperative sigmoidoscopy was used for both disease localization and to assess anastomotic integrity following laparoscopic segmental colectomy; however, no references were found from the gynecologic literature.<sup>18</sup> One isolated report,<sup>19</sup> which was not discovered through the literature search, describes another technique for establishing bowel integrity, as the authors instilled povidone-iodine solution through the rectum with concomitant occlusion of the proximal sigmoid. No reference source, however, was found to support this technique. Having examined these sources, we could not find an instructive reference regarding the materials and methods that are necessary to perform this procedure. We were therefore prompted to present this instructional manuscript.

## Materials and methods

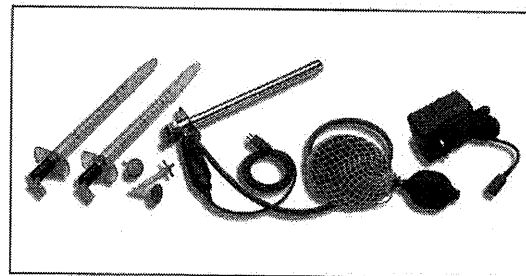
The rigid sigmoidoscope that can be used intraoperatively is available in either reusable or disposable forms. Sigmoidoscopy kits, such as the one produced by Welch Allyn (Skaneateles Falls, NY), include a sigmoidoscope, obturator, light handle, insufflation bulb, and transformer. (Figure 1). Rigid sigmoidoscopes are made of stainless steel and have a fiber optic light source providing excellent visualization. The shaft has discrete mark-



Rigid Sigmoidoscope.



53130 KleenSpec Disposable Sigmoidoscope, shown with 3.5v Halogen Illumination System.

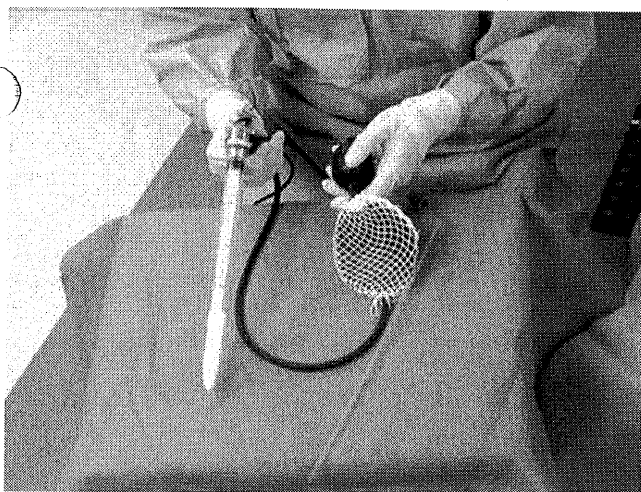


Sigmoidoscopes and Accessories.

**Figure 1** Rigid sigmoidoscopes and accessories. Reproduced with permission from Welch Allyn Inc.

ings every centimeter to allow measurements from either the dentate line or anal verge. The light source usually is located either at the handle or at the connection to the scope. The insufflation bulb should be maintained as close to the scope as possible to allow for better control and ease of insufflation. The obturator is placed through the scope to allow insertion of the instrument into the rectum with minimal trauma.<sup>20-22</sup>

In order to perform a rigid proctosigmoidoscopy, the device is first attached to its light source and insufflation



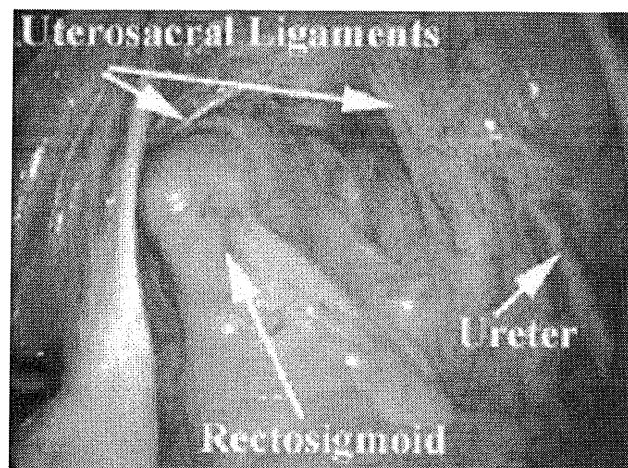
**Figure 2** Position for holding rigid sigmoidoscope and insufflator.

bulb, and the obturator, with its tip lubricated, is placed through the scope. The surgeon then performs a rectal examination in order to lubricate the anus and distal rectum and relax the sphincter muscles.<sup>20-22</sup>

The sigmoidoscope then is typically held in the dominant hand and the insufflating bulb is squeezed with the other hand (Figure 2). With the patient in a modified dorsolithotomy position, the obturator and scope are inserted together in a direction pointing toward the umbilicus. Once the scope is felt to be within the rectum, the obturator is removed. Air insufflation then is performed by squeezing the bulb to allow visualization of the colonic and rectal lumen. Care should be taken to avoid excessive dilation of the colon. Once the lumen is seen, then the scope can be advanced under direct visualization. Typically, the low- and mid-rectum are midline, thus requiring the surgeon to direct the scope cephalad and in a posterior direction. As the scope is advanced through a visualized lumen to the upper rectum, it should be directed toward the left of the patient in order to follow the normal course of the rectum. A complete examination usually requires examination up to a level of 20 to 25 cm. Intraoperatively, however, an adequate examination requires that the involved portion of bowel be visualized and examined completely. At the completion of the examination, the air is removed and the sigmoidoscope gently retracted.<sup>20-22</sup>

Delineation of lesions to identify planes of dissection is done by using the sigmoidoscope as a probe. This is done by gently moving the sigmoidoscope within the bowel with or without the use of air in the vertical and horizontal planes under direct laparoscopic visualization (Figures 3 and 4). Although this task also can be performed with a rectal probe, the ability to insufflate and visualize the colonic lumen via the sigmoidoscope makes it a more versatile tool.<sup>23</sup>

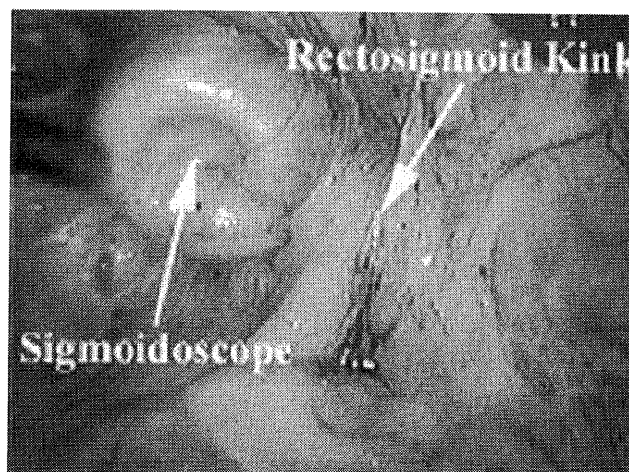
Bowel integrity is assessed after completion of extensive bowel dissection, shaving resection, or following a segmental resection and repair by simultaneous examination and



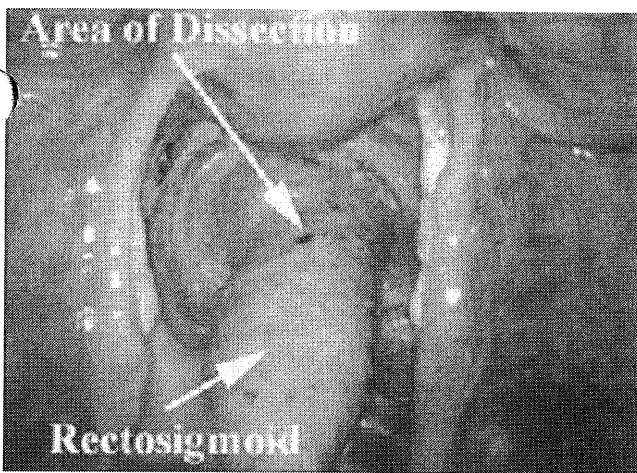
**Figure 3** Normal rectosigmoid deviated to left by sigmoidoscope.

direct visualization of the area in question with the sigmoidoscope and laparoscope (Figure 5). The pelvis then is filled with an isotonic solution, such as normal saline, and air is injected into the bowel through the sigmoidoscope. The site of bowel resection or repair is submersed in the fluid while the proximal bowel is gently compressed with a blunt instrument. This process is aided by changing the patient's position between Trendelenburg and reverse Trendelenburg, allowing the air and fluid to travel to the area of bowel requiring underwater examination. The production of air bubbles in the fluid denotes a lack of bowel integrity as air can escape even through very small defects. When this occurs, the defect is repaired and the procedure is repeated.<sup>15-17,22</sup>

There are various indications for intraoperative proctosigmoidoscopy. In cases of severe disease involving the bowel, such as endometriosis, adhesions, fibrosis, or certain malignant implants, the sigmoidoscope is used to aid in the intraoperative assessment of possible bowel wall invasion and potential stricture that can be caused by these entities.



**Figure 4** Rectosigmoid with right deviation and stricture due to endometriosis and fibrosis with distal sigmoidoscope placement.



**Figure 5** Rectosigmoid with sigmoidoscope after vaporization and shaving of endometriosis.

## Discussion

Proctosigmoidoscopy can be used at the conclusion of procedures involving the bowel to assess for any potential bowel injury.

A recent study was conducted to determine the utility and safety of intraoperative proctosigmoidoscopy.<sup>3</sup> Two hundred sixty-two consecutive patients who underwent operative laparoscopy for rectosigmoid endometriosis and severe adhesions had a proctosigmoidoscopy to evaluate for any intraluminal abnormality, rectal and/or rectosigmoid injury, and/or assessment of a rectosigmoid repair.

Sigmoidoscopy was used to evaluate the rectum or sigmoid colon in 60.7% of the patients, the large bowel in 11.1%, and the posterior cul-de-sac in 28.3%. Forty-four (16.8%) of the patients had an enterotomy. One incomplete repair was detected, and one incidental benign rectal polyp was discovered.<sup>3</sup>

All cases of bowel injury were diagnosed intraoperatively. In four (1.5%) patients, the bowel injury was identified only when concomitant proctosigmoidoscopy was performed. The enterotomies were all repaired by intracorporeal laparoscopic suturing. There were no postoperative bowel perforations.<sup>3</sup> This study exemplifies the usefulness, accuracy, and safety of intraoperative proctosigmoidoscopy in the detection of bowel injury, incomplete bowel repair, and unsuspected bowel pathologies such as rectal polyps. However, due to the bowel wall thinning that sometimes accompanies dissection, we recommend that extra care be taken when performing proctosigmoidoscopy in these situations to avoid traumatic injury. In addition, although intraoperative proctosigmoidoscopy is useful in the detection of bowel pathology, we do not advocate its use in place of preoperative colonoscopy when indicated.

Some gynecologists prefer that a surgical consultation be obtained in situations where bowel dissection/resection and proctosigmoidoscopy are deemed necessary. Although this is a valid opinion, this option may not always be readily available, especially in cases where bowel involvement is

unexpected. Therefore, we believe that gynecologic surgeons treating endometriosis and adhesions involving the bowel would benefit from learning and being able to perform proctosigmoidoscopy. This philosophy allows gynecologic surgeons to provide complete treatment for these commonly encountered gynecologic conditions and decreases dependence on general or colorectal surgeons for assistance.

## Conclusion

We believe that intraoperative proctosigmoidoscopy is a valuable tool that can be used during laparoscopic surgery involving the rectosigmoid colon, rectovaginal septum, or posterior cul-de-sac. The depth of penetration of endometriosis can be better evaluated, proper planes of dissection identified, and rectosigmoid integrity assessed following manipulation or repair. The last is achieved through direct laparoscopic visualization combined with air insufflation and underwater examination of affected portions of bowel, allowing detection of defects of any size, regardless of their location. In this manner, proctosigmoidoscopy allows safe and accurate detection of intraoperative gastrointestinal complications, thereby preventing much more serious postoperative adverse outcomes. It is a simple procedure that can be learned easily and poses minimal, if any, risk of injury or complication, especially when performed under direct laparoscopic guidance. It is not associated with a significant increase in intraoperative time or additional cost. By decreasing the risk of disastrous postoperative complications, the benefits of its use significantly outweigh the risks. It is however greatly underused by most practicing gynecologic surgeons and probably should be considered as part of the teaching curriculum in obstetrics and gynecology training programs.

## References

- Schrenk P, Woisetschlager R, Rieger R, Wayand W. Mechanism, management, and prevention of laparoscopic bowel injuries. *Gastrointest Endosc*. 1996;43:572-574.
- Chapron C, Pierre F, Harchaoui Y, Lacroix S, et al. Gastrointestinal injuries during gynaecologic laparoscopy. *Hum Reprod*. 1999;14:333-337.
- Nezhat CH, Seidman D, Nezhat F, Nezhat CR. The role of intraoperative proctosigmoidoscopy in laparoscopic pelvic surgery. *J Am Assoc Gynecol Laparosc*. 2004;11:47-49.
- Harkki-Siren P, Kurki T. A nationwide analysis of laparoscopic complications. *Obstet Gynecol*. 1997;89:108-112.
- Peterson HB, Hulka JF, Phillips JM. American Association of Gynecologic Laparoscopists' 1988 membership survey on operative laparoscopy. *J Reprod Med*. 1990;35:587-589.
- Lehmann Willenbrock E, Riedel HH, Mecke H, Semm K. Pelviscopy/laparoscopy and its complications in Germany, 1949-1988. *J Reprod Med*. 1992;37:671-677.

7. Jansen FW, Kapiteyen K, Trimbos-Kemper T, et al. Complications of laparoscopy: a prospective multicentre observational study. *Br J Obstet Gynaecol.* 1997;104:595-600.
8. Bishoff JT, Allaf ME, Kirkels W, et al. Laparoscopic bowel injury: incidence and clinical presentation. *J Urol.* 1999;161:887-890.
9. Anderson ML, Pasha TM, Leighton JA. Endoscopic perforation of the colon: lessons from a 10-year study. *Am J Gastroenterol.* 2000;95:3418-3422.
10. Gatto NM, Frucht H, Sundararajan V, Jacobson JS, Grann VR, Neugut AI. Risk of perforation after colonoscopy and sigmoidoscopy: a population-based study; *J Natl Cancer Inst.* 2003;95:230-236.
11. Nelson RL, Abcarian H, Prasad ML. Iatrogenic perforation of the colon and rectum. *Dis Colon Rectum.* 1982;25:305-308.
12. Robinson RJ, Stone M, Mayberry JF. Sigmoidoscopy and rectal biopsy: a survey of current UK practice. *Eur J Gastroenterol Hepatol.* 1996;8:149-151.
13. Ventura-Braswell A, Brattain PC. Sigmoidoscopic screening for colorectal neoplasia: a comparison of residents in obstetrics and gynecology to those in internal medicine in a military center. *Primary Care Update for Ob/Gyns.* 1999;6:177-180.
14. Saad JA, Pirie P, Sprafka JM. Relationship between flexible sigmoidoscopy training during residency and subsequent sigmoidoscopy performance in practice. *Fam Med.* 1994;26:250-253.
15. Wheelless CR, Dorsey JH. Use of the automatic surgical stapler for intestinal anastomosis associated with gynecologic malignancy: review of 283 procedures. *Gynecol Onc.* 1981;11:1-7.
16. Wheelless C. In: Rock JA, Thompson JD, Eds. *Te Linde's Operative Gynecology.* 8th ed. Philadelphia, Pa: Lippincott-Raven Publishers; 1997:1297-1298.
17. Nezhat CR, Siegler AM, Nezhat FR, Nezhat CH, Seidman DS, Luciano AA, Eds. *Operative Gynecologic Laparoscopy: Principles and Techniques.* 2nd ed. New York, NY: McGraw-Hill; 2000:198.
18. Zmora O, Dinnewitzer AJ, Pikarsky AJ, et al. Intraoperative endoscopy in laparoscopic colectomy. *Surg Endosc.* 2002;16:808-811.
19. Varol N, Maher P, Healey M, et al. Rectal surgery for endometriosis—should we be aggressive? *J Am Assoc Gynecol Laparosc.* 2003;10:182-189.
20. Corman ML. *Colon and Rectal Surgery.* Philadelphia, Pa: Lippincott Williams & Wilkins; 1998:52.
21. Beck D. *Complications of Colon and Rectal Surgery.* Baltimore, Md: Williams & Wilkins; 1996:79.
22. Beard JD, Nicholson ML, Sayers RD, et al. Intraoperative air testing of colorectal anastomosis: a prospective, randomized trial. *Br J Surg.* 1990;77:1095.
23. Bartos P, Vraný M. Laparoscopic excision of endometriosis of the rectovaginal septum using the Diomed laser. *Ceska Gynecol.* 2000;65:13-15.