

Observational Study

Role of colonoscopy in the diagnostic work-up of bowel endometriosis

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Abstract

AIM: To evaluate the accuracy of colonoscopy for the prediction of intestinal involvement in deep pelvic endometriosis.

METHODS: This prospective observational study was performed between September 2011 and July 2014. Only women with both a clinical and imaging diagnosis of deep pelvic endometriosis were included. The study was approved by the local ethics committee and written informed consent was obtained in all cases. Both colonoscopy and laparoscopy were performed by expert surgeons with a high level of expertise with these techniques. Laparoscopy was performed within 4 wk of colonoscopic examination. All hypothetical colonoscopy findings (eccentric wall thickening with or without surface nodularities and polypoid lesions with or without surface nodularities of endometriosis) were compared with laparoscopic and histological findings. We calculated the sensitivity, specificity, positive predictive value and negative predictive value for the presence of colonoscopic findings of intestinal endometriosis.

RESULTS: A total of 174 consecutive women aged between 21-42 years with a diagnosis of deep pelvic endometriosis who underwent colonoscopy and

surgical intervention were included in our analysis. In 76 of the women (43.6%), intestinal endometrial implants were found at surgery and histopathological examination. Specifically, 38 of the 76 lesions (50%) were characterized by the presence of serosal bowel nodules; 28 of the 76 lesions (36.8%) reached the muscularis layer; 8 of the 76 lesions (10.5%) reached the submucosa; and 2 of the 76 lesions (2.6%) reached the mucosa. Colonoscopic findings suggestive of intestinal endometriosis were detected in 7 of the 174 (4%) examinations. Colonoscopy failed to diagnose intestinal endometriosis in 70 of the 76 women (92.1%). A colonoscopic diagnosis of endometriosis was obtained in all cases of mucosal involvement, in 3 of 8 cases (37.5%) of submucosal involvement, in no cases of muscularis layer involvement and in 1 of 38 cases (2.6%) of serosa involvement. The sensitivity, specificity, positive predictive and negative predictive values of colonoscopy for the diagnosis of intestinal endometriosis were 7%, 98%, 85% and 58%, respectively.

CONCLUSION: Being an invasive procedure, colonoscopy should not be routinely performed in the diagnostic work-up of bowel endometriosis.

Key words: Endometriosis; Colonoscopy; Intestinal; Bowel; Laparoscopy

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Core tip: Endometriosis is common gynecological condition that in a substantial number of cases injures intestinal tissue and causes remarkable morbidity among affected individuals. A surgical approach is still the most effective, but preoperative assessment is often challenging even for expert physicians and requires several diagnostic techniques for a clear definition of the location and extent of endometrial implants. The aim of the present study was to evaluate the role of colonoscopy in the diagnostic work-up of bowel endometriosis.

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INTRODUCTION

Intestinal endometriosis is a condition that causes significant morbidity in affected individuals and, despite our current knowledge of this disease, it continues to be a challenging diagnosis to make preoperatively^[1].

Although a precise diagnosis regarding the presence, location and extent of endometrial implants should be required during the preoperative evaluation in order to ensure the best therapeutic approach and treatment planning^[2], there is a notable absence of agreed upon disease-specific endoscopic and radiological features^[3].

The reference standard for the diagnosis of endometriosis is the laparoscopic visualization of suspicious lesions, which also provides correct staging of the disease, as established by the American Fertility Society^[4-6].

Conversely, the role of colonoscopy in the assessment of bowel involvement is still controversial.

Despite some authors believing that the paucity of mucosal involvement makes colonoscopy more useful in excluding other diagnoses rather than confirming the diagnosis^[7,8], other authors identify the colonoscopic findings of intestinal endometriosis^[9].

The aim of the present study was to evaluate the accuracy of colonoscopy for the prediction of intestinal involvement in deep pelvic endometriosis using laparoscopic and histological data as the reference standard.

MATERIALS AND METHODS

This prospective observational study was carried out between September 2011 and July 2014 in women with a clinical and radiological diagnosis of deep pelvic endometriosis. Written informed consent was obtained in all cases and was approved by the local ethics committee.

The inclusion criteria were as follows: clinical symptoms, such as chronic pelvic pain, dysmenorrhea, dyspareunia and infertility; gastrointestinal disorders suggestive of bowel involvement, such as rectal pain coincident with menses and cramping abdominal pain before or during the passage of stools; defecation disorders without signs of bowel obstructions; and video laparoscopy within 4 wk of the colonoscopic examination. The patients who did not undergo video laparoscopy within 4 wk of the imaging were excluded.

Colonoscopy was performed in all cases by an expert operator with over 10 years of experience in intestinal endoscopy, focusing on all hypothetical colonoscopic findings of endometriosis, according to previous literature (eccentric wall thickening with or without surface nodularities and polypoid lesions with or without surface nodularities). The exam was performed again until accurate bowel cleaning was obtained. No biopsies were taken and the diagnosis was made at bowel resection. Of interest, the endoscopist was blinded about the previous radiological diagnosis.

In all surgeries, after adequate adhesiolysis, the presence, location, number of nodules and extent of endometriosis were noted during laparoscopic surgery

Table 1 Colonoscopy and deep pelvic endometriosis

	Colonoscopy and deep pelvic endometriosis (n = 174)	
	Presence of intestinal endometriosis	Absence of intestinal endometriosis
Presence of colonoscopic findings	6	1
Absence of colonoscopic findings	70	97
Sensitivity = 7% Specificity = 98%		
Positive predictive value = 85%		
Negative predictive value = 58%		

performed by expert laparoscopic surgeons (more than 200 laparoscopic procedures were performed). All specimens obtained were evaluated histologically for the presence of endometrial tissue, particularly focusing on intestinal wall involvement. Diagnosis of rectosigmoid endometriosis was based on the presence of ectopic endometrial and stromal tissue penetrating at least into the serosal layer of the bowel wall. Colonoscopic findings were compared with laparoscopic and histological findings. Of interest, bowel resection was not influenced by colonoscopic findings; bowel involvement was assessed by laparoscopic evaluation.

We calculated the sensitivity (those with both presence of colonoscopic findings and diagnosis of intestinal endometriosis/those with diagnosis of intestinal endometriosis), specificity (those without the presence of either colonoscopic findings or diagnosis of intestinal endometriosis/those without diagnosis of intestinal endometriosis), positive predictive value (those with the presence of both colonoscopic findings and diagnosis of intestinal endometriosis/those with the presence of colonoscopic findings) and negative predictive value (those without the presence of colonoscopic findings or diagnosis of intestinal endometriosis/those without diagnosis of intestinal endometriosis) for the presence of colonoscopic findings of intestinal endometriosis.

Statistical analysis

Statistical methods should be described when they are used to verify the results. Suitable techniques are chosen for the statistical treatments; for example, *t* test (group or paired comparisons), χ^2 test, Ridit, probit, logit, regression (linear, curvilinear or stepwise), correlation, analysis of variance (ANOVA), analysis of covariance, *etc.*

RESULTS

One hundred and seventy-four consecutive women in the age range 21-42 years (mean age 29.7 ± 5.2 years) with diagnosis of deep pelvic endometriosis (by echography and magnetic resonance) who underwent colonoscopy and surgical intervention were included in our analysis. In 76 women (43.6%), intestinal

endometrial implants were found at surgery and histopathological examination. Colonoscopy and video laparoscopy were concordant in 103 out of 174 cases (59.1%). Colonoscopic findings suggestive of intestinal endometriosis were detected in 7 out of 174 (4%) examinations. Colonoscopy failed to diagnose intestinal endometriosis in 70 out of 76 women (92.1%).

In detail, 38 out of 76 lesions (50%) were characterized by the presence of serosal bowel nodules; 28 out of 76 lesions (36.8%) reached the muscularis layer; 8 out of 76 lesions (10.5%) reached the submucosa and 2 out of 76 lesions (2.6%) reached the mucosa.

Of interest, diagnosis of intestinal endometriosis by colonoscopy was obtained in all 2 cases of mucosa involvement, in 3 out of 8 cases (37.5%) of submucosa involvement, in no cases of muscularis layer involvement and in 1 out of 38 cases (2.6%) of serosa involvement.

We found 2 cases of polypoid lesions without surface nodularities which were confirmed to be intestinal endometriosis and 5 cases of wall thickening without surface nodularities, of which one was not confirmed to be an intestinal endometriosis.

Six out of 174 cases (3.4%) were true positive, 97 out of 174 cases (55.7%) were true negative, 70 out of 174 cases (40.2%) were false negative and 1 out of 174 (0.5%) were false positive. The sensitivity, specificity, positive predictive and negative predictive values of colonoscopy for the diagnosis of intestinal endometriosis were 7%, 98%, 85% and 58%, respectively (Table 1).

DISCUSSION

Endometriosis is a common gynecological disease defined as the presence of endometrial glands and stroma outside the uterus which induces a chronic inflammatory reaction. The most common locations of endometriosis are the ovaries and the pelvic peritoneum. Peritoneal lesions can be superficial or deep^[10].

Deep pelvic endometriosis is defined as the presence of endometrial implants, fibrosis and muscular hyperplasia more than 5 mm below the peritoneum^[11]. Rectovaginal endometriosis is deep infiltrating endometriosis that infiltrates the vagina, rectum and the rectovaginal septum and obliterates the posterior cul-de-sac or the pouch of Douglas^[12].

It is much less common than ovarian or peritoneal endometriosis and affects between 3.8% and 37% of all patients with endometriosis. Anywhere from 5.3%-12% of patients are estimated to have bowel endometriosis. The rectosigmoid is the most common site of gastrointestinal involvement, affecting 74% of patients^[12,13].

Preoperative diagnosis can be challenging. There is a notable absence of agreed upon disease-specific

endoscopic and radiological features. However, several diagnostic methods have been proposed and studied in the literature, including digital rectovaginal examination, transvaginal/transrectal ultrasounds, magnetic resonance imaging (MRI) colonoscopy, computed tomography (CT) colonography and, ultimately, laparoscopic excision with histological confirmation^[14-16].

Laparoscopy is the gold standard for the diagnosis of endometriosis and histological confirmation can be beneficial due to high false positive rates of visual diagnosis. Due to the invasiveness of the procedure, other methods are often employed to detect the lesion and to aid with preoperative planning and patient counseling. Transvaginal ultrasound, transrectal ultrasound, CT colonography and MRI are examples of the preoperative methods available to detect deep infiltrating RVE^[14].

There is varying data on which offers the highest sensitivity, specificity, PPV and NPV, and accuracy in cases of deep rectovaginal endometriosis. On the other hand, this is the first study, to our best knowledge, evaluating the usefulness of colonoscopy.

Although colonoscopy is often performed in many patients with IE to evaluate presenting complaints, most authors believe that the paucity of mucosal involvement makes colonoscopy more useful in excluding other diagnoses rather than confirming the diagnosis. Bowel endometriosis refers to a condition in which endometrial glands and stroma infiltrate the bowel wall inward from the serosa, reaching at least the subserosal fat tissue. It is particularly common in the subserosa and muscularis propria of the colon. The submucosa may be involved but the infiltration of the lesion into the mucosa is thought to be rare^[7].

However, several case reports described the diagnosis of colorectal endometriosis by colonoscopy. Furthermore, Kim *et al*^[9] described the colonoscopic finding of colorectal endometriosis, concluding that eccentric wall thickening is the most common colonoscopic finding of colorectal endometriosis and the histological diagnostic yield of endoscopic biopsy is high when lesions are accompanied by surface nodularities.

Regarding the study by Kim *et al*^[9], several limitations have to be addressed. It is a retrospective observational study on a small representative study population that includes only intestinal endometriosis, not using laparoscopic and/or histological data as the reference standard. Different from this previous experience, we designed a prospective observational study including all women with deep pelvic endometriosis, confirming the colonoscopic findings by certain laparoscopic and histological diagnosis.

At present, recognized endoscopic findings of colorectal endometriosis include distortion, narrowing or inward bulging of the bowel lumen, polyps or masses, and mucosal changes such as erythema and granularity^[9,17,18].

We can confirm that the colonoscopic findings of intestinal endometriosis are wall thickening and polypoid lesions. However, the incidence of the presence of colonoscopic findings of intestinal endometriosis in deep pelvic endometriosis is quite low (4%); therefore, we cannot justify routine colonoscopy in all women with deep pelvic endometriosis. With the sensitivity being very low (7%), we cannot identify intestinal endometriosis by colonoscopy. Furthermore, the negative predictive value is quite low (58%) and we cannot exclude the need for a bowel resection based on a negative colonoscopy examination alone.

Thus, colonoscopy could be considered useless in the identification of bowel involvement in deep pelvic endometriosis. Although colonoscopy should be performed in patients with intestinal symptoms such as rectal bleeding as the differential diagnoses, we can hypothesize that, being an invasive procedure, it should not be routinely performed. However, further studies are needed to validate its effectiveness. Furthermore, further studies could be useful to evaluate the potential role of virtual colonoscopy and compare the accuracy of these procedures, with virtual colonoscopy a non-invasive diagnostic tool^[19,20].

COMMENTS

Background

Preoperative assessment of deep pelvic endometriosis is often challenging even for expert physicians, requiring several diagnostic techniques for a clear definition of location and extension of endometrial implants.

Research frontiers

The aim of the present study is to evaluate the role of colonoscopy in the diagnostic work-up of bowel endometriosis.

Innovations and breakthroughs

This is the first study evaluating the usefulness of colonoscopy for the prediction of intestinal involvement in deep pelvic endometriosis.

Applications

Being an invasive procedure, colonoscopy should not be routinely performed in the diagnostic work-up of bowel endometriosis.

Peer-review

This is an interesting paper that adds to the literature. The authors need to clarify how the bowel endometriosis diagnosis was made. The topic of this paper, with regards to the diagnosis of endometriosis, especially when compromising the bowel or the rectum, is a very challenging field. Some minor revisions and language polishing are needed.

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