**Name of journal:** *World Journal of Gastroenterology*

**ESPS Manuscript NO: 14606**

**Columns: ORIGINAL ARTICLE**

***Observational Study***

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

Marco M *et al.*Endometriosis and colonoscopy

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**Ethics approval:** The study was reviewed and approved by the Local Ethic Committee of University of Naples “Federico II”.

**Informed consent:** All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

**Conflict-of-interest:** Authors have no conflicting interest to declare.

**Data sharing:** No additional data are available.

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**Received:** October 15, 2014

**Peer-review started:** October 15, 2014

**First decision:** December 2, 2014

**Revised:** December 20, 2014

**Accepted:** February 12, 2015

**Article in press:**

**Published online:**

**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 hypotetic 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 endometriotic 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 muscolaris 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; Bowel; Intestinal; 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 pre-operative assessment is often challenging even for expert physicians and requires several diagnostic techniques for a clear definition of the location and extent of endometriotic implants. The aim of the present study was to evaluate the role of colonoscopy in the diagnostic work-up of bowel endometriosis.

Milone M, Mollo A, Musella M, Maietta P, Sosa Fernandez LM, Shatalova O, Conforti A, Barone G, De Placido G, Milone F. Role of colonoscopy in the diagnostic work-up of bowel endometriosis. *World J Gastroenterol* 2015; In press

**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 endometriotic 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 it is still controversial the role of colonoscopy in the assessment of bowel involvement.

Despite some authors believe that the paucity of mucosal involvement makes colonscopy 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 radiologic 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; video laparoscopy within 4 wk of the colonoscopic examination. The patients who did not undergo video laparoscopy within 4 weeks of the imaging were excluded.

Colonoscopy was performed in all cases by expert operator with more than 10 tears of experience in intestinal endoscopy focusing on all hypotetic colonnoscopic 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 has been 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, presence, location, number of nodules, and extent of endometriosis were noted during laparoscopic surgery performed by expert laparoscopic surgeons (more than 200 laparoscopic procedures performed). All specimens obtained were evaluated histologically for the presence of endometriotic 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 has not been influenced by colonoscopic findings; bowel involvement has been assessed by laparoscopic evaluation.

We have calculated the sensitivity (those with both presence of colonoscopic findings and diagnosis of intestinal endometriosis/those with diagnosis of intestinal endometriosis), specificity (those without presence of either colonoscopic findings or diagnosis of intestinal endometriosis/those without diagnosis of intestinal endometriosis), positive predictive value (those with presence of both colonoscopic findings and diagnosis of intestinal endometriosis/those with presence of colonoscopic findings), and negative predictive value (those without 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. Choose suitable techniques 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 endometriotic implants were found at surgery and histopathological examination. Colonoscopy and video laparoscopy were concordant 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 details, 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 one cases of muscolaris layer involvement and in 1 out of 38 cases (2.6%) of serosa involvement.

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

6 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 (Figure 1).

**DISCUSSION**

Endometriosis represents a common gynaecological 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 (DPE) 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 it obliterates the posterior cul-de-sac or the pouch of Douglas[12].

It is much less common than ovarian or peritoneal endometriosis and effects 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 those 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, in 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 colonscopy 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 subserous fat tissue. It is particularly common in the subserosa and muscolaris propia 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 histologic 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 retrsospective observational study on a few representative study population including only intestinal endometriosis, not using laparoscopic and/or histological data as the reference standard. At difference with this previous experience we have 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. Being the sensitivity 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. Even though 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 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, being the virtual colonoscopy a non-invasive diagnostic tool[19,20].

**COMMENTS**

***Background***

Pre-operative 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 endometriotic 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 regards to the diagnosis of endometriosis, especially when compromising the bowel or the rectum, a very challenging field. Some minor revisions and language polishing are needed.

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**P-Reviewer:** Borrelli GM, Cutner AS **S-Editor:** Yu J

**L-Editor:** **E-Editor:**

**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% |