

Surgical Management of Appendicular Endometriosis: A Series of Cases

Haley Calcagnotto¹, Gabriela Françoes Rostirolla^{1*}, Arthur Henry Michelin¹,
Élvio Heitor Michelin², Eduardo Brambilla³

¹Department of Gynecology, Caxias do Sul University, Rio Grande do Sul, Brazil

²Endoelite Institute, Caxias do Sul, Brazil

³Department of Coloproctology, Caxias do Sul University, Rio Grande do Sul, Brazil

Email: *gabirossti@gmail.com

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Abstract

Endometriosis is a condition characterized by the presence of endometrial tissue outside the uterine cavity. This tissue, found in the inner lining of the uterus, develops in other pelvic organs, such as the ovaries, fallopian tubes, peritoneum, and bowel. In cases of deep endometriosis, the appendix may be affected, and consequently, appendectomy becomes a perioperative possibility. From February 2018 to February 2023, the surgical team performed 133 laparoscopic procedures. The number of appendectomies by the time of the surgical procedure was 19.5% (26 cases), with 50% of these (13 cases) confirming the histological presence of appendiceal endometriosis (AE), no increasing of postoperative complications was noticed. This report is important to reinforce multidisciplinary training, review postoperative complications, and provide training in advanced pelvic surgery. Furthermore, it aims to emphasize that appendectomy performed during the surgical act is a safe and viable procedure that does not increase complication rates.

Keywords

Endometriosis, Appendix, Appendicular Endometriosis, Appendectomy, Laparoscopy

1. Introduction

Endometriosis is an estrogen-dependent disease characterized by its high replicative and expansive capacity within the abdominal cavity. The pathophysiology of endometriosis arises from the presence of endometrial-like tissue and/or stroma outside the uterine cavity, typically resulting in inflammation of the affected tissue. This inflammatory response is accompanied by increased cytokine and growth

factor secretion, stimulation of angiogenesis, nerve involvement, and anatomical distortion [1]. Common sites of endometriosis include the ovaries, fallopian tubes, pelvic peritoneum, and uterosacral ligaments, whereas atypical sites may involve the gastrointestinal tract, urinary tract, soft tissues, and thoracic cavity [1] [2].

Abrão *et al.* [3] describe that women with deep endometriotic lesions may also experience appendicular endometriosis (AE) with associated intestinal symptoms. Clinical manifestations of AE in affected women may include acute or chronic pelvic pain, fever, intussusception, or lower gastrointestinal bleeding, which often worsens during menstruation [2] [4] [5]. Although AE incidence remains low, its potential for mimicking acute appendicitis necessitates a prepared clinical approach to differentiate it from acute appendicitis and may require surgical intervention in elective cases [6].

Laparoscopic examination of the affected appendix often reveals signs such as edema, rigidity, hyperemia, and congestion; however, a definitive diagnosis of AE can only be confirmed through resection and histopathological analysis [2] [3] [7]. Appendectomy during endometriosis surgery can potentially alleviate chronic pelvic pain, reduce future appendectomy risk, prevent appendicitis in endometriosis patients, and thereby reduce associated healthcare costs [2] [8] [9]. This study aims to evaluate the prevalence of AE in surgical procedures performed between February 2018 and February 2023 in symptomatic women with endometriosis and to examine potential complications associated with this condition.

2. Patients and Methods

This retrospective cross-sectional study included 133 patients who underwent surgery for endometriosis performed by the same surgical team, with an analysis of cases in which appendectomy was conducted for specific clinical indications. All patients had a history of chronic abdominal pain, either intermittent or continuous, lasting six months or more, and had been using contraceptives and analgesics chronically to manage symptoms (**Table 1**).

All procedures were performed via video laparoscopy by the same team, primarily for endometriosis treatment due to either pain or infertility. Appendectomy was performed by the co-author when indicated intraoperatively, based on abnormal appendiceal findings such as visible AE lesions, adhesions, rigidity, congestion, hyperemia, and color changes.

The appendectomy technique involved ligation of the appendicular artery, mobilization of the appendix, closure of the stump with non-invaginated sutures, and cold scissor resection. The specimen was extracted through the laparoscopic trocar and preserved in formalin for histopathological analysis. Hemostasis of operative fields was verified following excision.

Preoperative investigations included transvaginal ultrasound, computed tomography, magnetic resonance imaging, and/or colonoscopy. All exams were realized with intestinal preparation.

3. Results

Between February 2018 and February 2023, 133 patients were included in the study. The mean patient age was 39 years (range: 22 - 53 years). Surgical indications included complaints of pelvic and abdominal pain, either chronic, intermittent, or continuous for six months or more, in association with endometriosis (**Table 1**).

Table 1. Preoperative signs and symptoms.

SIGNS AND SYMPTOMS	No AE	With AE
Abdominal pain	All	All
Infertility	42	6
Dyschezia	7	3
Dysmenorrhea	6	1
Low back pain	3	-
Dysuria	2	1
Intestinal nodule	2	-
Constipation	2	-
Dyspareunia	2	-
Hematochezia	-	1
Right shoulder pain	1	-

The appendectomy procedure was performed in 26 patients (19.5%), over the 132 patients that showed bowel endometriosis. Other treatments included 55 shaving resections (38.8%), 43 segmental resections (30.3%) and 36 discoid resections of the rectal anterior wall (25.3%). Additional procedures are detailed in **Figure 1**.

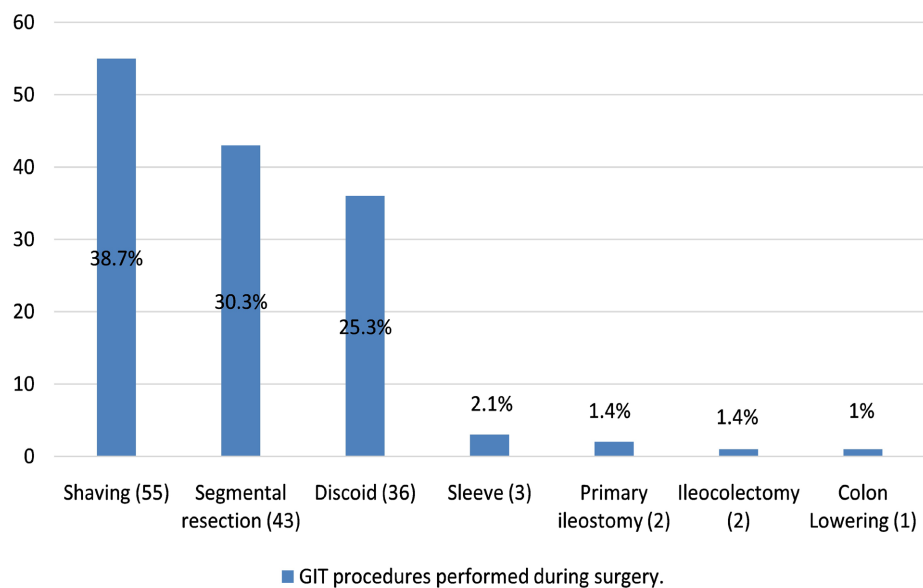


Figure 1. GIT procedures performed during surgery.

Histopathological analysis confirmed endometriosis in 13 of the 26 appendectomy specimens (50%), representing 10% of the total sample. No postoperative complications related to appendectomy were observed. Documented intestinal complications included six cases (4.5%) of constipation, small bowel obstruction, rectal granulomas, fistula formation, late bleeding, and hematomas (**Table 2**).

Table 2. Postoperative complications.

COMPLICATIONS (n = 10)	No Appendectomy	With Appendectomy
Late bleeding	3 cases	1 case
Fistula	2 cases	-
Hematoma	2 cases	-
Intestinal obstruction	-	1 case
Intestinal colitis	1 case	-
Total=	8	2

4. Discussion

The presence of appendicular endometriosis (AE) was initially described in 1860 by the Austrian pathologist Karl von Rokitansky [8]. In 1955, Collins D.C. [9] identified AE in 0.054% of cases within a study of 50,000 appendix specimens. Subsequently, Feldhaus *et al.* [4], reported AE in less than 1% of women on post-appendectomy pathological analysis.

AE manifestations range from asymptomatic presentations to acute appendicitis-like symptoms, lower gastrointestinal bleeding, perforation, or intestinal obstruction due to intussusception [2] [6] [7]. The clinical signs often mimic gastrointestinal diseases, with symptoms such as abdominal pain, diarrhea, constipation, bloating, flatulence, nausea, and vomiting [2] [6] [10]-[14]. Melena [2] [6] [9], proctalgia [15], and gut microbiota alterations [13] have also been documented. Symptoms resembling appendicitis, particularly in young women with a history of infertility and pelvic endometriosis, may prompt suspicion of AE [2] [4] [6] [7] [15].

In two-thirds of AE cases, histopathological involvement extends to muscular and seromuscular layers, with one-third involving only the serosal surface [7]. AE may exhibit mucosal or submucosal infiltration, leading to symptoms similar to inflammatory diseases like Crohn's disease, enteritis, and ischemic colitis [7] [14].

Due to endometriosis' diverse manifestations and nonspecific indications, accurate preoperative AE diagnosis is challenging [14]. Transvaginal ultrasonography, MRI, and Doppler ultrasound are not definitively diagnostic for AE, though Luzier J. *et al.* [15] reported the "doughnut sign" on ultrasound as indicative of AE with intussusception. Serum CA125 levels may be elevated but tend to normalize postoperatively [14].

Laparoscopy, confirmed through histopathology, remains the most effective diagnostic tool. Appendectomy is recommended for pain resolution and visibly

abnormal appendices [2] [4] [7] [16]. Abrão MS *et al.* [16] adds that in laparoscopy, it is impossible to state that a normal-appearing appendix is truly free of disease, however, they believe this to be clinically irrelevant as they also imply that it would be unethical to perform an appendectomy on an appendix laparoscopically normal. Mabrouk M. *et al.* [12] emphasize that patients with endometriosis undergoing surgery should be counseled on the potential for appendectomy.

In this study, histopathological abnormalities were confirmed in 13 of the 26 resected appendices. Abnormal findings during laparoscopy, such as intussusception, edema, adhesion, or nearby endometriosis, were reliable indicators for AE, though only half were histologically confirmed.

5. Conclusion

Appendicular endometriosis is an important but relatively uncommon finding. Surgical assessment of the appendix during endometriosis procedures is critical. While clinical symptoms and imaging may suggest AE, definitive diagnosis relies on histopathological evaluation. Appendectomy is warranted when laparoscopy identifies abnormalities; however, there is no consensus on removal in cases with a macroscopically normal appendix. Patients should receive appropriate counseling prior to surgery, and further prospective, randomized studies are necessary to establish a standard recommendation for appendectomy in women with endometriosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Song, S.Y., Jung, Y.W., Shin, W., Park, M., Lee, G.W., Jeong, S., *et al.* (2023) Endometriosis-Related Chronic Pelvic Pain. *Biomedicines*, **11**, Article 2868. <https://doi.org/10.3390/biomedicines11102868>
- [2] Allahqoli, L., Mazidimoradi, A., Momenimovahed, Z., Günther, V., Ackermann, J., Salehiniya, H., *et al.* (2023) Appendiceal Endometriosis: A Comprehensive Review of the Literature. *Diagnostics*, **13**, Article 1827. <https://doi.org/10.3390/diagnostics13111827>
- [3] Abrao, M.S., Goncalves, M.O.D.C., Dias, J.A., Podgaec, S., Chamie, L.P. and Blasbalg, R. (2007) Comparison between Clinical Examination, Transvaginal Sonography and Magnetic Resonance Imaging for the Diagnosis of Deep Endometriosis. *Human Reproduction*, **22**, 3092-3097. <https://doi.org/10.1093/humrep/dem187>
- [4] Feldhaus, D.J., Harris, R.K. and Dayal, S.D. (2020) Appendiceal Endometriosis Presenting as Possible Cecal Mass. *The American Surgeon*, **86**, 1528-1530. <https://doi.org/10.1177/0003134820933606>
- [5] Gimonet, H., Laigle-Quérat, V., Ploteau, S., Veluppillai, C., Leclère, B. and Frampas, E. (2016) Is Pelvic MRI in Women Presenting with Pelvic Endometriosis Suggestive of Associated Ileal, Appendicular, or Cecal Involvement? *Abdominal Radiology*, **41**, 2404-2410. <https://doi.org/10.1007/s00261-016-0884-7>
- [6] Hale, J., Scott, B., Suydam, C. and Brockmeyer, J. (2023) Endometriosis of the

- Appendix: When Appendicitis Is Less than Straightforward. *Military Medicine*, **188**, e3730-e3733. <https://doi.org/10.1093/milmed/usad233>
- [7] Gupta, R., Singh, A.K., Farhat, W., Ammar, H., Azzaza, M., Mizouni, A., *et al.* (2019) Appendicular Endometriosis: A Case Report and Review of Literature. *International Journal of Surgery Case Reports*, **64**, 94-96. <https://doi.org/10.1016/j.ijscr.2019.07.046>
- [8] Von Rokitsansky, C. (1860) Über Uterusglanden-Neubildung in Uterus- und Ovarial-Sarcomen. *Ztschrkk Gesselsh Aerzte Wien*, **16**, 577-581.
- [9] Collins, D.C. (1955) A Study of 50,000 Specimens of the Human Vermiform Appendix. *Surgery, Gynecology & Obstetrics*, **101**, 437-450.
- [10] Guo, C., Chen, M.Z., Chiu, T., Condous, G. and Barto, W. (2023) The Appendix in Endometriosis. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, **63**, 792-796. <https://doi.org/10.1111/ajo.13730>
- [11] Moulder, J.K., Siedhoff, M.T., Melvin, K.L., Jarvis, E.G., Hobbs, K.A. and Garrett, J. (2017) Risk of Appendiceal Endometriosis among Women with Deep-Infiltrating Endometriosis. *International Journal of Gynecology & Obstetrics*, **139**, 149-154. <https://doi.org/10.1002/ijgo.12286>
- [12] Mabrouk, M., Raimondo, D., Mastronardi, M., Raimondo, I., Del Forno, S., Arena, A., *et al.* (2020) Endometriosis of the Appendix: When to Predict and How to Manage—A Multivariate Analysis of 1935 Endometriosis Cases. *Journal of Minimally Invasive Gynecology*, **27**, 100-106. <https://doi.org/10.1016/j.jmig.2019.02.015>
- [13] Svensson, A., Brunkwall, L., Roth, B., Orho-Melander, M. and Ohlsson, B. (2021) Associations between Endometriosis and Gut Microbiota. *Reproductive Sciences*, **28**, 2367-2377. <https://doi.org/10.1007/s43032-021-00506-5>
- [14] Idetsu, A., Ojima, H., Saito, K., Yamauchi, H., Yamaki, E., Hosouchi, Y., *et al.* (2007) Laparoscopic Appendectomy for Appendiceal Endometriosis Presenting as Acute Appendicitis: Report of a Case. *Surgery Today*, **37**, 510-513. <https://doi.org/10.1007/s00595-006-3440-1>
- [15] Luzier, J., Verhey, P. and Dobos, N. (2006) Preoperative CT Diagnosis of Appendiceal Intussusception. *American Journal of Roentgenology*, **187**, W325-W326. <https://doi.org/10.2214/ajr.06.0103>
- [16] Abrão, M.S., Dias, J.A., Rodini, G.P., Podgaec, S., Bassi, M.A. and Averbach, M. (2010) Endometriosis at Several Sites, Cyclic Bowel Symptoms, and the Likelihood of the Appendix Being Affected. *Fertility and Sterility*, **94**, 1099-1101. <https://doi.org/10.1016/j.fertnstert.2009.10.031>