Int. J. Morphol.,
42(4):923-928, 2024.

Simultaneous Deep Endometriosis Affecting Abdominal Wall and Vermiform Appendix

Endometriosis Simultánea de Pared Abdominal y Apéndice Vermicular

Carlos Manterola[1,2,3] & María Elena Espinosa[1,4]

MANTEROLA, C. & ESPINOSA, M.E. Simultaneous deep endometriosis affecting abdominal wall and vermiform appendix. *Int. J. Morphol., 42(4)*:923-928, 2024.

SUMMARY: Endometriosis, defined as the presence of endometrial glands and stroma outside the uterine cavity, is a chronic inflammatory condition that affects between 8 % and 44 % of women of reproductive age. Occasionally it presents as a sensitive mass in the abdominal wall, in relation to a surgical scar. On the other hand, in the most severe stage of endometriosis, intestinal involvement is common, and endometriotic disease of the appendix may be present even in appendices with macroscopically normal appearance. Simultaneous affectation of both locations is very rare. Nevertheless, treatment of choice is the excision of both lesions with safety margins. The aim of this manuscript was to report a case of simultaneous deep endometriosis affecting the total abdominal wall and vermiform appendix, resected in a single surgical procedure, which subsequently required abdominal wall repair with mesh plasty. Since desmoid tumors and endometriosis share similar clinical signs and unspecific imaging exams, both options should be considered in case of abdominal wall mass in female patients of childbearing age, especially if they have a history of uterine-related surgery.

KEY WORDS: Endometriosis; Abdominal Wall; Endometriosis/surgery.

INTRODUCTION

Endometriosis, defined as the presence of endometrial glands and stroma outside the uterine cavity, is a chronic inflammatory condition that affects between 8 % and 44 % of women of reproductive age (Rindos & Mansuria, 2017). It is associated with ovulatory dysfunction and oocyte production impairment, as well as an increase in inflammatory cells in peritoneal fluid, ovarian endometriomas, and disruption of normal endometrial function. It is a cause of pain and infertility in 10-15 % of women of reproductive age (Andres *et al*., 2020).

On the other hand, deep endometriosis distinguishes itself from peritoneal or superficial types of endometrioses and ovarian endometriosis by the presence of endometriotic nodules larger than 5 mm (Koninckx *et al*., 2019).

The most widely accepted pathogenic theory is that of retrograde menstruation, wherein endometrial cells reach the abdominopelvic cavity through the fallopian tubes during menstruation. Subsequently, these cells undergo neoangiogenesis before implantation (Gordts *et al*., 2017; Koninckx *et al*., 2019).

This theory is supported by the discovery of endometrial implants in pelvic-dependent areas, such as the recto-uterine cul-de-sac, retrocervix, uterosacral ligaments, sigmoid colon, rectum, and bladder (Becker *et al*., 2022); however, it can manifest in extra-pelvic locations, including the abdominal wall, visceral organs, skin, as well as the respiratory, gastrointestinal, and urinary systems (Rindos & Mansuria, 2017; Galazis *et al*., 2019; Carsote *et al*., 2020). It has also been reported in more distant sites, such as the brain, vertebral nerves, and peripheral nervous system, possibly through lymphatic or hematogenous dissemination (Jerman *et al*., 2020). Nevertheless, other theories exist, such as "benign metastasis," "immune dysregulation," "celomic metaplasia," "hormonal imbalance," "involvement of stem cells," and "alterations in epigenetic regulation." However, the true pathogenesis of endometriosis remains poorly understood (Lamceva *et al*., 2023).

[1] Universidad de La Frontera, Doctorado en Ciencias Médicas, Temuco, Chile.
[2] Núcleo Milenio de Sociomedicina, Chile.
[3] Center for Morphological and Surgical Studies (CEMyQ), Universidad de La Frontera, Temuco, Chile.
[4] Universidad Técnica Particular de Loja, Loja, Ecuador.

Received : 2024-02-16 Accepted: 24-04-2024

Furthermore, in the most severe stage of endometriosis (Stage IV), intestinal involvement is common, and endometriotic disease of the appendix may be present even in appendices with macroscopically normal appearance. Hence, the true prevalence of appendiceal endometriosis remains unknown (Guo *et al*., 2023), even though there is evidence from a multivariate analysis of 1935 surgically treated patients with endometriosis, where the frequency of appendiceal endometriosis was confirmed in 2.6 % of cases (Mabrouk *et al*., 2020), which can reach up to 12.3 % when special analyses are employed (Ross *et al*., 2020). On the other hand, appendiceal involvement may mimic acute appendicitis, invade the sigmoid colon, and even cause intussusception of the appendix (Jeong *et al*., 2019; Lainas *et al*., 2019; Lopez *et al*., 2021). These are some of the reasons supporting appendectomy in patients with endometriosis undergoing minimally invasive surgery (Nikou *et al*., 2021).

These patients are typically seen by surgeons, given that among the clinical manifestations they exhibit, notable features include masses in the abdominal wall and infiltration of intra-abdominal organs (Manterola & Espinosa, 2022).

The treatment of choice remains surgical resection with adequate margins, taking care not to rupture the mass to prevent recurrence and re-implantation of microscopic remnants of endometrial tissue (Slaiki & Jamor, 2020). Thereby recurrence can be avoided, which has been described in 4.3 % to 26.9 % of cases, possibly due to resection with compromised surgical margins (Yela *et al*., 2017; Hirata *et al*., 2020).

The aim of this manuscript was to report a case of simultaneous deep endometriosis affecting the total abdominal wall and vermiform appendix, resected in a single surgical procedure, which subsequently required abdominal wall repair with mesh plasty.

CASE PRESENTATION

Case Description: A 40-year-old female patient with a history of surgery for hepatic cystic echinococcosis, cholecystectomy, and incisional hernioplasty with mesh, presented with a symptomatic focal lesion of the abdominal wall. The tumor was diagnosed through abdominal computed tomography in 2023, revealing a focal lesion measuring 8 cm with irregular margins, symmetry, and hypovascularity, and another one in the distal third of the appendix, both suggesting desmoid tumors. In December 2023, a MRI was conducted, verifying post-surgical changes of medial partial hepatectomy, with remaining liver parenchyma with homogeneous signal, without focal lesions; absence of free fluid, intestinal loops of normal caliber, normal retroperitoneal and mesenteric lymph nodes. Nodular and massiform image with lobulated and irregular contours, centered on the right rectus abdominis muscle, measuring 4.9 x 7.1 x 2.7 cm in diameter, with extension towards the left rectus abdominis and involvement of the fascia of the internal and external oblique muscles, and the transversus abdominis. Furthermore, transmural involvement of the abdominal wall was observed, with invasion of the parietal peritoneum and infiltration of the small intestine loop. Cecal appendix could not be adequately visualized due to non-use of spasmolytic. The MRI conclusion was indicative of aggressive fibromatosis, desmoid tumor or soft tissue sarcoma (Fig. 1).

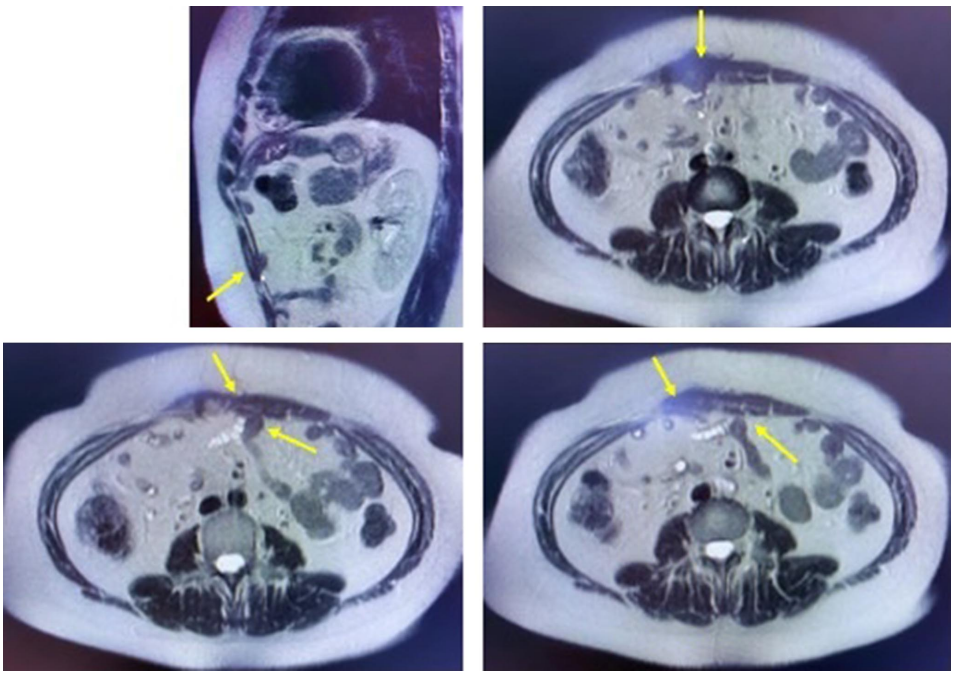

Fig. 1. Images of the patient lesion by MRI. A localized lesion is observed in the abdominal wall, measuring 8 x 6 x 4 cm. The yellow arrows facilitate the identification of the focal point of the primary lesion, which involves the entire thickness of the wall and encompasses the anti-mesenteric margin of a jejunal loop.

Laboratory findings: indicated an elevated erythrocyte sedimentation rate, and C-Reactive protein; however, tumor markers were negative (Table I). Thus, given the characteristics of the lesion, diagnostic uncertainty, and the patient's preference, she was admitted for surgical exploration. Syndromic diagnosis of an abdominal and appendiceal tumor of unspecified origin, possibly desmoid tumor, was established.

Table I. Preoperative laboratory tests.

Variables	*Our case*	*Normal values*
Hemoglobin (g/dL)	13.5	13 - 17
Hematocrit (%)	40.4	40 - 54
Leukocytes (10^3/ul)	8.21	4 - 10
Platelets (10^3/ul)	234	150 - 400
ESR (mm/h)	**19.5**	0 - 13
C-Reactive Protein (mg/dL)	**11.5**	0 - 10
Blood glucose (mg/dL)	99	74 - 99
Uremia (mg/dL)	27.9	19.3 - 42.8
Creatinine (mg/dL)	1.0	0.6 - 1.2
Total proteins (g/dL)	7.4	6.4 - 8.3
Albumin (g/dL)	4.0	3.5 - 5.0
Total bilirubin (mg/dL)	1.0	0.2 - 1.3
Alkaline phosphatases (U/L)	94	38 - 126
AST (U/L)	34	17 - 59
ALT (U/L)	31	21 - 72
GGTP (U/L)	69	15 - 73
Prothrombin (%)	100	70 - 100
PTTK (seg)	27.5	21 - 32
AFP (ng/ml)	9.5	0.0 -10.0
CEA (ng/ml)	2.1	0.0 - 2.5
Ca 19-9 (Um/L)	11.2	0 - 37

ESR:Erythrocytesedimentation rate; AST: Aspartate aminotransferase; AST: Alanine aminotransferase; GGTP: Gamma-glutamyl transpeptidase; PTTK: Partial thromboplastin time; AFP: Alpha-fetoprotein; CEA: Carcinoembryonic antigen.

Surgical findings: 16-1-24. A tumor was observed in the abdominal wall, located in the middle third of the midline, involving both rectus muscles, mainly on the right side, with an approximate diameter of 10 cm. Additionally, it extended to the antimesenteric margin of a proximal jejunum loop. Another tumor measuring approximately 1 cm, was confirmed in the distal third of the appendix. There was an absence of ascites, enlargement of local lymph nodes, or any additional lesions within the liver or peritoneal cavity.

Surgery performed: Excision of the abdominal tumor, intestinal resection, appendectomy and abdominal wall plasty with mesh were carried out. A fish-mouth incision was made surrounding the previously described tumor with safety margins of at least 2 cm in its entire circumference. A block excision of skin, subcutaneous tissue, rectus muscles, parietal peritoneum, and 10 cm of the involved small bowel was performed. Subsequently, an end-to-end entero-enteral anastomosis was performed with continuous Monocryl-000 sutures. Subsequently, an appendectomy was performed, ligating the meso with Ligasure Impact®, securing the appendiceal base with Vicryl-00, and concluding with an invaginating suture of the appendicular stump using the same material. The abdominal wall was closed in layers, utilizing continuous Vycril-1 sutures for the peritoneum and continuous PDS-1 sutures for the aponeurosis. Then it was necessary to install a 30 x 30 cm polypropylene mesh to reinforce the wall, which was fixed with polypropylene-00 stitches to the fascia of both anterior rectus abdominis muscles and both internal obliques (Fig. 2). Afterward, an aspiration drain was placed over de mesh, which was brought out through a counter opening. Cleaning and final hemostasis. Closure of the deep cellular layer with 00 Vicryl sutures, the superficial cellular layer with monocril-000 sutures, and skin closure with staples.

Fig. 2. abdominal wall reconstruction by using polypropylene mesh.

Pathological study: In the macroscopic analysis, in formalin there is a surgical resection specimen that includes subcutaneous adipose tissue, soft tissues, and skin measuring 10.0 x 8.5 x 4.0 cm. A skin flap measuring 6.3 x 1.7 cm with a pinkish-grayish, wrinkled, and opaque surface is observed.

Towards the depth of the subcutaneous adipose tissue, there is the presence of an indurated area, apparently related to the muscular fascia, which is observed towards the deep margin measuring 7.5 x 5.5 cm and up to 3.5 cm. The lateral margins are stained blue and black, and the deep margin is stained red (Fig. 3A). The sample included marking with black suture threads oriented towards the 12 o'clock position, with the left margin stained black, the right margin blue, and the deep margin red. Upon sectioning, the described lesion presented a whitish-pink fascicular surface with brownish-yellow areas resembling adipose tissue and some microcystic areas with a gelatinous surface. The lesion was located macroscopically 4.5 cm from the superficial margin (Fig. 3B). Additionally, in formalin a cecal appendix was observed measuring 6 cm in length and up to 0.6 cm in thickness. The serosal surface was brownish white, partly pink, smooth, and shiny. The mesoappendix was up to 1.2 cm thick. On sectioning, the wall was 0.1 to 0.2 cm thick, with a dilated lumen of up to 0.2 cm containing fecal-like material (Fig. 3C).

Microscopic analysis revealed a specimen composed of fragments of fibroadipose and skeletal muscle tissue with abundant foci of epithelium and stroma of normotypical endometrial type within the thickness. There are areas of lymphocytic inflammation, extensive fibrosis, and focal fragments of adhered small intestine wall, without associated atypia. A superficial fragment with skin was observed, showing generally preserved architecture (Figs. 4A and 4B). On the other hand, vermiform appendix was studied, showing partially preserved overall architecture, with mucosa featuring normotypical mucosecretory columnar epithelium. Abundant glands and stroma of normotypical endometrial type were present within the thickness of the wall.

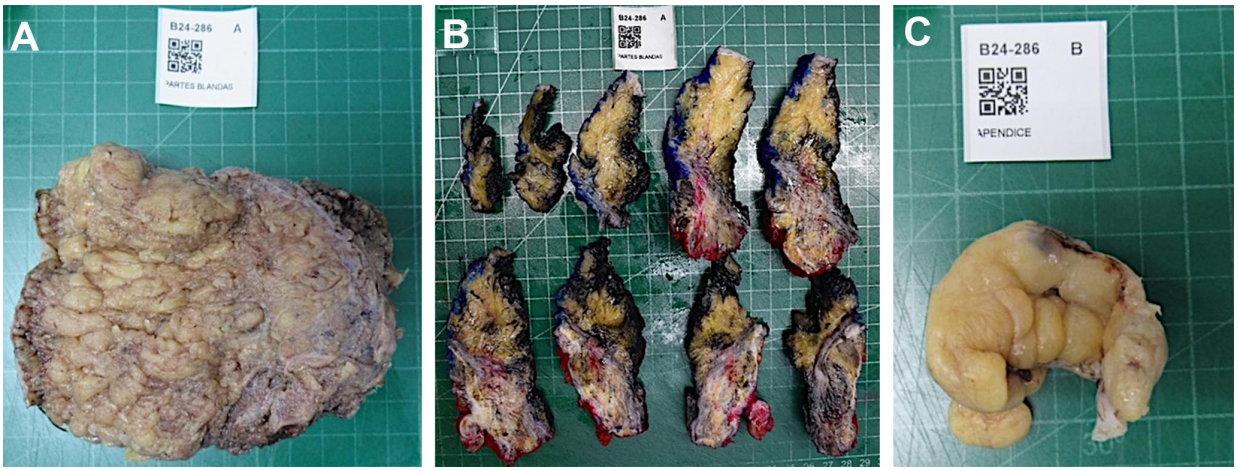

Fig. 3. Macroscopy images. A) Abdominal wall tumor (Surgical resection specimen comprising subcutaneous adipose tissue, soft tissues, and skin measuring 10 x 8.5 x 4 cm. The skin flap measures 6.3 x 1.7 cm, exhibiting a pinkish-grayish, rough, and opaque surface). B) Cross-section of the specimens (staining of the lateral margins is executed in blue and black, while the deep margin is stained in red. Additionally, apparent marking with two black suture threads is included, oriented towards the 12 o'clock position. Subsequently, the left margin is stained black, the right margin is stained blue, and the deep margin is stained red). C) Appendix (cecal appendix measuring 6 cm in length and up to 0.6 cm in thickness).

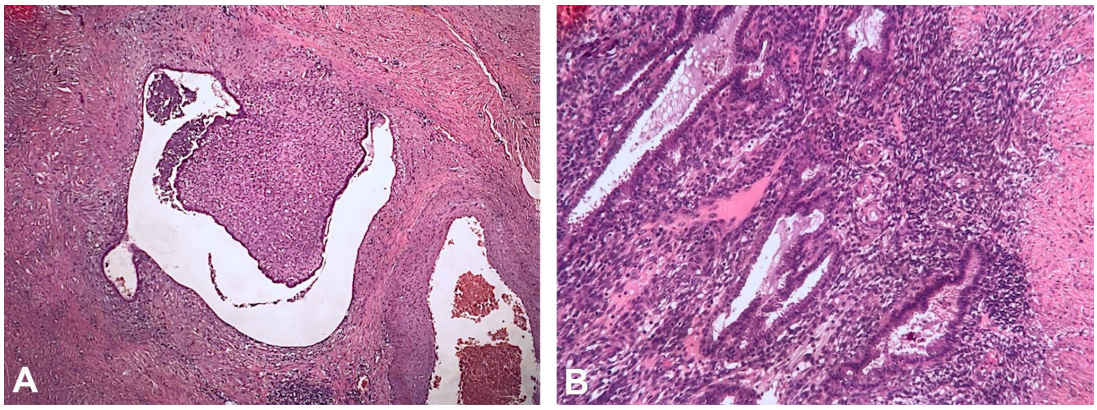

Fig. 4. Microscopy images. H&E A) 40. B) 100x. Fibroconnective and adipose tissue are discernible in a fibrous organizational pattern with a chronic inflammatory process involving lymphocytes and hemorrhagic areas. Additionally, there is the presence of endometrial glands and stroma, all without atypical features.

The final histopathological diagnosis was morphological changes consistent with endometriosis in the abdominal wall, and appendicular endometriosis.

Postoperative Course: The patient experienced an uneventful postoperative course, with mobilization and oral intake initiated on the first postoperative day, leading to discharge on the third day. During the subsequent follow-up, it was confirmed that the patient was in good overall condition and had resumed normal activities and was undergoing gynecological control and treatment with hormonal therapy (oral contraceptives).

DISCUSSION

Abdominal wall masses have different etiologies. Differential diagnosis includes desmoid tumors, sarcomas, carcinomas and other benign and malignant lesions, among which abdominal wall endometriosis. Diagnosis is challenging, especially in asymptomatic patients and cases with unspecific symptoms, and imaging contribution may be poor (Ji *et al*., 2017; Archer *et al*., 2019; Bedell *et al*., 2020; Girardi *et al*., 2022).

Extrapelvic implantations of endometrial tissue have been reported in different abdominal organs, but abdominal wall is a rare site of localization, usually associated with surgical scar of caesarean section (Manterola & Espinosa, 2022). In spite of its rarity, extrapelvic endometriosis of the rectus abdominis muscle should be included among other pathological entities in the differential diagnosis of chronic pelvic pain in women of reproductive age, with a history of caesarean or gynecological surgery (Thanasa *et al*., 2022).

In these cases, ultrasound is a useful diagnostic tool to determine diameter, extent of the disease, as well as to exclude the differential diagnosis of hernia (Manterola & Espinosa, 2022). The ultrasound appearance of endometriosis is variable; however, the most common presentation is that of a hypoechoic solid mass with peripheral vascularity, with irregular margins and infiltration of surrounding tissues and the use of Doppler may help to demonstrate internal vascularity (Edwards *et al*., 2018). Similarly, CT-Scan and MRI could help by providing more information, as was in this case; and ultrasound-guided fine needle aspiration of the lesion may also be useful, but seeding of the needle tract has been reported and must be included in the resection margins (Edwards *et al*., 2018; Carvalho *et al*., 2023).

Treatment of choice for abdominal wall endometriosis is considered to be a wide surgical excision with at least a 1cm margin with patch grafting of the defect (Manterola & Espinosa, 2022). Therefore, given the size of the defect, approximately 10 % of patients require the use of meshes to reconstruct the defect after resection of a focus of abdominal wall endometriosis (Manterola & Espinosa, 2022; Paramythiotis *et al*., 2022).

Furthermore, in reference to appendiceal endometriosis, it is important to comment that clinical manifestations are mostly asymptomatic, so preoperative diagnosis remains very difficult, as there are no reported gross or radiological features that describe appendiceal endometriosis. The treatment must be surgical resection of the appendix by open or laparoscopic approach (Nikou *et al*., 2021; Yaghi *et al*., 2021; Guo *et al*., 2023).

Regarding the prognosis of this type of lesions, it is relevant to point out that there is a high possibility of recurrence of endometriosis, subsequent follow-ups in patients with this disorder is needed (Carsote *et al*., 2020). On the other hand, long-term follow-up of these lesions is also very important, as there is a risk of up to 1.0 % of degeneration into clear cell carcinomas or endometrioid carcinoma, which can occur decades after primary surgery (Ferrari *et al*., 2021; Liu *et al*., 2021).

Since desmoid tumors and endometriosis share similar clinical signs and unspecific imaging exams, both options should be considered in case of abdominal wall mass in female patients of childbearing age, especially if they have uterine-related surgery history (Girardi *et al*., 2022).

ACKNOWLEDGMENTS. ANID – MILENIO – NCS2021_013.

MANTEROLA, C. & ESPINOSA, M. E. Endometriosis simultánea de pared abdominal y apéndice vermicular. *Int. J. Morphol., 42(4)*:923-928, 2024.

RESUMEN: La endometriosis se define como la presencia de glándulas endometriales y estroma fuera del útero. Es una afección crónica que afecta entre el 8 % y el 44 % de las mujeres en edad reproductiva. Ocasionalmente se presenta como una masa sensible en la pared abdominal, en relación con una cicatriz quirúrgica. Por otro lado, en su estadio más grave de la endometriosis, la afectación intestinal es común y puede afectar al apéndice, pudiendo estar presente incluso en apéndices de apariencia macroscópicamente normal. La afectación de ambas localizaciones simultáneamente es muy infrecuente. Sin embargo, el tratamiento de ambas lesiones es su exéresis quirúrgica con márgenes de seguridad. El objetivo de este manuscrito fue reportar un caso de endometriosis profunda simultánea que afectaba la pared abdominal total y el apéndice vermiforme, las que fueron resecadas en un solo tiempo quirúrgico, incluyendo posteriormente reparación de la pared abdominal con uso de malla. Dado que los tumores desmoides y la endometriosis comparten signos clínicos similares y exámenes de imágenes inespecíficos, se deben considerar ambas

opciones en caso de masas en la pared abdominal de mujeres en edad fértil, especialmente si tienen antecedentes de cirugía relacionada con el útero.

PALABRAS CLAVE: Endometriosis; Pared abdominal; Cirugía de endometriosis.

REFERENCES

Andres, M. P.; Arcoverde, F. V. L.; Souza, C. C. C.; Fernandes, L. F. C.; Abrão, M. S. & Kho, R. M. Extrapelvic endometriosis: a systematic review. *J. Minim. Invasive Gynecol., 27(2)*:373-89, 2020.

Archer, L.; Wong, D.; Nairn, R. & Hodder, R. Not all abdominal wall masses in women are endometriomas or desmoids; endometriosis-associated abdominal wall cancer. *ANZ J. Surg., 89(5)*:609-11, 2019.

Becker, C. M.; Bokor, A.; Heikinheimo, O.; Horne, A.; Jansen, F.; Kiesel, L.; King, K.; Kvaskoff, M.; Nap, A.; Petersen, K.; *et al*; ESHRE Endometriosis Guideline Group. ESHRE guideline: endometriosis. *Hum. Reprod. Open., 2022(2)*:hoac009, 2022.

Bedell, S.; Chang, Z.; Burt, C.; Khalifa, M. A. & Argenta, P. A. Incisional carcinoma of Mullerian Origin: A case report and review of literature. *Gynecol. Oncol. Rep., 33*:100588, 2020.

Carsote, M.; Terzea, D. C.; Valea, A. & Gheorghisan-Galateanu, A. A. Abdominal wall endometriosis (a narrative review). *Int. J. Med. Sci., 17(4)*:536-42, 2020.

Carvalho, A. C.; Cardoso, R.; Pires, F.; Ventura, S.; Portela, F.; Ministro, P. & Silva, A. Diagnosis of bowel endometriosis using endoscopic ultrasound-guided fine needleaspiration. *Korean J. Gastroenterol., 81(1)*:46-51, 2023.

Edwards, K.; Tsai, S. H. & Kothari, A. Clinical and imaging features of abdominal wall endometriomas. *Australas. J. Ultrasound. Med., 21(1)*:24-8, 2018.

Ferrari, F.; Valenti, G.; Forte, S.; Ardighieri, L.; Iraci Sareri, M.; Barra, F.; Sartori, E. & Odicino, F. Clear cell degeneration associated with endometriosis of abdominal wall after cesarean section: A case report and systematic review of literature. *J. Obstet. Gynaecol. Res., 47(4)*:1243-52, 2021.

Galazis, N.; Kyriacou, C.; Johnstone-Ayliffe, C. & Nawar, M. Abdominal wall endometriosis in a region distant to the caesarean section scar. *BMJ Case Rep., 12(8)*:e229889, 2019.

Girardi, M.; Marano, A.; Fortunato, M.; Gelarda, E. & Giuffrida, M. C. Abdominal wall endometriosis misdiagnosed as a desmoid tumor: A case report. *Int. J. Surg. Case Rep., 93*:106979, 2022.

Gordts, S.; Koninckx, P. & Brosens, I. Pathogenesis of deep endometriosis. *Fertil. Steril., 108(6)*:872-885.e1, 2017.

Guo, C.; Chen, M. Z.; Chiu, T.; Condous, G. & Barto, W. The appendix in endometriosis. *Aust. N. Z. J. Obstet. Gynaecol., 63(6)*:792-96, 2023.

Hirata, T.; Koga, K. & Osuga, Y Extra-pelvic endometriosis: A review. *Reprod. Med. Biol., 19(4)*:323-33, 2020.

Jeong, D. H.; Jeon, H. & Adkins, K. Appendiceal endometriosis: a greater mimicker of appendicitis. *Hong Kong Med. J., 25(6)*:492-3, 2019.

Jerman, L. F.; Anderson, L.; Markham, R. & Hey-Cunningham, A. J. The lymphatic system in endometriosis: a pilot study of endometrial-like cells and immune cell populations in lymph nodes associated with deep infiltrating bowel lesions. *Reprod. Sci., 27(4)*:977-87, 2020.

Ji, W.; Wu, J.; Cheng, J. & Di, W. Serous adenocarcinoma arising from endometriosis in cesarean section abdominal wall scar: a case report and literature review. *Int. J. Clin. Exp. Pathol., 10(7)*:7534-41, 2017.

Koninckx, P. R.; Ussia, A.; Adamyan, L.; Wattiez, A.; Gomel, V. & Martin, D. C. Pathogenesis of endometriosis: the genetic/epigenetic theory. *Fertil. Steril., 111(2)*:327-40, 2019.

Lainas, P.; Dammaro, C.; Rodda, G. A.; Morcelet, M.; Prevot, S. & Dagher, I. Appendiceal endometriosis invading the sigmoid colon: a rare entity. *Int. J. Colorectal Dis., 34(6)*:1147-50, 2019.

Lamceva, J.; Uljanovs, R. & Strumfa, I. The Main Theories on the Pathogenesis of Endometriosis. *Int. J. Mol. Sci., 24(5)*:4254, 2023.

Liu, G.; Wang, Y.; Chen, Y. & Ren, F. Malignant transformation of abdominal wall endometriosis: A systematic review of the epidemiology, diagnosis, treatment, and outcomes. *Eur. J. Obstet. Gynecol. Reprod. Biol., 264*:363-7, 2021.

Lopez, M. P. J.; Chan, V.; Melendres, M. F. & Lutanco, R. Appendiceal intussusception from endometriosis. *BMJ Case Rep., 14(6)*:e241592, 2021.

Mabrouk, M.; Raimondo, D.; Mastronardi, M.; Raimondo, I.; Del Forno, S.; Arena, A.; *et al*. Endometriosis of the Appendix: When to Predict and How to Manage-A Multivariate Analysis of 1935 Endometriosis Cases. *J. Minim. Invasive Gynecol., 27(1)*:100-6, 2020.

Manterola, C. & Espinosa, M. E. Endometriosis de la Pared Abdominal en Relación con Cicatriz de Operación Cesárea. Serie de Casos. *Int. J. Morphol., 40(3)*:608-12, 2022.

Nikou, A. F.; Tenzel, N. S.; Hua, P.; Orbuch, L. & Orbuch I. K. Appendectomy should be performed during minimally invasive surgery for endometriosis. *JSLS, 25(1)*:e2020.00095, 2021.

Paramythiotis, D.; Karlafti, E.; Tsomidis, I.; Iraklis, G.; Malliou, P.; Karakatsanis, A. & Antonios, M. Abdominal wall endometriosis: a case report. *Pan. Afr. Med. J., 41*:193, 2022.

Rindos, N. B. & Mansuria, S. Diagnosis and management of abdominal wall endometriosis: a systematic review and clinical recommendations. *Obstet. Gynecol. Surv., 72(2)*:116-22, 2017.

Ross, W. T.; Newell, J. M.; Zaino, R.; Kunselman, A. R.; Harkins, G. J. & Benton, A. S. Appendiceal endometriosis: is diagnosis dependent on pathology evaluation? A prospective cohort study. *J. Minim. Invasive Gynecol., 27(7)*:1531-7, 2020.

Slaiki, S. & Jamor, J. Endometriosis of the rectus abdominis muscles: a rare case of dual location. *J. Surg. Case Reports., 2020(9)*:rjaa360, 2020.

Thanasa, A.; Thanasa, E.; Kamaretsos, E.; Gerokostas, E. E. & Thanasas, I. Extrapelvic endometriosis located individually in the rectus abdominis muscle: a rare cause of chronic pelvic pain (a case report). *Pan. Afr. Med. J., 42*:242, 2022.

Yaghi, M.; Nassar, H.; Zadeh, C. & Faraj, W. Incidental appendiceal mass as the only manifestation of endometriosis. *BMJ Case Rep., 14(2)*:e239090, 2021.

Yela, D. A.; Trigo, L. & Benetti-Pinto, C. L. Evaluation of cases of abdominal wall endometriosis at Universidade Estadual de Campinas in a period of 10 years. *Rev. Bras. Ginecol. Obstet., 39(8)*:403-7, 2017.

Corresponding author:
Dr. Carlos Manterola
CEMyQ
Universidad de La Frontera
Francisco Salazar 01145
Temuco
CHILE

E-mail: carlos.manterola@ufrontera.cl