

Left isolated inguinal endometriosis without pelvic endometriosis associated with PCOS and review of literature

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ABSTRACT

The coexistence of polycystic ovary syndrome (PCOS) and endometriosis is rare. Inguinal endometriosis (IEM) is an uncommon extrapelvic form of endometriosis, accounting for approximately 0.3-0.6% of all cases. It typically presents as inguinal swelling with cyclical pain and enlargement related to the menstrual cycle. A 40-year-old woman with a known diagnosis of type 1 PCOS and a history of two cesarean sections presented with a painful mass in the left inguinal region. The pain and swelling were cyclical in nature and became more pronounced during menstruation. The patient reported that her symptoms had worsened following the discontinuation of combined oral contraceptives, which she had been using for PCOS management. Physical examination revealed a tender mass in the left groin. Ultrasonography and magnetic resonance imaging demonstrated a lesion in the left inguinal region suggestive of endometriosis. Based on clinical and radiological findings, surgical intervention was planned. The patient underwent laparotomy, during which the left round ligament and the associated mass were completely excised. Intraoperative findings were consistent with endometriosis. The postoperative course was uneventful. Histopathological examination of the excised tissue confirmed the diagnosis of endometriosis. PCOS can be associated with inguinal endometriosis even without pelvic endometriosis.

Keywords: Endometriosis, PCOS, canal of Nuck, inguinal, oral contraceptive

INTRODUCTION

The coexistence of polycystic ovary syndrome (PCOS) and inguinal endometriosis (IEM) is extremely rare. PCOS is a common endocrinopathy affecting women of reproductive age.¹ IEM is an uncommon extrapelvic manifestation of endometriosis, with an estimated prevalence of 0.3-0.6% among all endometriosis cases.^{2,3} IEM is classified into three types: (1) involvement of an inguinal hernia sac or hydrocele of the canal of Nuck; (2) round ligament IEM; and (3) superficial IEM. Most cases reported in the literature involve right-sided IEM and are frequently associated with concomitant pelvic endometriosis.⁴⁻⁶ Common differential diagnoses include inguinal hernia, lipoma, lymphadenopathy, and malignancy.

The aim of this case report is to present a rare association of PCOS with isolated left-sided IEM in the absence of pelvic endometriosis, and to discuss its diagnosis, management, and relevant literature.

CASE

A 40-year-old female with a history of two cesarean section presented with a history of recurrent left-sided inguinal pain and lump that coincided with her menstrual cycles. According to the Rotterdam criteria, the patient had a diagnosis of type

1 PCOS in her previous follow-up.¹ The patient had a history of two previous pregnancies with ovulation induction. She had been using combined oral contraceptive (COC) for many years due to her history of PCOS and menstrual irregularity. After stopping COC use, she complained of groin pain and a palpable mass near the mons pubis in the left groin. There was no evidence of intrapelvic endometriosis in the previous surgery. No abnormal findings were identified in the pelvic cavity on bimanual examination.

On physical examination, hard, painful mass was detected on the left inguinal canal towards the mons pubis. In abdominal ultrasonography (USG) revealed hypoechoic and vascular mass measuring 30×15 mm (**Figure 1**). Abdomino-pelvic magnetic resonance imaging (MRI) revealed a nodular mass measuring 30×12 mm in the left inguinal region, consistent with the left round ligament (**Figure 2, 3**). Based on these findings, the patient was diagnosed with left isolated IEM without pelvic endometriosis associated with PCOS. Laparotomy resection of the left round ligament and associated mass was performed. The mass was excised completely with a 0,5 cm safety margin and inguinal canal floor was repaired. To prevent intraoperative cell implantation, proper normal

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saline irrigation should be performed prior to wound closure. Macroscopically, the excised mass was 30x15 mm (Figure 4). Histopathological examination showed endometrial glands surrounded by endometrial stroma (Figure 5).

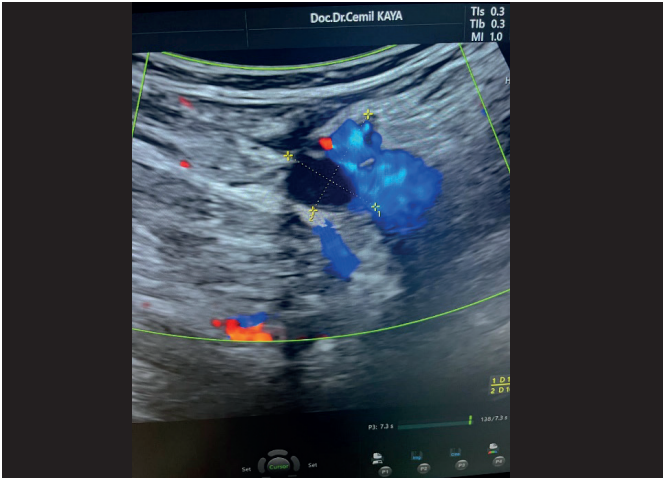


Figure 1. Abdominal USG image of the lesion. Ultrasound revealed a mildly heterogeneous, hypoechoic mass with vascularity (30x15 mm)

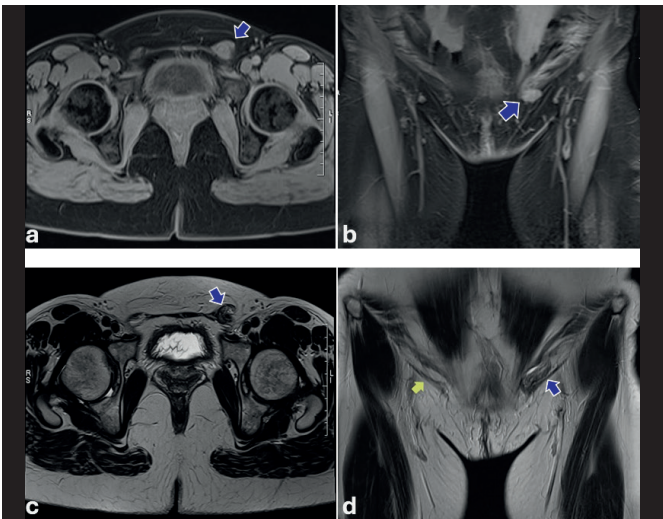


Figure 2. Magnetic resonance imaging findings of left inguinal endometriosis
a) Fat-suppressed T1-weighted axial image and
b) coronal T1 image show an isointense lesion in the left groin;
c) T2-weighted axial image shows a mixed hyperintense and hypointense lesion in the left groin
d) T2-weighted coronal image shows a normal inguinal canal appearance in the right groin with fat intensity (yellow arrow), while the left groin reveals an inguinal canal with mixed hypointense and hyperintense lesion (blue arrow). Both T1 and T2 section findings are consistent with endometriosis in the left groin. The blue arrow points to the endometriosis lesion in the left round ligament

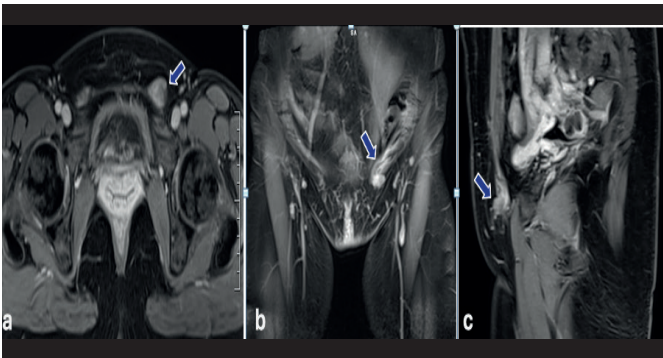


Figure 3. Magnetic resonance imaging findings of inguinal endometriosis
T1-weighted contrast-enhanced axial (a), coronal (b), and sagittal (c) images demonstrate a contrast-enhancing hyperintense lesion located in the left inguinal region (blue arrows). The blue arrow points to the endometriosis lesion the extraperitoneal round ligament in the left inguinal region

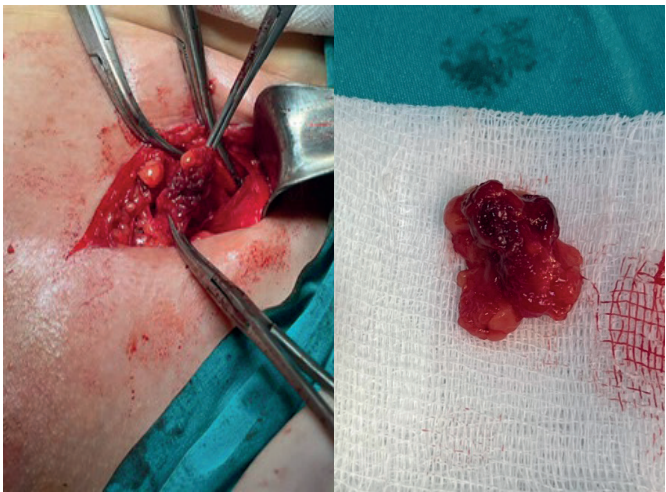


Figure 4. Shows intraoperative pictures. A shows the left canal of Nuck after exploring the area of tenderness. gross specimen of the excised left distal round ligament. Black, hemorrhagic lesion along the left round ligament down towards the mons pubis

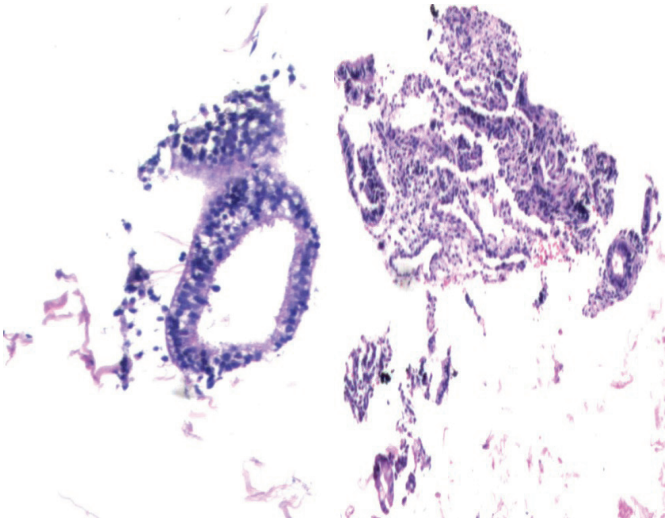


Figure 5. Histopathological examination showed multiple foci of endometrial glands surrounded by endometrial stroma. Endometrial stroma and glands, as well as hemosiderin-laden macrophage clusters and old bleeding foci were detected

DISCUSSION

In this study, a case presentation was conducted alongside a comprehensive literature search and presented as a narrative review. A comprehensive literature search was performed using PubMed and Google Scholar to identify English-language articles published from January 1990 to September 2025. The search strategy included the following terms and combinations: “inguinal endometriosis,” “extrapelvic endometriosis,” “infertility,” “treatment outcome,” and “PCOS.” Titles and abstracts of the retrieved studies were screened, and reference lists of eligible articles were manually reviewed to identify additional relevant reports. The review included case reports related specifically to IEM, while cases of extraperitoneal endometriosis without IEM were excluded (Table). The evidence from the studies included in this narrative review was used to discuss the pathophysiological mechanisms and clinical features of the PCOS-endometriosis association, as well as IEM.

Table. Literature reviewed of this study						
Studies	Clinical findings	Menstrual/obstetrics history	Duration/age/parity	Surgical history	Intervention	Follow
Lipschultz RA, (2025, 1 case)	Right painful groin mass	Regular	1 year/NA	NA	Surgical excision of mass	NA
Haghgoo A, (2024, 8 case)	Right inguinal, groin mass with cyclical pain	Regular/dyspareunia	1-4 years/(36.3, (30-51) Multiparity (4) Nulliparity (2)	Abdominal surgery (1)	Surgical excision of mass	NA
Mushiak Shu, (2023, 2 case)	Right inguinal, groin mass with cyclical pain	Regular/dyspareunia	NA/36, 51/NA	No	Surgical excision of mass plus explotarive laparoscopy	NA
Mongelli M, (2022, 2 case)	Right vs left groin mass	Regular	1 years/NA	NA	Surgical excision of mass	NA
Watanabe Y, (2022, 1 case)	Left painful groin mass	Regular	2 year/44/NA	NA	Surgical excision of mass	NA
Ayuste EC JR, (2022, 1 case)	Bilateral inguinal groin mass	Regular	1 year/44/M	No	Surgical excision of mass	Asymptomatic
Swatesutipun V, 2021, 1 case)	Right inguinal, groin mass with cyclical pain	Reguler	2 years/34/NA	NA	Surgical excision of mass	NA
Skarpas AS, (2021, 1 case)	Right inguinal, groin mass with cyclical pain	NA	3 years/42/NA	NA	Surgical excision of mass	NA
Mu B, (2021, 3 case)	Right-left and bilaterality groin pain	NA	2 years/36/Nulliparity	NA	Surgical excision of mass	Asymtomatic
AlSinan FM (2021, 1case)	Left groin pain	Regular	2 year/33/Nulliparity	NA	Surgical excision of mass	Asymtomatic
Pei-Chen Chen (2021, 1 case)	Right inguinal, groin mass with pain	Regular	3 month/40/Multiparity	NA	Surgical excision of mass	
Nigam VK, (2020, 1 case)	Right inguinal, groin mass with pain	Regüler	1 month/40/Multiparity	C/S	Surgical excision of mass	NA
Basnayake O (2020, 1 case)	Right painful groin mass	Dsypareunia	4 months/27/NA	no	Surgical excision of mass	Asemyptomatic COC
Zihni İ, (2020, 1 case)	No cyclical groin pain	NA	1 year/31/Multiparity	C/S	Surgical excision of mass	Asymptomatic
Fujikawa H, (2020, 1 case)	Right groin pain	Dyspareunia	1 year/42/NA	NA	Surgical excision of mass	Asymtomatic
Thomas JA (2019, 1 case)	Right groin pain	Dyspareunia	1 year/23/NA	NA	Surgical excision of mass	NA
Fong KN, (2019, 1 case)	Right groin pain	Dsypareunia	1 year/33/N	NA	Surgical excision of mass	NA
Azhar E, (2019, 1 case)	Right groin pain	Endometriosis related to infertility	2 days /33/Multiparity	Laparoscopic endometrioma excision	Surgical excision of mass	NA
Nagana T, (2019, 1 case)	Right groin pain	NA	10 years/41/NA	Right inguinal hernia repair	Surgical excision of mass	NA
Raviraj S, (2019, 20 case)	Right inguinal, groin mass with cyclical pain	Dysmenorrhea, endometrioma	5 month/30/NA	C/S(1) L/S(3) L/T(1) Other surgical history (15)	Surgical excision of mass	NA
Wolfhagen, (2018, 9 case)	Painful groin mass	Dysmenorrhea, endometrioma	1 months-2 years/28-43/ Muliparity (5) Nulliparity (1)	C/S (1)	Surgical excision of mass	After 8 months recurrence
Ion D (2017, 1 case)	Right inguinal, groin mass with pain	İnfertility	3 months/42/Nulliparity	NA	Surgical excision of mass	Cyclical pain operation area
Okoshi K, (2017, 1 case)	Right inguinal, groin mass with cyclical pain	Endometriosis	NA/44/Nulliparity	Laparoscopic endometrioma excision	Surgical excision of mass	NA
Kılıç MO, (2016, 1 case)	Right inguinal, groin mass with pain	Endometriosis	2 years/NA	Laparoscopic endometrioma excision	Surgical excision of mass	NA
Tsuchie E, (2016, 1 case)	Right inguinal, groin mass with pain	NA	1 years/35/NA	NA	Surgical excision of mass	NA
Husain F, (2015, 1 case)	Right inguinal, groin mass with pain	NA	2 years/32/Multiparity	C/S	Surgical excision of mass	NA
Pandey D, (2015, 1 case)	Left inguinal, groin mass with pain	Regular	4 ay /39/Multiparity	C/S	Surgical excision of mass	NA
Albutt K, (2014, 1 case)	Left inguinal, groin mass with pain	Regular	4 days/23/NA	no		NA
Kim DH (2014, 1 case)	Right inguinal, groin mass with pain	Regular	2 years/40/Nulliparity	no		NA
Borhghans RA, (2014, 1 case)	Right inguinal, groin mass with pain	NA	1 years/28/NA	no	Surgical excision of mass	NA
Ibrahim NT, (2013, 1 case)	Right inguinal, groin mass with pain	Regular	2 years/29/NA	no	Surgical excision of mass	NA

Table. Literature reviewed of this study (continues)						
Studies	Clinical findings	Menstrual/obstetrics history	Duration/age/parity	Surgical history	Intervention	Follow
Stojanovic M, (2013, 1 case)	Left inguinal, groin mass with pain	Regular	2 years/40/NA	no	Surgical excision of mass	NA
Prabhu R, (2013, 1 case)	Left inguinal, groin mass with pain	Regular	6 months/49/Multiparity	C/S	Surgical excision of mass	NA
Rajendran S, (2012, 1 case)	Left inguinal, groin mass with pain	NA	3 years/36/NA	Hysterectomy	Surgical excision of mass	Laparoscopy COC
Wong WS, (2011, 1 case)	Left inguinal, groin mass with pain	Menorrhagia	8 weeks/48/Multiparity	NA	Surgical excision of mass	NA
Wang CJ, (2009, 1 case)	Left inguinal, groin mass with pain	Regular	6 months/35/NA	NA	Surgical excision of mass	NA
Apostolidis S, (2009, 3 case)	Left inguinal, groin mass with pain	Reguler-Dysmenorrhea (2)	4 months-1 years/36-37-41/ Multiparity (2) Nulliparity (1)	Bilateraly oophorectomy (1)	Surgical excision of mass and round ligament	NA
Kaushik R, (2008, 1 case)	Right inguinal, groin mass with pain	NA	5 years/37/Multiparity	CS	Surgical excision of mass and round ligament	NA
Mashfigul MA, (2007, 1 case)	Right inguinal, groin mass with pain	NA	2 months/37/NA	NA	Surgical excision of mass and round ligament	NA
Hagiwara Y, (2007, 1 case)	Right inguinal, groin mass with pain	Dysmenorrhea	7 months/28/NA	Laparoscopic left ovarian endometrioma excision	Surgical excision of mass	NA
Boggi U, (2001, 2 case)	Right inguinal, groin mass with pain	NA	4 months/35-30/NA	CS	Surgical excision of mass	Laparoscopy
Ling CM, (2000, 1 case)	Right inguinal, groin mass with pain	Regular	4 months/46/Multiparity	no	Surgical excision of mass	NA
Freed KS, (1996, 1 case)	Right inguinal, groin mass with pain	Regular	Several years/45/ Multiparity	no	Surgical excision of mass and round ligament	Laparoscopy
Goh JT, (1994, 1 case)	Right inguinal, groin mass with pain	Regular	2 years/22/NA	no	Surgical excision of mass	NA
Imai A, (1994, 1 case)	Right inguinal, groin mass with pain	Regular	1 years/39/NA	no	Surgical excision of mass	Laparoscopy
NA: Not available, C/S: Cesarian section, L/T: Laparotomy, L/S: Laparoscopy, COC: Combine oral contraceptive						

PCOS, Extrapelvic IEM Coexistence and Literature Review

The present case further highlights the rare coexistence of PCOS with isolated IEM in the absence of pelvic endometriosis. To the best of our knowledge, very few cases of PCOS and IEM have been reported in the literature.^{7,8} Current evidence suggests that PCOS and endometriosis are opposing conditions in terms of etiopathogenesis. Although this rare association aligns with the inverse comorbidity hypothesis, its underlying mechanism remains speculative. The prevalence of incidental pelvic endometriosis in women with PCOS ranges from 7.7% to 45.3%,⁸ with overall prevalence roughly half that in women without PCOS. Almost all reported cases of PCOS with pelvic endometriosis are classified as minimal or mild disease per the revised American Fertility Society criteria,⁹ and advanced endometriosis or IEM has not been observed in these women. These findings support the inverse comorbidity theory, which posits that the presence of one condition reduces the likelihood of the other. Emerging evidence suggests that PCOS and endometriosis may represent divergent manifestations of altered hypothalamo-pituitary-gonadal axis development and activity.⁹ Factors such as western-style diet, genetic predisposition, environmental exposures, and endocrine-disrupting chemicals may influence developmental pathways leading to either PCOS or endometriosis.¹⁰⁻¹² The interplay between these conditions remains poorly understood, underscoring their heterogeneous and multifactorial nature.

The largest systematic review reports that IEM accounts for approximately 58% of extrapelvic endometriosis cases.¹³ About 94% of patients present with painful inguinal masses temporally related to menstruation, with right-sided involvement in ~90%. Concomitant pelvic endometriosis and associated inguinal hernia or canal of Nuck cyst occur in ~20% of cases. Abdominal USG was used in 73.6%, CT in 40.6%, and MRI in 39.1% of cases, with USG being the primary imaging modality. FNA was performed in 7.5%, and serum CA-125 was not assessed in 73.6%. Surgical treatment was performed in 87.2%, while hormonal therapy was used in 7.2%. Malignant transformation is rare, predominantly right-sided, and recurrence occurred in 12% of cases, with intervals from 3 months to 19 years.¹³ Another review by Prodromidou et al.¹⁴ identified 36 IEM cases across 20 studies, with a prevalence of 0.3-6%. Most of the malignant transformations were adenocarcinomas.

In this review, data from 85 patients across 46 studies were analyzed. Right-sided IEM was most frequent, with the majority of patients being multiparous. Abdominal USG and MRI were the most commonly used diagnostic modalities. Among women of reproductive age, peak incidence occurred between 30 and 40 years, typically presenting with tender inguinal swelling (Table). All patients underwent surgical treatment, while serum CA-125 was largely unreported. Pathology most frequently confirmed right-sided IEM, with inguinal hernia being the most common associated lesion.

Postoperative follow-up was inconsistently reported, though recurrence was limited among those with available data at one year. Overall, these findings align with previous systematic reviews.¹²⁻¹⁴

Pathophysiology, Diagnosis and Treatment of IEM

The development of extrapelvic IEM remains unclear, as retrograde menstruation alone cannot fully explain its etiopathogenesis. Right-sided predominance of IEM may be related to the clockwise circulation of peritoneal fluid, whereas the sigmoid colon may protect the left inguinal canal. Alternative mechanisms include the stem cell theory, proposing that bone marrow-derived mesenchymal stem cells differentiate into endometrial tissue at distant sites;¹⁶ the coelomic metaplasia theory, particularly in congenital or iatrogenic uterine absence such as Mayer-Rokitansky-Küster-Hauser syndrome;¹⁵⁻¹⁷ and the Müllerian remnant theory; suggesting that stem cells within extrapelvic Müllerian remnants may later form endometriotic lesions.¹⁸⁻²⁰

USG, CT, and MRI are valuable diagnostic tools for IEM, with MRI demonstrating a reported diagnostic accuracy of 91-96%. Gaeta et al.¹⁸ described two characteristic MRI patterns: hyperintense cystic lesions on both T1- and T2-weighted images, and lesions with solid components, showing high T1 signal and hypo- or moderate hyperintensity on T2, often with “shading signs.” In the present case, contrast-enhanced T1-weighted axial, coronal, and sagittal images revealed a contrast-enhancing hyperintense lesion in the left inguinal region (**Figure 3**), while T2-weighted axial images showed a mixed hyper- and hypointense lesion (**Figure 2**), consistent with IEM. Although Candiani et al.¹⁵ reported pelvic endometriosis in 91% of IEM cases, our patient had left-sided type 2 round ligament IEM without pelvic involvement. FNA cytology remains controversial due to the risk of endometrial cell implantation, and incidental IEM detection has been reported on whole-body iodine-131 (I-131) scans post-thyroidectomy.¹⁹ Therefore, definitive diagnosis relies on postoperative histopathology.

Surgical excision remains the first-line treatment for IEM, with meticulous technique essential to prevent spillage and minimize recurrence, which may reach 9.1% after incomplete resection. In cases with concomitant pelvic endometriosis, laparoscopic or laparotomic exploration is recommended to detect additional implants. In the present case, as no evidence of pelvic endometriosis was identified during previous cesarean sections, and no findings suggestive of pelvic endometriosis were detected on transvaginal USG and abdominopelvic MRI, a laparotomic approach was preferred over laparoscopy. Hormonal therapy constitutes a second-line option. Although early studies suggested absence of hormonal receptors in IEM,²² recent immunohistochemistry confirms estrogen and progesterone receptor positivity,²³ supporting its role in recurrence prevention. Symptom onset after discontinuation of combined oral contraceptives in our patient indicates prior disease suppression. Hormonal therapy may be considered in patients refusing surgery, as adjuvant post-excision therapy, or preoperatively to reduce lesion size. Dienogest (2 mg/day) has demonstrated efficacy in reducing lesion size, alleviating pain,

and preventing recurrence.^{24,25} Further studies are warranted to define optimal hormonal management strategies in IEM.”

CONCLUSION

PCOS may be associated with IEM even in the absence of pelvic endometriosis, although the number of reported cases remains extremely limited. Larger case series are required to better elucidate this association. Although IEM most commonly occurs in the right inguinal region and is frequently associated with pelvic endometriosis, isolated left-sided involvement without pelvic disease may also occur. MRI is currently the most sensitive modality for the diagnosis of IEM. At present, there is no consensus regarding the pathogenesis of IEM, and the lack of comparative studies precludes definitive recommendations regarding optimal diagnostic strategies, treatment approaches, and clinical outcomes.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

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Author Contributions

Concept: CK; Design: CK; Control: CK, BSA, HE; Resources: CK; Materials: CK; Data Collection and/or Processing: CK; Analysis and/or Interpretation: CK, BSA, HE; Literature Review: CK, BSA, HE; Writing the Article: CK, BSA, HE; Critical Review: CK, BSA, HE.

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Data Availability Statement

The original contributions of the study are included in the article. Further inquiries can be directed to the corresponding authors.

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