

Available online at www.sciencedirect.com

journal homepage: www.elsevier.com/locate/radcr

Case Report

Acute abdomen by red degeneration of a parasitic leiomyoma: A case report and literature review ☆,☆☆

Rika Yoshida^{a,*}, Yuko Makihara, MD^a, Akina Miyamoto, MD^a, Hisatoshi Araki, MD^a, Shinji Ando, MD^a, Takeshi Yoshizako, MD^a, Aki Oride, MD^b, Yasushi Kaji, MD^a

^aDepartment of Radiology, Faculty of Medicine, Shimane University, Izumo, Shimane, Japan

^bDepartment of Obstetrics and Gynecology, Faculty of Medicine, Shimane University, Enya-cho, 89-1, Izumo 693-8501, Shimane, Japan

ARTICLE INFO

Article history:

Received 30 December 2023

Accepted 10 January 2024

Keywords:

Acute abdomen

Computed tomography

Magnetic resonance imaging

Parasitic leiomyoma

Red degeneration

ABSTRACT

A 43-year-old woman, with a history of uterine fibroids and multiple myomectomy, presented with acute lower abdominal pain. Computed tomography revealed multiple tumors, including a high-density mass in the left lower abdomen indicative of a parasitic leiomyoma undergoing red degeneration. This uncommon condition is due to acute occlusion, often caused by peripheral venous thrombosis at the fibroid edge. The diagnosis was corroborated by distinctive findings on magnetic resonance imaging and computed tomography. Notably, high signal intensity on T1-weighted images (T1WI) suggested methemoglobin presence due to hemorrhagic infarction, whereas low signal intensity on T2-weighted images (T2WI) indicated deoxyhemoglobin. Symptom improvement followed treatment with analgesics. This case underscores the significance of considering parasitic myomas in the differential diagnosis of intraperitoneal tumors after myomectomy and proposes that vascular torsion from mechanical stress on the mobile mesentery may contribute to red degeneration in such tumors. In this report, we detail the imaging characteristics and clinical progression of red degeneration in a parasitic leiomyoma, emphasizing the importance of this diagnosis in patients with a history of uterine surgery.

© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

☆ Acknowledgments: We thank Enago (www.enago.com) for the English language review.

☆☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence work reported in this paper.

* Corresponding author.

E-mail addresses: yoshidar@med.shimane-u.ac.jp (R. Yoshida), makiharay@med.shimane-u.ac.jp (Y. Makihara), amymt@med.shimane-u.ac.jp (A. Miyamoto), sora225@med.shimane-u.ac.jp (H. Araki), ando@med.shimane-u.ac.jp (S. Ando), yosizako@med.shimane-u.ac.jp (T. Yoshizako), oride@med.shimane-u.ac.jp (A. Oride), ysskaji3@med.shimane-u.ac.jp (Y. Kaji).
<https://doi.org/10.1016/j.radcr.2024.01.031>

1930-0433/© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Uterine fibroids, which are common benign tumors in women, can lead to complications, such as red degeneration, especially during pregnancy, following thromboembolic events, or due to hormonal therapy [1,2]. Parasitic leiomyomas, a rarer manifestation of fibroids, have gained attention for their potential for red degeneration and acute clinical symptoms [3–8]. The widespread adoption of laparoscopic surgery has increased awareness of these entities [3–7]. These leiomyomas often present with nonspecific symptoms, posing a significant diagnostic challenge. In this report, we discuss a case of red degeneration in a parasitic leiomyoma, detailing its imaging characteristics and clinical progression. This underscores the importance of considering this diagnosis in patients with a history of uterine surgery.

Case report

A 43-year-old woman presented to the gynecology department with lower abdominal pain that began the previous day. Currently undergoing infertility treatment, she is receiving hormone therapy with human menopausal gonadotropin and clomiphene citrate. Her medical history includes uterine fibroids, with an open myomectomy 3 years ago to remove 18 fibroids, excision of a leiomyoma in the left inguinal area 8 years ago, a laparoscopic myomectomy 10 years ago, and surgery for a pedunculated fibroid 15 years ago. Details

are limited as these procedures were performed at various institutions.

On physical examination, tenderness was noted in the lower left abdomen, with a palpable hard mass in the corresponding area. Laboratory blood biochemistry results indicated an elevated white blood cell count ($16.7 \times 10^3/\mu\text{L}$) and C-reactive protein (6.3 mg/dL), but no other abnormal data were observed. Coagulation function was normal.

On the day following the onset, a noncontrast CT was performed (Fig. 1A), revealing multiple tumors within the abdominal cavity and nodules in the abdominal wall in the left inguinal area. The noncontrast CT identified a uniformly high-density tumor (maximum diameter 9 cm, arrowhead) in the left lower abdomen (Fig. 1A, arrowhead). An increase in peritoneal adipose tissue concentration around the tumor was noted (Fig. 1A, small arrows). This tumor in the left lower abdomen exhibited different characteristics from other intraabdominal masses, corresponding to the area of pain, with plain CT suggesting red degeneration of a parasitic myoma.

Four days later, contrast-enhanced CT was conducted to assess infection presence, evaluate other tumors, and determine surgical suitability. Following contrast media injection, the tumor showed no enhancement except for slight capsular enhancement at the margins (Fig. 1B, arrowhead). Besides the poorly enhancing tumor in the left lower abdomen, multiple nodules and tumors observed had a density equivalent to muscle on noncontrast CT, exhibiting gradual enhancement on contrast-enhanced imaging (Fig. 1A-D, arrow). Based on these CT findings, a diagnosis of parasitic leiomyoma with red degeneration was established. The patient was managed

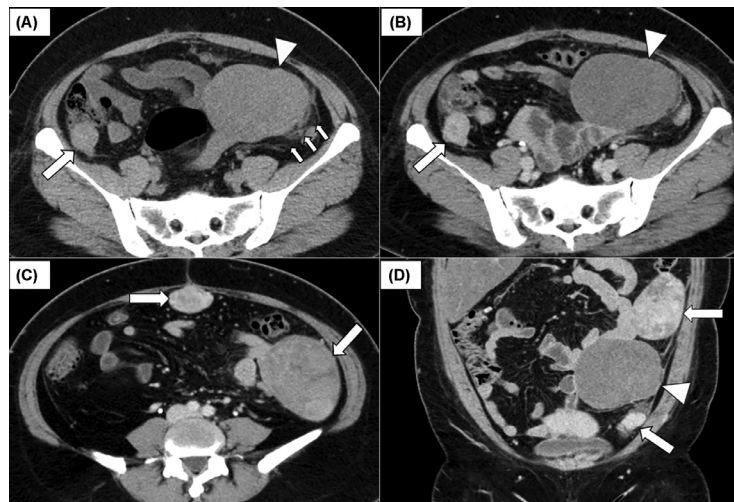


Fig. 1 – Computed tomography. (A) Noncontrast axial CT on the day after the onset of symptoms. (B) Contrast-enhanced axial CT during the equilibrium phase, 4 days after the onset of symptoms. (C) Contrast-enhanced axial CT during the equilibrium phase, 4 days after the onset of symptoms; cranial level from (B). (D) ontrast-enhanced coronal CT during the equilibrium phase, 4 days after the onset of symptoms. Noncontrast CT reveals a tumor (maximum diameter 9 cm, arrowhead) in the left lower abdomen with a relatively uniform high density (A, arrowhead). An increase in intraperitoneal adipose tissue concentration (A, small white arrows) is observed around the tumor. The tumor exhibits no enhancement, except for slight capsular enhancement at the margin (B), on CT after the injection of contrast-enhanced media. In addition to the large, nonenhanced mass in the left lower quadrant (A and B, arrowhead), numerous nodules and masses (B-D, white arrows) with gradually enhanced patterns are confirmed in the abdominal cavity, left inguinal area, and just below the navel (C, white arrow; maximum diameter, 3.7 cm).

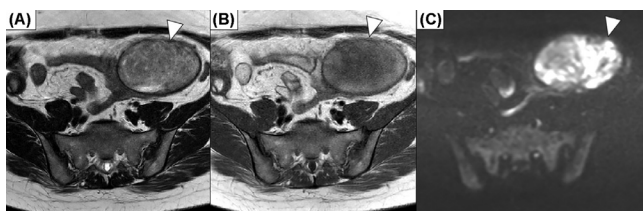


Fig. 2 – Magnetic resonance imaging (MRI) for the evaluation of fibroids in the uterine cavity 26 days after onset. (A) Axial T2-weighted images (T2WI), (B) axial T1-weighted images (T1WI), and (C) diffusion-weighted images (DWI) (b-value, 1000 s/mm²). (A) Axial T2WI revealed a mass (maximum diameter, 9 cm; arrowhead) in the left lower abdomen showing heterogeneous high signal intensity. The mass showed a low signal intensity with peripheral high intensity on axial T1WI (B). On DWI (C), the mass had a high signal intensity with a low ADC map ($0.668 \times 10^{-3} \text{ mm}^2/\text{s}$).

conservatively using analgesics, and her symptoms improved over several days.

Due to symptom improvement, surgery was not performed. Additionally, considering the patient's prior surgical interventions for multiple uterine fibroids and leiomyoma in the left inguinal area, the diagnosis was acute abdomen due to red degeneration of a parasitic leiomyoma. A routine uterine fibroid magnetic resonance imaging evaluation, part of the infertility treatment, was conducted 26 days after the onset of acute abdominal symptoms, partially including scanning of the current parasitic leiomyoma.

Axial T2WI (Fig. 2A) displayed a mass with heterogeneous high signal intensity in the left lower abdomen. The mass showed low signal intensity with peripheral high intensity on axial T1WI (Fig. 2B). Axial diffusion-weighted images revealed high signal intensity (Fig. 2C), with a low ADC value of $0.668 \times 10^{-3} \text{ mm}^2/\text{s}$. Based on these MR findings, a diagnosis of parasitic leiomyoma with red degeneration was established.

Discussion

Red degeneration of uterine fibroids primarily results from hemorrhagic infarction and necrosis, often triggered by acute occlusive events like peripheral venous thrombosis in the fibroid's periphery [1]. It occurs in approximately 8% of fibroids during pregnancy and 3% overall [2]. Associations with factors such as pregnancy, thromboembolic events, oral contraceptives, and hormone therapy have been reported [2].

On noncontrast CT, areas undergoing red degeneration typically exhibit increased attenuation. The opacity of adipose tissue around the mass on plain CT reflects edema and inflammation associated with infarction. In the initial stages, venous infarction may manifest as high signal intensity on T1WI due to methemoglobin formation, highlighting the leiomyoma's margins, and low signal intensity on T2WI associated with deoxyhemoglobin [1,2]. This increased signal intensity on T1WI becomes evident in the subacute phase, several days postin-

farction, while the reduced signal intensity on T2WI is typically observable approximately half a day after the event [1,2]. Over time, the leiomyoma's core increasingly exhibits hyperintensity on T1WI, with variable T2WI findings. Overall, a persistent lack of contrast enhancement was noted throughout the leiomyoma.

Parasitic myomas are fibroids that have detached from the uterus and adhered ectopically, either spontaneously or iatrogenically postoperatively when fibroid tissue relocates in the abdominal cavity. The widespread use of laparoscopic surgery and morcellators has been associated with an increased incidence of parasitic myomas [3,4]. Morcellator-induced parasitic myoma is termed morcelloma [3,4], with risk factors including morcellation (frequency = 0.12%-0.95%), myomectomy (frequency = 0.20%-1.25%), age <40 years, and exposure to sex hormones (eg, hormone replacement therapy) [5,6].

While a few imaging studies have described red degeneration of parasitic myomas, the reported signal patterns reflected hemorrhagic infarction similar to conventional fibroids, showing high signal intensity over time on T1WI [7,8]. In our patient, multiple parasitic myomas were found not only in the abdominal cavity but also in the left inguinal region, with pathologically confirmed diagnoses. Among the numerous tumors, only the one in the lower left abdomen caused acute abdominal symptoms due to red degeneration, although it was not the largest lesion.

While it remains unclear why only this lesion underwent red degeneration without surgical intervention in this case, it is noteworthy that the affected myoma was attached to the mesentery of the sigmoid colon. It exhibited fat stranding and increased density on the mesenteric side, suggesting torsion and poor enhancement of the perfusing veins. The attachment of the parasitic myoma to the highly mobile mesentery of the sigmoid colon could potentially have caused venous torsion and subsequent thrombosis due to mechanical stress.

Conclusion

The parasitic myomas should be considered as a potential differential diagnosis in cases of multiple intraperitoneal tumors following uterine myomectomy. The findings of this study strongly suggest the presence of red degeneration in a parasitic myoma. In addition to the usual mechanisms observed in uterine fibroids, physical factors such as vascular compression or torsion may contribute to the red degeneration of parasitic myomas.

Author contributions

All authors provided substantial contributions to the manuscript and approved the final version of the article to be published.

Patient consent

Informed consent was obtained for the publication of this case report.

REFERENCES

- [1] Nakai G, Yamada T, Hamada T, Atsukawa N, Tanaka Y, Yamamoto K, et al. Pathological findings of uterine tumors preoperatively diagnosed as red degeneration of leiomyoma by MRI. *Abdom Radiol* 2017;42(7):1825–31. doi:10.1007/s00261-017-1126-3.
- [2] Takeuchi M, Matsuzaki K, Bando Y, Harada M. Evaluation of red degeneration of uterine leiomyoma with susceptibility-weighted MR imaging. *Magn Reson Med Sci* 2019;18(2):158–62. doi:10.2463/mrms.mp.2018-0074.
- [3] Huang BS, Yang MH, Wang PH, Li HY, Chou TY, Chen YJ. Oestrogen-induced angiogenesis and implantation contribute to the development of parasitic myomas after laparoscopic morcellation. *Reprod Biol Endocrinol* 2016;14(1):64. doi:10.1186/s12958-016-0200-y.
- [4] Giovanardi G, Oden S, Khalil H, Marpeau L, Seracchioli R, Roman H. Parasitic myomas due to laparoscopic intra-abdominal morcellation. *CRSLS* 2013:239. doi:10.4293/CRSLS.2013.00239.
- [5] Van der Meulen JF, Pijnenborg JMA, Boomsma CM, Verberg MFG, Geomini PMAJ, Bongers MY. Parasitic myoma after laparoscopic morcellation: a systematic review of the literature. *BJOG* 2016;123(1):69–75. doi:10.1111/1471-0528.13541.
- [6] Tan-Kim J, Hartzell KA, Reinsch CS, O'Day CH, Kennedy JS, Menefee SA, et al. Uterine sarcomas and parasitic myomas after laparoscopic hysterectomy with power morcellation. *Am J Obstet Gynecol* 2015;212(5):594.e1–594.e10. doi:10.1016/j.ajog.2014.12.002.
- [7] Araki H, Yoshizako T, Yoshida R, Maruyama M, Ishikawa N, Kitagaki H. MR imaging of parasitic leiomyoma with red degeneration. *Magn Reson Med Sci* 2020;19(2):87–8. doi:10.2463/mrms.ici.2019-0028.
- [8] Ueda H, Togashi K, Konishi I, Kataoka ML, Koyama T, Fujiwara T, et al. Unusual appearances of uterine leiomyomas: MR imaging findings and their histopathologic backgrounds. *Radiographics* 2019;19(suppl_1):S131–45. doi:10.1148/radiographics.19.suppl_1.g99oc04s131.