

CASE REPORT

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Peritoneal carcinoma metastasis to uterine leiomyoma: A case highlighting the role of the pseudocapsule in tumor-to-tumor metastasis

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ABSTRACT

Introduction: Tumor-to-tumor metastasis represents an uncommon pattern of malignant spread, in which a distinct neoplasm disseminates into another tumor. Instances involving uterine leiomyomas have been rarely documented.

Case Report: A 66-year-old nulliparous woman was investigated for a pelvic mass. Magnetic resonance imaging demonstrated a uterine leiomyoma with suspected peritoneal dissemination, while computed tomography revealed nodular lesions in the omentum, right paracolic gutter, and subdiaphragmatic peritoneum, without evidence of extraperitoneal disease. Serum CA-125 levels were mildly elevated. Laparoscopic exploration confirmed peritoneal nodules and disclosed a hemorrhagic uterine mass that was excised. Histopathological examination showed a leiomyoma encompassed by a pseudocapsule containing foci of high-grade serous carcinoma. Immunohistochemical staining demonstrated WT1 positivity, aberrant p53 expression, and strong estrogen receptor reactivity in both uterine and peritoneal components, supporting metastatic high-grade serous carcinoma.

Conclusion: This rare case highlights the potential for peritoneal carcinoma to metastasize to a leiomyoma.

These findings suggest that the pseudocapsule and its vasculature may provide a favorable microenvironment for metastatic implantation, supporting Paget’s “seed and soil” hypothesis.

Keywords: High-grade serous carcinoma, Pseudocapsule, Tumor-to-tumor metastasis, Uterine leiomyoma

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INTRODUCTION

Tumor-to-tumor metastasis (TTM) is a rare phenomenon in which a histologically distinct malignant neoplasm (donor tumor) metastasizes to another benign or malignant neoplasm (recipient tumor). Since its first description, only 19 cases of uterine leiomyomas harboring metastatic lesions have been documented in the literature, with breast carcinomas and gastrointestinal adenocarcinomas comprising most of the reported donor tumors [1].

Primary peritoneal high-grade serous carcinoma (HGSC) is an aggressive malignancy characterized by extensive peritoneal dissemination; however, metastasis to a uterine leiomyoma is exceedingly uncommon. Here, we describe an unusual case of HGSC metastasizing to a uterine leiomyoma, with particular emphasis on

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the pathological interface between the leiomyoma pseudocapsule and metastatic tumor cells, an aspect that may have practical implications for gynecologic surgeons during operative and pathological evaluations.

CASE REPORT

A 66-year-old nulliparous woman was referred to a local hospital for evaluation of a gradually enlarging pelvic mass. Transvaginal ultrasonography suggested a uterine leiomyoma, and follow-up was scheduled for three months later. At that time, the patient developed abdominal distension, and repeat ultrasonography revealed further enlargement of the uterine mass. Pelvic contrast-enhanced magnetic resonance imaging (MRI) demonstrated multiple uterine leiomyomas and findings suspicious for peritoneal dissemination. The patient was referred to our institution for further evaluation and management.

Magnetic resonance imaging revealed a well-demarcated lesion measuring approximately 21 × 16 mm in the uterine fundus, showing mixed low and high signal intensity on T2-weighted imaging, no abnormally high signal on diffusion-weighted imaging (DWI), and peripheral predominant enhancement on dynamic imaging. Additional well-circumscribed round lesions, measuring 36 × 31 mm on the right uterine wall and 47 × 22 mm posteriorly, were observed. Both demonstrated low signal intensity on T2-weighted imaging and no abnormal signal on DWI, findings consistent with leiomyomas. In contrast, a lesion in the pouch of Douglas exhibited mildly high signal intensity on T2-weighted

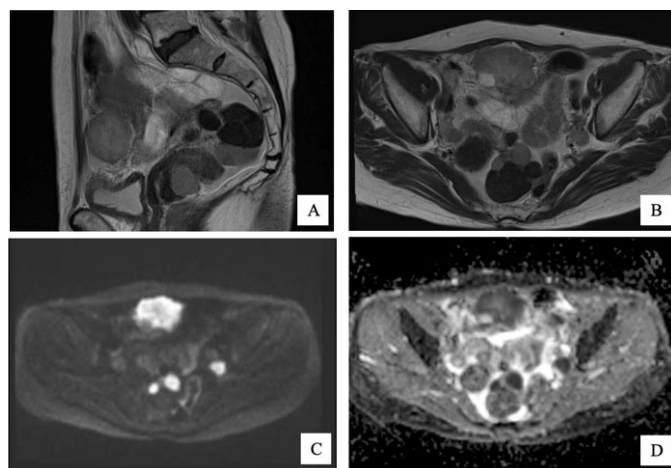


Figure 1: Pelvic magnetic resonance imaging findings. (A) Sagittal T2-weighted image (T2WI) showing a well-circumscribed uterine mass with heterogeneous internal signal intensity. (B) Axial T2-weighted image (T2WI): multiple uterine lesions predominantly showing low signal intensity suggestive of leiomyoma. (C) Axial diffusion-weighted image (DWI, b = 1000 s/mm²): A high-signal area was detected around the uterine leiomyoma, suggesting peritoneal dissemination. (D) Apparent diffusion coefficient (ADC) map: The corresponding area shows low signal intensity, supporting diffusion restriction.

imaging and high signal intensity on DWI, suggesting peritoneal dissemination (Figure 1).

Contrast-enhanced computed tomography (CT) revealed no evidence of extraperitoneal distant metastasis but demonstrated suspected disseminated nodules in the omentum, subdiaphragmatic peritoneum, and right paracolic gutter. The serum CA-125 level was mildly elevated at 95 U/mL.

Based on these findings, peritoneal carcinoma was suspected, and diagnostic laparoscopy was performed. Numerous whitish papillary nodules, consistent with peritoneal dissemination, were observed throughout the parietal peritoneum of the pelvic floor. The ovaries and fallopian tubes appeared grossly normal. The posterior uterine mass was highly hemorrhagic; excision of the uterine mass and biopsy of the peritoneal nodules were performed (Figure 2).

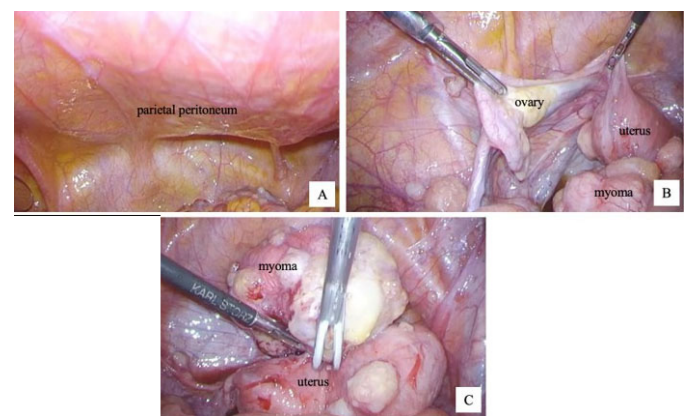


Figure 2: Intra-abdominal findings during surgery. (A) A limited number of whitish nodules were observed on the parietal peritoneum, indicating relatively sparse peritoneal involvement. (B) Disseminated nodules were identified on the uterine fundus, along with a subserosal uterine myoma. (C) The uterine myoma appeared highly friable and prone to bleeding; therefore, resection of the myoma along with biopsy of the peritoneal lesions was performed.

Pathological Findings

Grossly, the resected specimen measured 6 cm in diameter and appeared as a well-circumscribed whitish mass (Figure 3). Multiple yellowish-white nodules were scattered on the serosal surface, accompanied by prominent superficial vasculature.

Microscopically, the lesion consisted of benign intersecting bundles of smooth muscle, consistent with a leiomyoma. At the periphery, nests, papillary clusters, and isolated tumor cells exhibiting marked nuclear pleomorphism and brisk mitotic activity infiltrated the surrounding tissues. Similar carcinoma cell nests were also identified in peritoneal biopsy specimens. Relatively loose stromal areas were noted between the leiomyoma and the carcinoma, with vascular structures along the outer margin forming a pseudocapsule-like architecture.

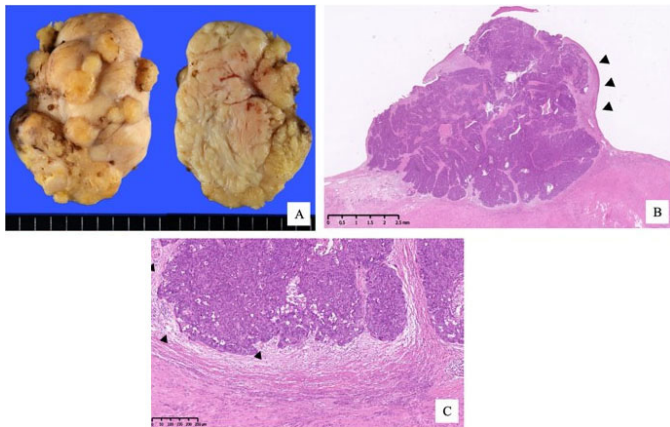


Figure 3: Pathological findings of the resected uterine leiomyoma. (A) Gross findings: Multiple grayish-white solid nodules are observed protruding from the surface of the leiomyoma. On the cut surface, solid lesions of gray-white color are seen extending to the superficial portion of the leiomyoma. (B) Microscopic findings (H&E stain, ×40): Proliferation of tumor cells is observed protruding from the serosal surface of the leiomyoma. The tumor is surrounded by the serosa (▶) that appears continuous with the periphery of the leiomyoma. (C) Microscopic findings (H&E stain, ×100): Tumor cells are also found isolated within the leiomyoma. A pseudocapsule-like structure is observed between the leiomyoma and the tumor, within which vascular structures (▶) are present.

Immunohistochemically, both the uterine and peritoneal tumor components demonstrated diffuse nuclear WT1 positivity, aberrant p53 accumulation, and strong estrogen receptor expression. Taken together,

these findings supported the diagnosis of TTM from HGSC (donor) to uterine leiomyoma (recipient).

DISCUSSION

Tumor-to-tumor metastasis is an exceptionally rare phenomenon in which a distinct malignant tumor (donor) metastasizes to another benign or malignant tumor (recipient). Reports of leiomyomas serving as recipient tumors are extremely uncommon, with only 19 cases reported to date [1].

Pamphlett proposed four diagnostic criteria for TTM: (1) the primary and recipient tumors must be clearly distinct; (2) the metastatic focus must be located within the recipient tumor; (3) direct invasion or collision tumors must be excluded; and (4) hematogenous or lymphatic spread must be plausible [2]. In the present case, carcinoma cell nests were identified within the leiomyoma and were clearly distinguishable histologically from the primary tumor, thus fulfilling most of Pamphlett's criteria. However, due to the close anatomical proximity between the peritoneum and leiomyoma, direct invasion from the primary lesion cannot be completely excluded, making it challenging to definitively differentiate TTM from direct extension.

A review of the literature from the past decade indicates that breast carcinoma and malignant melanoma represent the most frequently documented primary tumors reported to metastasize to uterine leiomyomas (Table 1). Other primary tumors include lung, gastric, colorectal, and renal

Table 1: Reported cases of TTM to uterine leiomyoma: Summary of literature from 2015 to 2025.

Year	Country	Author	Journal	Primary tumor (origin site)
2015	Japan	Kiyokoba R	Case Rep Obstet Gynecol [3]	Gastric adenocarcinoma
2015	Thailand	Chanhasenanont A	J Med Assoc Thai [4]	Malignant melanoma
2017	USA	Rush SK	Gynecol Oncol Rep [5]	Pulmonary adenocarcinoma
2017	Pakistan	Razia S	Oncol Letters [6]	Breast carcinoma
2019	UK	Knox B	BMJ Case Rep [7]	Pulmonary adenocarcinoma
2019	Pakistan	Amidzić J	J Coll Physicians Surg Pak [8]	Malignant melanoma
2020	China	Han C	Human Pathol: Case Rep [9]	Cervical squamous cell carcinoma
2021	Nepal	Karki D	JNMA J Nepal Med Assoc [10]	Colorectal adenocarcinoma
2024	USA	Karamooz S	Int J Surg Pathol [11]	Renal cell carcinoma

carcinomas. These cancers are well recognized for their tendency to spread via hematogenous or lymphatic routes, supporting the concept that leiomyomas may serve as a permissive “soil” for metastasis [12].

The pathogenesis of TTM appears to depend largely on the biological characteristics of the recipient tumor, often referred to as the “soil.” Low proliferative activity, rich vascularization, and stroma abundant in collagen or lipids are considered favorable conditions for metastatic implantation [12]. Consistent with this, meningiomas and renal angiomyolipoma are among the frequently reported

recipient tumors. Uterine leiomyomas, characterized by a vascular network along the outer margin of their pseudocapsules, may similarly provide a suitable niche for tumor cell implantation [13].

In the present case, a pseudocapsule-like structure was observed between the leiomyoma and carcinoma. Pseudocapsules form as leiomyomas enlarge, compressing the surrounding myometrium, and are composed mainly of compressed myometrial fibers [13]. Paget's classic “seed and soil” hypothesis, proposed in 1889, postulates that metastasis occurs through

interaction between circulating tumor cells (the “seed”) and a permissive microenvironment (the “soil”) [14]. This concept aligns with our findings, suggesting that the vascular pseudocapsule provides a favorable soil for the implantation and proliferation of HGSC cells. Furthermore, the slow growth of leiomyomas may have facilitated carcinoma cell expansion within the recipient tumor.

CONCLUSION

This case illustrates a rare phenomenon most consistent with TTM involving a uterine leiomyoma, although direct invasion from a primary peritoneal carcinoma cannot be completely ruled out. In routine ovarian cancer surgery, leiomyomas are not always examined in detail; therefore, similar metastatic events may be under-recognized and potentially more common than currently appreciated. This report highlights the importance of identifying TTM in gynecologic oncology and demonstrates that even benign tumors such as leiomyomas can occasionally harbor metastatic or invasive lesions, underscoring their diagnostic and clinical relevance.

REFERENCES

1. Wong A, Koszyca B, Blumbergs PC, Sandhu N, Halcrow S. Malignant melanoma metastatic to a meningioma. *Pathology* 1999;31(2):162–5.
2. Pamphlett R. Carcinoma metastasis to meningioma. *J Neurol Neurosurg Psychiatry* 1984;47(5):561–3.
3. Kiyokoba R, Yagi H, Yahata H, Kawano Y, Kaneki E, Okugawa K, et al. Tumor-to-tumor metastasis of poorly differentiated gastric carcinoma to uterine lipoleiomyoma. *Case Rep Obstet Gynecol* 2015;2015:352369.
4. Chanthasenanon A, Nantakomom T, Kintarak J, Vithisuvanukul N, Pongrojapaw D, Suwannarurk K. Incidental finding of metastatic cutaneous malignant melanoma at uterine leiomyoma, a Thai university hospital experience: A case report. *J Med Assoc Thai* 2015;98 Suppl 3:S126–31.
5. Rush SK, Toukatly MN, Kilgore MR, Urban RR. Metastases from lung adenocarcinoma within a leiomyoma: A case report. *Gynecol Oncol Rep* 2017;20:27–29.
6. Razia S, Nakayama K, Tsukao M, Nakamura K, Ishikawa M, Ishibashi T, et al. Metastasis of breast cancer to an endometrial polyp, the cervix and a leiomyoma: A case report and review of the literature. *Oncol Lett* 2017;14(4):4585–92.
7. Knox B, Dobrotwir A, Ades A. Isolated uterine metastasis from a lung adenocarcinoma. *BMJ Case Rep* 2019;12(12):e232487.
8. Amidzic J, Solajic N, Levakov AF, Djolai M, Vuckovic N. Tumour-to-tumour metastasis: Cutaneous melanoma metastasizing to leiomyoma uteri. *J Coll Physicians Surg Pak* 2019;29(12):S112–3.
9. Han C, Wang Y, Han H. Occult metastasis of cervical squamous cell carcinoma in subserosal leiomyoma

of uterus: A case report. *Human Pathology: Case Reports* 2020;21:200399.

10. Karki D, Adhikari P, Shrestha D, Kafle A. Tumor to tumor metastasis: A case report. *JNMA J Nepal Med Assoc* 2021;59(234):204–6.
11. Karamooz S, Binsol PD, Asirvatham JR, Pargaonkar A. Metastasis of clear cell renal cell carcinoma to uterine leiomyoma: First case report and review of literature. *Int J Surg Pathol* 2024;32(8):1552–6.
12. Langley RR, Fidler IJ. The seed and soil hypothesis revisited—The role of tumor-stroma interactions in metastasis to different organs. *Int J Cancer* 2011;128(11):2527–35.
13. Awataguchi K. Studies on the angioarchitecture of uterine myoma (author's transl). [Article in Japanese]. *Nihon Ika Daigaku Zasshi* 1982;49(2):225–32.
14. Fidler IJ, Poste G. The “seed and soil” hypothesis revisited. *Lancet Oncol* 2008;9(8):808.

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Author Contributions

Kohei Urago – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Yoshinao Kinjo – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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