Case Reports in Women's Health 45 (2025) e00681

Contents lists available at ScienceDirect

Case Reports in Women's Health

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

Primary retroperitoneal mucinous carcinoma with BRAF, KIT, NF2, and AR mutations: A case report and review of the literature

Sandrine Leponce [a,*], Frédéric Buxant [a], Jean-Christophe Noël [b]

[a] Department of obstetrics and gynaecology, IRIS Hospitals South, 63 rue Jean Paquot, 1050 Brussels, Belgium
[b] Department of pathology, Hôpital Universitaire de Bruxelles, Free University of Brussels, 808 route de Lennik, 1070 Brussels, Belgium

ARTICLE INFO

Keywords:
Case report
Primary retroperitoneal mucinous carcinoma
Anatomopathological findings
Management

ABSTRACT

Primary retroperitoneal mucinous carcinoma is an extremely rare malignancy, posing diagnostic and therapeutic challenges due to its nonspecific clinical presentation and lack of established management guidelines. The present article reports the case of a 39-year-old woman with progressive abdominal bloating and ascites, initially evaluated for a suspected ovarian mass. Imaging studies revealed a large mass with cystic and solid components mimicking an ovarian origin. However, surgical exploration revealed a retroperitoneal mass. Subsequent pathological analysis confirmed the diagnosis of mucinous Mullerian carcinoma. Molecular analysis revealed several mutations, including BRAF (V600E). Surgical resection was successful in treating the mass and the patient was in full remission at two-year follow-up. Despite its rarity, mucinous carcinoma should always be considered in the differential diagnosis of retroperitoneal masses. This case report discusses the anatomopathological features of primary retroperitoneal mucinous carcinoma and highlights the need for further research to elucidate the optimal management strategies and prognostic factors for this rare malignancy.

1. Introduction

Primary retroperitoneal tumors are rare. Malignant tumors are four times more frequent than benign lesions and account for 0.1–0.2 % of all malignant neoplasms [1–4]. Among these malignant primary retroperitoneal tumors, liposarcoma is the most frequent diagnosis, while mucinous carcinoma is an extremely rare diagnosis [1].

This article describes a case of primary retroperitoneal mucinous carcinoma (PRMCa) of Mullerian origin with an atypical BRAF mutation, providing insight into the diagnostic process, pathological characteristics, and management strategies for PRMCa.

2. Case Presentation

A 39-year-old woman presented with progressive abdominal bloating. She had no reproductive or significant medical history except for uncomplicated appendectomy during childhood. Her family medical history was unremarkable, and she denied ever using tobacco. Pelvic examination revealed a large right adnexal mass. Pelvic and abdominal ultrasound showed apparently normal uterus and adnexa, surrounded by ascites. An abdominal CT scan showed the presence of a 30 cm mass with cystic and solid components, likely originating from the right ovary. Serum blood count indicated microcytotic anaemia, while oncological markers cancer antigen125 (CA125) and tumoral antigen CA 15.3 were normal, respectively at 21kU/L (reference range < 35kU/L) and 24 kU/L (reference range < 26 kU/L). A pelvic MRI scan also confirmed the presence of a large mixed-component mass of 30 cm with a 2 mm solid component classified as a "borderline O-RADS 4 epithelial lesion", associated with right ureterohydronephrosis.

Exploratory laparotomy revealed a voluminous retroperitoneal cyst presenting adherences to the peritoneum without any ovarian involvement. Its origin was not identifiable. The encapsulated mass weighed 5960 kg and was successfully removed without spillage of its tumoral contents. No other intra-abdominal pathology was noted. No complications occurred during surgery and postoperative follow-up was uneventful.

Pathological findings confirmed the diagnosis of mucinous Mullerian carcinoma (Fig. 1). The tumor was positive for CK20, CK7, and CDX2, focally positive for PAX8, and negative for both hormonal receptors (ER and PR) and SATB2. Molecular analysis conducted using the Kappa Hyper Prep kit and SeqCap technology identified BRAF (V600E), KIT (G961S), AR (Q80del) and NF2 (N36S) mutations. The BRAF mutation is

* Corresponding author at: 63 rue Jean Paquot, 1050 Brussels, Belgium.
E-mail addresses: sandrine.leponce@ulb.be (S. Leponce), fbuxant@his-izz.be (F. Buxant), jean-christophe.noel@hubruxelles.be (J.-C. Noël).

https://doi.org/10.1016/j.crwh.2025.e00681
Received 13 November 2024; Received in revised form 3 January 2025; Accepted 6 January 2025
Available online 8 January 2025

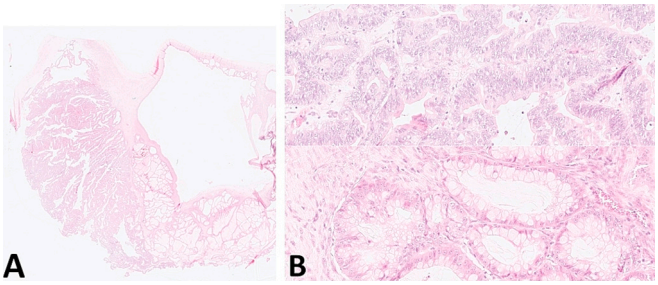

Fig. 1. Mucinous carcinoma-pathological features. At low-power view (A), note the absence of intervening stroma between glands. At high-power view (B), the glands are irregular, with mucinous cytoplasm.

known to be pathogenic, whereas the significance of the KIT, AR, and NF2 mutations is unknown. No BRCA1 or BRCA2 mutation was found.

Given the lack of management recommendations in the literature, the multidisciplinary oncology team opted for a vigilant surveillance strategy involving imaging (MRI and PET scan) and clinical examinations every six months. At two-year follow-up, there had been no recurrence. The patient does not wish to conceive and has opted for condom use as a preventive approach.

3. Discussion

3.1. Description and Epidemiology

Primary retroperitoneal tumors account for 0.1–0.2 % of all malignant tumors [2–4]. Retroperitoneal mucinous carcinomas present histological similarities to ovarian mucinous tumors but can arise at any location in the retroperitoneum without any relationship to the ovary [5]. Most cases occur in women, with a female-to-male ratio of 10:1 [2,3,5] and a median age of 42 years [2].

In 2017, Wolf et al. [2] reviewed 144 cases of primary retroperitoneal mucinous tumors and discovered that mucinous carcinoma was the most frequent primary retroperitoneal carcinoma, with more than 70 cases described in the literature [4,6]. Cases of benign and malignant retroperitoneal mucinous tumors have also been reported during pregnancy [7,8].

3.2. Immunohistochemistry

PRMCa share similar immunohistochemical features with ovarian mucinous carcinomas. Indeed, they are often positive for CK20, CDX2, or CK7 and more rarely focally positive for PAX8 and SATB2 [5,9–12]. Hormonal receptors are typically negative in ovarian mucinous carcinomas [13].

Table 1 compares immunohistochemical patterns of various PRMCa reported in the literature.

Table 1
Immunohistochemical pattern of various PRMCa.

	Current case (2025)	Azeem et al. (2022) [14]	Geetha et al. (2023) [12]
ER and PR	–	NA	NA
CK7, CK20	+	+	+
CDX2	+	–	+
SATB2	–	–	focally +
PAX8	focally +	NA	focally +

Abbreviations: ER, oestrogen receptor; PR, progesterone receptor; NA, not available.

3.3. Molecular Findings

Table 2 compares the molecular pattern of the present case with the molecular pattern of a PRMCa described by Tenti et al. in 1994 as well as the typical molecular pattern of ovarian mucinous carcinoma. Ovarian mucinous carcinomas typically present KRAS and TP53 mutations [14].

Interestingly, no KRAS mutation was found in the present case despite its presence in most ovarian mucinous carcinomas, whereas a BRAF mutation was identified. The BRAF V600E mutation occurs in approximately 8 % of all human cancers, with the highest prevalence observed in cutaneous melanoma, papillary thyroid cancer, and serous ovarian cancer. It is found in 15–20 % of sporadic colorectal cancers, 9 % of mucinous appendiceal adenocarcinomas, and has been described in both mucinous borderline tumors and invasive ovarian carcinomas, but with a frequency of only 0–9 % in mucinous ovarian carcinomas [14,16–18].

Mucinous tumors presenting this mutation are considered to have a relatively good prognosis, as was the case for the patient in the present study, who had not experienced any recurrence or complication at two-year follow-up.

3.4. Management

Symptoms include bloating, abdominal pain, palpable abdominal mass, and compressive syndrome [4–6,15].

Imaging studies help localize and characterize the mass, but the definitive diagnosis can be made only during surgery and following histological analysis [2,4,6].

Serum tumor markers (CA125, CA19–9, CEA, CA15–3, AFP) have not been shown to be helpful in the diagnosis or follow-up, although CEA levels can be raised in the aspiration fluid [5,6,12]. Despite this, some teams prefer to continue to use them for follow-up when they are initially elevated [12,15].

There are currently no clear guidelines for the optimal management of these types of tumors. Surgery is the cornerstone of treatment, aiming to entirely remove the tumor [4,6,15]. No evidence supports the advantage of additional total hysterectomy with bilateral salpingo-oophorectomy [6,12,15].

There is no staging classification for PRMCa. The use of adjuvant chemotherapy has been described, although mucinous carcinomas are known to be relatively chemoresistant [4,6,9]. The meta-analysis conducted by Myriokefalitaki et al., which reviewed 78 cases of PRMCa between 1950 and 2015, found no survival benefit with adjuvant chemotherapy. It therefore seems to be unnecessary when the tumor has been entirely resected without spillage of tumor cells [4,15].

The 5-year overall survival for PRMCa is approximately 70 % [1,4]. Recurrence rates range from 40 % to 55 % [1,6]. Metastases have also been described. The distant recurrence sites include the brain, liver, peritoneum, bones, and abdominal wall [2,12]. Based on their observations, Myriokefalitaki et al. recommend regular follow-up with imaging studies during the first 2 years following diagnosis [6]. At two-year follow-up, the patient in the present report did not show any sign of recurrence on imaging studies or during clinical examination.

Table 2
Molecular pattern of various mucinous carcinomas.

	Mucinous ovarian carcinoma [14]	PRMCa (current case, 2025)	PRMCa (Tenti et al., 1994) [10]
KRAS mutation	40–76 %	–	+
TP53 mutation	52–75 %	+	NA
BRAF mutation	0–9 %	+	NA

Abbreviation: NA, not available; PRMCa, primary retroperitoneal mucinous carcinoma.

4. Conclusion

Primary retroperitoneal mucinous carcinoma remains a rare condition, representing a diagnostic and management challenge. Further research and observation are crucial to unravel the complexities surrounding these tumors, understand their pathophysiology and guide effective management.

Contributors

Sandrine Leponce contributed to conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

Frédéric Buxant contributed to patient care, conception of the case report, acquiring and interpreting the data and revising the article critically for important intellectual content.

Jean-Christophe Noël contributed to patient care, conception of the case report, acquiring and interpreting the data and revising the article critically for important intellectual.

All authors approved the final submitted manuscript.

Funding

No funding from an external source supported the publication of this case report.

Patient consent

Informed consent was obtained from the patient for publication of this case report and the accompanying histopathology images.

Provenance and peer review

This article was not commissioned and was peer reviewed.

Acknowledgments

Grammar and syntax were kindly reviewed by Dr. Ingrid Tuzi (Department of Orthopaedic Surgery, Hôpital Universitaire de Bruxelles). After that process, the authors reviewed and edited the content as needed, taking full responsibility for the content of the publication.

Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

References

[1] M. Salehipour, A. Haghpanah, A. Dehghani, J. Roozbeh, A. Amirian, N. Moein Vaziri, et al., Retroperitoneal mass, a rare manifestation of mucinous adenocarcinoma of appendix: a case report, Clin. Case Reports 10 (11) (nov 2022) e6602, https://doi.org/10.1002/ccr3.6602.

[2] B. Wolf, C. Kunert, L.C. Horn, J. Einenkel, Management of primary retroperitoneal mucinous tumors: a retrospective meta-analysis, Int. J. Gynecol. Cancer 27 (6) (juill 2017) 1064–1071, https://doi.org/10.1097/igc.0000000000001013.

[3] F. Tahmasebi, M. Morje, H. Jamall, A. Polson, N. Deo, Primary retroperitoneal mucinous Tumours diagnosed in pregnancy: a case report and literature review, Int. J. Women's Health 11 (2019) 649–653, https://doi.org/10.2147/ijwh.s176219.

[4] I. Otsuka, Primary retroperitoneal carcinomas: new insights into pathogenesis and clinical management in comparison with ovarian carcinomas and carcinoma of unknown primary, Cancers (Basel) 15 (18) (18 sept 2023) 4614, https://doi.org/10.3390/cancers15184614.

[5] S.Y. Lee, W.C. Han, Primary retroperitoneal mucinous cystadenoma, Ann. Coloproctol. 32 (1) (févr 2016) 33–37, https://doi.org/10.3393/ac.2016.32.1.33.

[6] E. Myriokefalitaki, I. Luqman, N. Potdar, L. Brown, W. Steward, E.L. Moss, Primary retroperitoneal mucinous cystadenocarcinoma (PRMCa): a systematic review of the literature and meta-analysis, Arch. Gynecol. Obstet. 293 (4) (avr. 2016) 709–720, https://doi.org/10.1007/s00404-015-3975-8.

[7] K. Kashima, T. Yahata, K. Fujita, K. Tanaka, Primary retroperitoneal mucinous cystadenocarcinoma associated with pregnancy, Int. J. Gynecol. Cancer 18 (5) (2008) 908–912, https://doi.org/10.1111/j.1525-1438.2007.01130.x.

[8] C.H. Chen, L.H. Chiu, J.Y. Lin, W.M. Liu, Pelvic retroperitoneal cyst during pregnancy, Taiwan J. Obstet. Gynecol. 52 (1) (mars 2013) 117–119, https://doi.org/10.1016/j.tjog.2012.07.041.

[9] A. Jain, M.V. Seiden, Rare epithelial tumors arising in or near the ovary: a review of the risk factors, presentation, and future treatment direction for ovarian clear cell and mucinous carcinoma, Am. Soc. Clin. Oncol. Educ. Book (2013), https://doi.org/10.14694/edbook_am.2013.33.e200.

[10] P. Tenti, S. Romagnoli, N.S. Pellegata, R. Zappatore, P. Giunta, G.N. Ranzani, et al., Primary retroperitoneal mucinous cystoadenocarcinomas: an immunohistochemical and molecular study, Virchows Arch. 424 (1) (1994) 53–57, https://doi.org/10.1007/bf00197393.

[11] S. Strickland, J.K. Wasserman, A. Giassi, B. Djordjevic, C. Parra-Herran, Immunohistochemistry in the diagnosis of mucinous neoplasms involving the ovary: the added value of SATB2 and biomarker discovery through protein expression database mining, Int. J. Gynecol. Pathol. 35 (3) (2016 May) 191–208, https://doi.org/10.1097/pgp.0000000000000238 (PMID: 26535987).

[12] S.D. Geetha, L. Kavoussi, R. Thomas, D. Savant, Primary Retroperitoneal Mucinous Cystadenocarcinoma: A Case Report, Cureus 15 (6) (juin 2023) e39983, https://doi.org/10.7759/cureus.39983.

[13] R. Vang, A.M. Gown, T.S. Barry, D.T. Wheeler, B.M. Ronnett, Immunohistochemistry for estrogen and progesterone receptors in the distinction of primary and metastatic mucinous tumors in the ovary: an analysis of 124 cases, Mod. Pathol. 19 (1) (2006 Jan) 97–105, https://doi.org/10.1038/modpathol.3800510 (PMID: 16294196).

[14] W. Kawecka, M. Bielak, K. Urbanska, Molecular alterations in mucinous ovarian tumors – a review, Curr. Issues Pharm. Med. Sci. 37 (3) (2024 Sep) 190–194, https://doi.org/10.2478/cipms-2024-0031.

[15] S. Azeem, T.M. Yablonsky, A. Kerestes, N. Tchabo, Retroperitoneal primary adenocarcinoma of Mullerian origin: case report with radiology review, Radiol. Case Rep. 17 (10) (oct 2022) 3810–3815, https://doi.org/10.1016/j.radcr.2022.07.041.

[16] R.R. Mikaeel, J.P. Young, G. Tapia Rico, P.J. Hewett, J.E. Hardingham, W. Uylaki, M. Horsnell, T.J. Price, Immunohistochemistry features and molecular pathology of appendiceal neoplasms, Crit. Rev. Clin. Lab. Sci. 58 (6) (2021 Sep) 369–384, https://doi.org/10.1080/10408363.2021.1881756. Epub 2021 Feb 11. PMID: 33569997.

[17] M.P. Campos, M. Cohen, E. Von Euw, V. Velculescu, J.L. Kujak, D. Conklin, D. Hallberg, D.J. Slamon, J. Elvin, G.E. Konecny, BRAF mutations occur infrequently in ovarian cancer but suggest responsiveness to BRAF and MEK inhibition, JCO Precis. Oncol. 2 (2018), https://doi.org/10.1200/po.18.00025. PO.18.00025. Epub 2018 Jun 14. PMID: 31799491; PMCID: PMC6886743.

[18] K. Ohnishi, K. Nakayama, M. Ishikawa, T. Ishibashi, H. Yamashita, K. Nakamura, T. Minamoto, K. Iida, S. Razia, N. Ishikawa, S. Kyo, Mucinous borderline ovarian tumors with BRAFV600E mutation may have low risk for progression to invasive carcinomas, Arch. Gynecol. Obstet. 302 (2) (2020 Aug) 487–495, https://doi.org/10.1007/s00404-020-05638-8 (Epub 2020 Jun 16. PMID: 32556513; PMCID: PMC7321901).