Case report

Malignant Female Adnexal Tumor of Probable Wolffian Origin (FATWO): A case report and review for the literature

Risha Sinha a, Bethany Bustamante a, Farnaz Tahmasebi b, Gary L. Goldberg a,∗

a Division of Gynecologic Oncology, Department of Obstetrics and Gynecology, Zucker School of Medicine at Hofstra/Northwell, Northwell Health, 270-05 76th Avenue, Suite C-221, New Hyde Park, NY 11040, United States

b Department of Pathology, Northwell Health, 6 Ohio Drive, Suite 202, Lake Success, NY 11042, United States

ARTICLE INFO

Keywords:
Female adnexal tumor of probable Wolffian origin
Adnexal mass
Para-tubal
Mesonephric
c-Kit

1. Introduction

Female adnexal tumor of probable Wolffian origin (FATWO) is a rare epithelial neoplasm first identified by Novak et al. in 1954 and further described by Kariminejad and Scully in 1973 (Kariminejad and Scully, 1973). FATWO is typically found as a para-tubal mass within the broad ligament and is thought to arise from mesonephric (Wolffian) remnants (Kariminejad and Scully, 1973; Fleming et al., 2017; Shalaby and Shehnoy, 2020). The majority of cases are considered benign, however, late tumor recurrences, metastases and disease related death have been documented (Fleming et al., 2017; Heatley, 2009). A review of the literature previously reported that 11% were recurrent (Heatley, 2009). We present a case of recurrent FATWO and a review of malignant FATWO cases.

2. Case

A 28-year-old multiparous woman presented to the emergency department (ED) with left lower quadrant (LLQ) pain for one day duration, unrelieved by over the counter analgesics. Her last menstrual period was 3 weeks prior to presentation. She had no significant medical history; surgical and social history revealed a prior cholecystectomy, current smoking, and Nexplanon use for contraception. Abdominal and pelvic exams were notable for LLQ tenderness to palpation. Transvaginal ultrasound revealed a 3.5 cm left soft tissue mass with cystic components, suggestive of a pedunculated ovarian lesion with possible intermittent torsion.

She was taken to surgery for suspected ovarian torsion. Intraoperative laparoscopic findings revealed a left para-tubal cyst, without evidence of torsion. The para-tubal cyst was dissected off the mesosalpinx and removed from the abdomen in a specimen retrieval pouch through the umbilical port site. She was discharged on the day of surgery without complaints. Final pathology returned female adnexal tumor of probable Wolffian origin (FATWO). Her four-week post-operative visit in the office was unremarkable. Work-up for FATWO with computed tomography (CT) of the chest was performed and unremarkable, CA 125 was 12, and inhibin B was 82.

Her post-operative course was notable for multiple ED visits for abdominal pain. Ultrasound and CT imaging were unremarkable during these evaluations. In an ED visit approximately two months after surgery, the patient presented with a malodorous discharge from her umbilicus and peri-umbilical pain radiating to the LLQ. Imaging studies were unremarkable, WBC was 9.12 K/μL, and vital signs were normal. Exam revealed a purulent drainage from the umbilical port site and cultures grew Proteus mirabilis and Streptococcus agalactiae. She was treated with oral antibiotics with resolution of her symptoms.

∗ Corresponding author at: Department of Obstetrics and Gynecology, Long Island Jewish Medical Center, 270-05 76th Avenue, Suite C-221, New Hyde Park, NY 11040, United States.

E-mail addresses: rsinha3@northwell.edu (R. Sinha), bbustamante@northwell.edu (B. Bustamante), ftahmas@northwell.edu (F. Tahmasebi), ggoldberg2@northwell.edu (G.L. Goldberg).

https://doi.org/10.1016/j.gore.2021.100726
Received 22 December 2020; Received in revised form 28 January 2021; Accepted 31 January 2021
Available online 9 February 2021

2352-5789/© 2021 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Eight months after initial surgery, she presented to the ED with severe peri-umbilical pain radiating to the LLQ. CT of the abdomen (Fig. 1) now showed multiple, ≤9 mm, rounded enhancing lesions in the abdominal wall at the level of the umbilicus, and one 7 mm implant deep to the rectus aponeurosis just below the level of the umbilicus. These findings were concerning for a recurrent neoplasm. Pelvic ultrasound now showed a 3.9 cm simple left ovarian cyst. Physical exam revealed tenderness in the peri-umbilical area and left adnexal and cervical motion tenderness. A superficial 1 cm mass was palpated in the base of the umbilicus just deep to the dermis. She was treated empirically for pelvic inflammatory disease due to physical exam and ultrasound imaging findings. After a short interval, the patient was brought to the operating room for an umbilicectomy and left salpingo-oophorectomy. Frozen pathology showed recurrent FATWO in the umbilicectomy specimen; the remaining specimens were benign.

3. Pathology.

Pathology (Fig. 2) from the para-tubal cystectomy revealed a smooth tan-white fallopian tube cyst measuring 3.0 × 2.5 × 2.0 cm with previously disrupted cyst structure. The tumor was multifocally positive for cytokeratin AE1/AE3 and cytokeratin 7 (CK7). CD117 (c-Kit) was moderately positive in approximately 7% of the tumor cells. Estrogen receptor (ER) stained strongly positive in approximately 75% and moderately positive in approximately 10% of the tumor cells. Progesterone receptor (PR) stained strongly positive in approximately 40% and moderately positive in approximately 10% of the tumor cells. There was negative staining for epithelial membrane antigen (EMA), PAX8, and p40. The specimen was diffusely positive for calretinin, multifocally positive for inhibin and very focally positive for CD10. The tumor had a wild-type pattern of immunostaining for p53. The Ki67 index of the tumor was moderately increased/positive.

Pathology from the recurrence revealed multiple tan-white, firm, and fleshy nodules ranging from 0.9 × 0.8 × 0.8 cm to 1.4 × 1.0 × 0.9 cm in the umbilicectomy specimen. The largest nodule measured 0.7 cm from the epidermal surface. The left fallopian tube and ovary were benign. The morphology of the recurrent sample was almost identical to the initial specimen. Immunohistochemical staining was also similar with Ki67 positive in approximately 10% of tumor cells, c-Kit staining in 5–10% of tumor cells with moderate intensity, ER staining of 80% of tumor cells with strong to moderate intensity, and PR staining of 50% of tumor cells with moderate to weak intensity.

4. Discussion

Less than 100 cases of FATWO have been reported and the majority show benign behavior (Heatley, 2009). However, increasing reports of metastatic and recurrent FATWO support a low malignant potential lesion (Brescia et al., 1985). Based on our literature review (Table 1), upwards of 25% FATWO cases published have recurrence or metastasis, which is significantly higher than the initial report of 11% in 2009 (Heatley, 2009).

FATWO is primarily reported to originate within the broad ligament. Embryologically, under the influence of gonadal hormones, sexual differentiation of the mesonephric (Wolffian) and para-mesonephric (Müllerian) ducts starts at approximately seven weeks gestation. Both ducts become enclosed in peritoneal folds which ultimately become the uterine broad ligaments. The lack of testosterone in the female causes the mesonephric ducts to regress by twelve weeks gestation (Hoffman et al., 2016).

In reviewing malignant FATWO cases (Table 1), age at presentation ranged from 15 to 81. Clinical presentations included abdominal pain, pelvic pain, changes in bowel habits and incidental findings on examination. Initial surgery included exploratory laparotomy, tumor resection with or without hysterectomy, removal of adnexal structures, omentectomy and pelvic and para-aortic lymph node dissection. Operative findings were notable for right laterality being more prevalent than left sided lesions. Tumor size ranged from 2.5 cm to >20 cm in largest dimension. Post-operative adjuvant therapy was typically not recommended. After recurrence and repeat cytoreductive surgery, treatment with standard chemotherapeutic agents, most commonly carboplatin and paclitaxel, or radiotherapy was employed with mixed success. Although many reports suggested positive outcomes with patients being alive at time of publication, several also reported patient death secondary to disease anywhere from four months to eight years after the initial surgery.

The diagnosis of FATWO is challenged by its various morphologies and undefined immunophenotype. Morphologic, immunohistochemical, and molecular analysis of fifteen FATWO cases revealed three major morphologies: tubular, solid and sieve-like (Bennett et al., 2020). In our case, the tumor showed solid and cribriform growth patterns. These morphologies overlap with other commonly encountered gynecologic

![Fig. 1. Axial (A) and sagittal (B) computed tomography (CT) imaging showing nodules (arrowheads) concerning for recurrence of FATWO.](image-url)
Immunohistochemical staining showed diffusely positive Calretinin (A) and CK7 (B) in the tumor cells. ER (C) stains roughly 80% of the tumor cells with moderate to strong intensity. KI-67 (D) proliferation index is low and is positive in approximately 10% of the tumor cells. Low-power microscopy of the tumor (E) shows a well-circumscribed partially cystic lesion. F and G represent medium power views of the cribriform architecture/growth (F) and solid growth (G) patterns. H and I show high power views of both architectural components of the tumor (cribriform, H and solid component, I) significant for cuboidal cells with scant cytoplasm and uniform round to ovoid nuclei with mostly low to focally low to intermediate nuclear atypia. Tumor cells showed low proliferative activity manifested with low mitotic activity that was counted as less than two in ten high power fields.
### Table 1
Cases in the English literature of malignant FATWO.

| Case      | Age | Presentation | Initial surgery | Origin, w/wo metastasis | Tumor size in greatest dimension, cm | Positive IHC | Adjuvant therapy | Recurrence site | RFS/PFS, mo | Recurrence/Progression treatment | Status                  |
|-----------|-----|--------------|-----------------|--------------------------|--------------------------------------|--------------|-----------------|----------------|-------------|-----------------------------------|-------------------------|
| Taxy, 1976 | 41  | Dysfunctional uterine bleeding | Hysterectomy | Right broad ligament | 8.5 | Noncontributory | EBRT | Hepatomegaly | 55 | Tissue/tumor biopsy | Alive at time of publication |
| Abbot, 1981 | 18 | Acute abdominal condition | Laparotomy, right adnexal cystectomy and removal of portion of right fallopian tube | Right mesosalpinx | 8.5 | Alcian blue, faint PAS, Reticulin | / | Right adnexa, serosal surfaces of peritoneal cavity & peritoneum, mesentery, serosa of bowel & hemidiaphragm | 78 | BSO, omentectomy, tumor resection (incomplete); Cyclophosphamide, Doxorubicin, Cisplatin; partial response | DOD, By s/p initial surgery |
| Hughesdon, 1982 | 79 | Urinary retention, constipation | Removal of bilateral adnexa | Left ovary | 14 | Alcian blue, PAS | / | Pouch of Douglas | 14 | None | DOD, 14 m s/p initial surgery |
| Brescia, 1985 | 23 | Right lower quadrant pain | Retroperitoneum in pararectal space | Laparotomy, tumor incision/drainage, biopsy > Complete tumor resection, partial cystectomy, vaginectomy, PLND | 13 | PAS, Reticulin | / | 1st: lower pole of surgical incision, omentum, bowel serosa, deep rectal space | 1st: 21 | 1st: surgical resection of recurrent tumor, EBRT | Alive at time of publication |
| Prasad, 1992 | 47 | Tenesmus | TAH-BSO, PLND, partial omentectomy, appendectomy | Right ovary/posterior broad ligament, + peritoneal spread | 12 | PAS, Reticulin, Cytoxan, EMA | 8 cycles Cisplatin-Cytoxan | N/A | N/A | N/A | Alive at time of publication |
| Daya, 1993 | 20 | Right lower quadrant pain | Resection of paravaginal tumor, in fragments | Right lateral vaginal wall | 12 | PAS, Reticulin | / | 1st: Site of previous surgery | 1st: 24 | 1st: biopsy, transposition of ovaries > RT, Cisplatin | Alive at time of publication |
| Daya, 1994 | 81 | Abdominal distension, weight loss | TAH-BSO, omentectomy, appendectomy | Right broad ligament, + omental spread | 20 | Reticulin | N/A | 2nd: paravaginal areas | 2nd: 12 | 2nd: LOA, resection of tumor | Died of other causes, 3 m postop |
| Sheyn, 2000 | 60 | Abdominal mass | TAH, BSO, omentectomy, LAR with primary reanastomosis, appendectomy | Right mesosalpinx, + peritoneal spread | 11 | CAM 5.2, Vimentin, Type IV collagen | 8 cycles Cisplatin-Cytoxan | Surface of liver | 61 | Surgical resection of liver surface mass | Not reported |
| Ramirez, 2002 | 38 | Lower abdominal pain, enlarging abdominal mass | Constipation | Pelvis, + peritoneal spread | 17 | PR | NR | Right anterior abdominal wall (including subcutaneous tissue), liver parenchyma, left upper quadrant, spleen, pelvis | 4 | Carboplatin/Paclitaxel, IM Leuprolide, progressive | Alive time of publication |
| 71 | Incidental pelvic mass on exam | Exploratory laparotomy, optimal tumor reductive surgery (LOA, excision of pelvic mass, BSO, omentectomy, excision of perihepatic masses, appendectomy), optimal debulking | Pelvis | 16 | Calretinin, Cytokeratin, Moc31, CK5/6, ER, PR | NR | Peritoneal implant, liver margin | 10 | Unsuitable for biopsy, monitor with CT imaging | Alive at time of publication |
| Atallah, 2004 | 27 | Incidental left adnexal mass on pelvic examination | Resection of left adnexal mass | Left broad ligament | 11 | PAS, Reticulin | NR | Peritoneal implants | 27 | TAH, BSO, omentectomy, PPALND; Cisplatin/Cyclophosphamide > | DOD, 2y after temporary survival |

(continued on next page)
Table 1 (continued)

| Case          | Age | Presentation                  | Initial surgery                                      | Origin, w/wo metastasis                                      | Tumor size in greatest dimension, cm | Positive IHC                                                                 | Adjuvant therapy                                      | Recurrence site                                    | RFS/PPS, mo | Recurrence/Progression treatment                                                                 | Status               |
|---------------|-----|-------------------------------|------------------------------------------------------|-----------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Steed, 2004   | 15  | Abdominal pain                | Exploratory laparotomy, resection of mass, removal of enlarged PALN [uterus and ovaries preserved for future fertility] | Retroperitoneum, paravaginal, broad ligament              | 14.2                                | Cytokeratin 7 and 19, CAM 5.2, Vimentin, EMA                                    | broad ligament, uterosacral ligaments, abdominal wall | less than 24 | progressive, Paclitaxel/Cisplatin for disease stabilization; > diffuse metastasis Surgical resection of tumor; Cisplatin/ Cyclophosphamide -> progressive, Amifostine, Etoposide, Ifosfamide, Carboplatin, Ibritin; refused RT -> laparotomy, optimal debulking [uterus and ovaries preserved for future fertility], + c-kit Epothilone B -> progressive, Gleevac -> radical hysterectomy, upper vaginectomy, large and small bowel resections, optimal debulking -> Gleevac | Alive at time of publication |
| Halushka, 2004| 34  | Right sided pelvic pain       | Exploratory laparotomy                                | Right fallopian tube                                      | 5.8                                 | AE1/AE3, CAM 5.2, Calretinin, Inhibin                                        | Number recurrences not reported                  | Inguinal mass | 24 from initial surgery                                              | Alive at time of publication |
| Sivridis, 2005| 76  | Abdominal pain, urinary retention | Debulking procedures x2, complete hysterectomy, ‘standard’ chemotherapy Fine needle aspiration | Right broad ligament, + peritoneal spread                | 20                                  | PAS, Pankeratin, Vimentin, S-100 protein, NSE                                  | N/A                                              | N/A                                           |                          | DOD, 4 m s/p initial surgery                                                             |                      |
| Tamiolakis, 2007 | 75  | Ascites, urinary retention     | TAH, BSO                                             | Right broad ligament                                      | 4.7                                 | AE1/AE3, CAM 5.2, Calretinin, Inhibin                                         | 6 cycles Cisplatin-Cytosarx                         | Left broad ligament | 24 | Debulking and chemotherapy; TAH, BSO, omentectomy, PPALND; Oral Medroxyprogesterone acetate | Alive at time of publication |
| Lesin, 2009 | 60  | Lower abdominal pain           | Debulking procedures x2, complete hysterectomy         | Right broad ligament                                      | 8                                   | Not performed                                                                  | Vaginal cuff                                      | 72                                           |                            | Alive at time of publication                                                              |                      |
| Syriac, 2011 | 38  | Right adnexal mass            | Exploratory laparotomy                                | Right broad ligament                                      | 12                                  | AE1/AE3, CK7, WT1, Calretinin, Inhibin                                       | Left ovary                                        | 36                                           | Hysterectomy, BSO, omentectomy, PPALND; + C-kit -> Gleevac | /                                                                  |                      |
| Heller, 2011 | 24  | Pelvic pain                   | Exploratory laparotomy, resection of tumor            | Left broad ligament                                       | 4                                   | Calretinin, Vimentin, CK7, Inhibin                                           | Appendix, small bowel obstruction and hydronephrosis | 1.5                                          |                            | Lost to follow-up                                                              | /                                                                  |                      |
| Liu, 2011    | 24  | Pelvic pain                   | Exploratory laparotomy, resection of left broad ligament tumor, left distal fallopian tube, omentum and peritoneal biopsies | Left broad ligament                                      | Not reported                        | ER, Calretinin, Cytokeratin, Vimentin, Inhibin                                | Serosa of appendix                                | 1                                            |                            | Exploratory surgery, resection of left adnexal lesion | /                                                                  |                      |
| Deshimaru, 2014 | 30  | Right ovarian mass on pelvic examination and transvaginal ultrasound | Exploratory laparotomy, RSO, tumorectomy             | Right fallopian tube, + peritoneal spread                | 5                                   | Calretinin, Inhibin, CD10, Vimentin, Desmin, CD34                            | 1 cycle Paclitaxel-Carboplatin; 3 cycles Carboplatin | Progression, tumor implants on bowel serosal surface, omentum, left ovary, pouch of Douglas (4) | 3 | Vaginal tumor resection, transvaginal tumorectomy; pegylated liposomal doxorubicin, irinotecan, ganciclibine | /                                                                  |                      |

(continued on next page)
| Case         | Age | Presentation                                      | Origin, w/wo metastasis | Tumor size in greatest dimension, cm | Positive IHC                                   | Adjuvant therapy | Recurrence site                                      | RFS/PFS, mo | Recurrence/Progression treatment | Status                  |
|--------------|-----|--------------------------------------------------|--------------------------|--------------------------------------|-----------------------------------------------|------------------|-----------------------------------------------------|-------------|-----------------------------------|-------------------------|
| Deen, 2007   | 81  | Post-menopausal bleeding, pelvic mass on imaging | Right ovary              | 18                                   | Vimentin, Calretinin, alpha-inhibin, chromogranin A, CD56, MIB1 |                  | Right adnexa, paravaginal area                       | 7           | RT offered however patient declined     | Not reported            |
| Kwon, 2016   | 52  | Pelvic pain                                      | Left ovary hilus         | 8                                    | D2-40, Calretinin, CK, CD10, CD56, Vimentin, CK7, mucicarmine |                  | Right sided cul-de-sac Progression, cul-de-sac, hepatic tip | 9           | Paclitaxel/Carboplatin               | Lost to follow-up       |
| Qiu, 2017    | 53  | Abdominal distention                             | Left mesosalpinx         | 10                                   | Inhibin A, Calretinin, ER, PR, CD99, PAX2, cytokeratin | NR               | Multiple nodules in abdominal and pelvic cavity     | 24          | Laparotomy, resection of pelvic masses and partial resection of omentum, Cisplatin (IP), Docetaxel (IV), Oxaliplatin (IP), progressive | Alive at time of publication |
| Wakayama,    | 37  | Lower abdominal pain                             | Left tubal fimbriae, posterior leaf of broad ligament | 7                                    | CK7, Vimentin, Inhibin, Calretinin | NR               | Peritoneal implants                                | 17          | TAH, RSO, extirpation of disseminated tumors, incomplete debulking, + C-kit, progressive, Gleevec, progressive, incomplete debulking, Paclitaxel/Carboplatin | Alive at time of publication |
| Hong, 2018   | 50  | Lower abdominal pain, constipation, increased urinary urgency | Exploratory laparotomy, TAH, BSO, mass resection, omentectomy, PPALND | 17                                   | ER, PR, CK7, EMA, CD10 | NR               | N/A                                                 | N/A         | N/A                               | Alive at time of publication |
| Present case | 28  | Left lower quadrant pain Library left paratubal cystectomy | Left mesosalpinx         | 3                                    | AE1/AE3, CK7, CD10, Calretinin, Inhibin, ER, PR, C-kit | NR               | Seeding vs recurrence at umbilical port site        | 8           | Umbilectomy, LSO; recommended treatment with Gleevec | Alive at time of publication |

BSO = bilateral salpingo-oophorectomy; BO = bilateral oophorectomy; cm = centimeters; d = day; DOD = died of disease; EMA = epithelial membrane antigen; EBRT = external beam radiation therapy; ER = estrogen receptor; IHC = immunohistochemistry; IP = intraperitoneal; LAR = low anterior resection; LDA = lysis of adhesions; LSO = left salpingo-oophorectomy; m = month; MRI = magnetic resonance imaging; N/A = not applicable; NR = not recommended; PALN = para-aortic lymph node; PAS = periodic acid Schiff; PFS = progression free survival; PLND = pelvic lymph node dissection; PPALND = pelvic and para-aortic lymph node dissection; PR = progesterone receptor; RFS = recurrence free survival; RSO = right salpingo-oophorectomy; RT = radiation therapy; s/p = status post; TAH = total abdominal hysterectomy; y = year; / = not reported; + = positive or present.
neoplasms such as endometrioid carcinoma and sex cord stromal tumors (e.g., Sertoli-Leydig cell tumors, granulosa cell tumors) (Shalaby and Shenoy, 2020; Bennett et al., 2020).

Although there is no single specific immunohistochemical stain for FATWO and patterns are not entirely reproducible between FATWO specimens, immunohistochemistry can help narrow the differential diagnosis. Endometrioid carcinoma typically has diffuse staining of EMA, PAX8, CK7, ER and vimentin. In Wolffian tumors, EMA and PAX8 are typically negative, as was in our case (Bennett et al., 2020). Distinguishing FATWO from sex cord stromal tumors provides a pathological challenge. Overlapping stains include calretinin, inhibin, and CD10 (Hoffman et al., 2016). However, sex-cord stromal tumors are typically diffusely positive for inhibin, whereas FATWO may have focal staining, as was in our case. Additional stains include CK7 and pan-cytokeratin (AE1/3), for which FATWO is reportedly immunoreactive, again seen in our case. CK7 is not seen and AE1/3 is rarely seen (33–37%) in granulosa cell tumors. Variable expression of ER, PR, and c-Kit is reported in FATWO (Shalaby and Shenoy, 2020). Moderate to strong staining of ER, PR, and c-Kit were seen in both the original para-tubal and recurrence specimens for our patient.

Very little information regarding the optimal management of FATWO is known. Surgical management is the primary approach to treatment. Treatment for recurrence with standard chemotherapy and other hormonal approaches, targeted therapy, or radiation therapy have been published with relatively short progression free and overall survival. Reports of targeted therapy with Imatinib mesylate (Gleevac) in the setting of c-Kit positivity first suggested by Steed et al. in 2004 has again seen in our case. CK7 is not seen and AE1/3 is rarely seen (33–37%) in granulosa cell tumors. Variable expression of ER, PR, and c-Kit is reported in FATWO (Shalaby and Shenoy, 2020). Moderate to strong staining of ER, PR, and c-Kit were seen in both the original para-tubal and recurrence specimens for our patient.

It remains unclear whether our case is one of true recurrence or surgical port site seeding during extraction of the specimen. However, there was no reported gross spillage of tissue or fluid at the initial surgery and a specimen retrieval pouch was used. Tumor dissemination and wound seeding, as elaborated in C.G. (Thomas, 1961) article in the Annals of Surgery, can be “enhanced” during specimen extraction and “direct dissemination of surface tumors (Thomas, 1961).” We are additionally intrigued by her multiple post-operative ED presentations. Although imaging at earlier post-operative visits were negative for abdominal pathology and cultures grew bacteria known to inoculate the genitourinary and intestinal tracts, the possibility of an inflammatory element from seeded FATWO is presented.

The ideal management of FATWO remains elusive due to its rarity and variation in invasive potential and multiple clinical presentations.

4.1. Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review on request.

CRediT authorship contribution statement

Risha Sinha: Conceptualization, Data curation. Bethany Bustamante: Conceptualization, Data curation. Farnaz Tahmasebi: Supervision, Conceptualization.

Declaration of Competing Interest

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

Acknowledgements

Robert Saslow MD at Memorial Sloan Kettering Cancer Center for final pathology consult.

Author contributions

R Sinha made contributions to conceptualization, data curation, drafting and revising the manuscript. B Bustamante made contributions to conceptualization, data curation, drafting and revising the manuscript. F Tahmasebi made contributions to pathology analysis and drafting the manuscript. GL Goldberg made contributions to supervision, conceptualization, drafting and revising the report.

References

Bennett, J.A., Ritterhouse, L.L., Furtado, L.V., et al., 2020. Female adnexal tumors of probable Wolffian origin: morphological, immunohistochemical, and molecular analysis of 15 cases. Med. Pathol. 33 (4), 734–747.
Brescica, R.I., de Almeida, P.C.C., Fuller, A.F.,Dickersin, G.R., Robboy, S.J., 1985. Female adnexal tumor of probable Wolffian origin with multiple recurrences over 16 years. Cancer 56 (6), 1456-1461.
Fleming, G.F., Seldman, J.D., Yemelyanova, A., Lengyel, E., 2017. Epithelial ovarian cancer. In: Chi, D.S., Berchuck, A., Dizon, D.S., Yashar, C.M., (Eds.), Principles and Practice of Gynecologic Oncology, 7th ed., pp. 667.
Harada, O., Ota, H., Takagi, K., Matsuura, H., Hidaka, E., Nakayama, J., 2006. Female adnexal tumor of probable wolffian origin: morphological, immunohistochemical, and ultrastructural study with c-kit gene analysis. Pathol. Int. 56 (2), 95-100.
Heatley, M.K., 2009. Is female adnexal tumour of probable wolffian origin a benign lesion? A systematic review of the English literature. Pathology 41 (7), 645-648.
Hoffman, B., Schorge, J.O., Bradshaw, K.D., Halvorson, L.M., Schaffer, J.I., 1985. Female adnexal tumor of probable Wolffian origin: morphological, immunohistochemical, and molecular analysis of 15 cases. Med. Pathol. 33 (4), 734–747.
Kariminejad, M.H., Scully, R.E., 1973. Female adnexal tumor of probably Wolffian origin: a distinctive pathologic entity. Cancer 31 (3), 671–677.
Shalaby, A., Shenoy, V., 2020. Female adnexal tumor of probable Wolffian origin: a distinct clinicopathologic case report and possible new treatment. Int. J. Gynecol. Cancer 14, 546–550.
Thomas, C.G.J., 1961. Tumor cell contamination of the surgical wound: experimental and clinical observations. Ann. Surg. 153 (5), 697–705.