Ovarian Fibrosarcoma: 5 Case Reports and Review of Literature

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Research

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Abstract

Ovarian fibrosarcoma is an extremely rare and malignant sex-cord stromal tumor. Due to its low incidence and poor prognosis, till now very few cases have been reported and most of them are sporadic. The treatments and prognostic factors of ovarian fibrosarcoma are still under discussion. Here we report 5 cases of ovarian fibrosarcoma in Peking Union Medical College Hospital during the past 20 years. The 5 patients were 41, 51, 54, 76, 76 years old with initial symptoms of pelvic mass or pain. Manifestations on ultrasound are usually as unilateral pelvic masses, within which are uneven echo enhancement and some blood flow signals. There was no significant increase in preoperative tumor markers such as serum CA125 and sex hormones. Final diagnosis depends on postoperative histopathological results since these tumors were easily misdiagnosed by intraoperative frozen sections. Pathological examinations showed the tumor cells were spindle shaped with moderate to severe atypia and high mitotic counts. Immunohistochemistry is not specific but the positive rate of Ki-67 was consistent with the degree of malignancy and prognosis of the tumor. In addition, Vimentin, α-inhibin, SMA, estrogen receptor and progesterone receptor could also be positive. There were significant differences in surgical methods and there is also no unified chemotherapy. The overall survival was >15, >7, >6, <1, <1 year for each patient. After reviewing the literature, there is a lack of evidence-based large-scale case study. As for treatments, complete cytoreductive surgery plus regimens of malignant cord stromal tumors in NCCN guidelines are recommended. Due to its low incidence, multi-center clinical studies and molecular studies are required to give gynecologists a better understanding and guidance for future managements of ovarian fibrosarcoma.

Introduction

Ovarian fibrosarcoma is a considerably rare neoplasm, accounting for less than 1% of ovarian malignancies [1]. According to previous reports, it may originate from the stromal cells around the sex cord of ovarian follicles and the fibrous components of the ovarian phylum, or from the malignant transformation of a benign ovarian fibroma [2]. Ovarian fibrosarcoma occur at any age although most of them appear in menopausal and postmenopausal women, associated with an extremely poor prognosis. There have been some reports in the literature regarding ovarian fibrosarcoma, which were usually with a 2-year overall survival rate of about 55.9 percent [3]. The diagnosis is mainly based on pathological examination, and immunohistochemistry helps to confirm the diagnosis. Due to its extremely low incidence, very few cases have been reported and most of them are sporadic. Here we present 5 cases of ovarian fibrosarcoma in Peking Union Medical College Hospital (PUMCH) during the past 20 years, the gathering of which is useful for future diagnosis and treatments.

Case Reports

Case 1

A 57-year-old woman was admitted to our clinic with abdominal mass for 2 weeks and without abdominal pain or distension. She had been post-menopausal for 3 years and had no vaginal bleeding after menopause. Vaginal and abdominal examinations confirmed the presence of a cystic mass, with a diameter of 6–7 cm and without pressing pain. Vaginal ultrasonography demonstrated: a 9.6*8.2*5.2 cm in diameter, thickly capsulated, liquid and irregular mass in the left ovarian region; there were several septa inside the cyst, with medium strong echo bulges on the septa and largest size was 1.8*1.1 cm; Slight blood flow signal can be seen on the septum; liquid area with the maximum depth of 4.6 cm can be seen in the pelvic cavity Before surgery, serum tumor markers were within normal limits.

During the laparotomy, an 8*10 cm in diameter, irregular, multilocular, cystic mass was found in the right ovarian region, and no metastatic lesions were found. Total abdominal hysterectomy (TAH) plus bilateral adnexectomy was performed. The pathologic diagnosis of the mass was a well-differentiated sarcoma of the right ovary (fibrostromal sarcoma or

fibrosarcoma). Immunohistochemical results were Vimentin (+), SMA (+), PR (±), ER (-), CD10 (-), Caldeson (-), Melan (-), α-inhibin (-).

The tumor was labelled as Federation International Gynecology Obstetrics(FIGO) stage I C. The patient was given 2 cycles of systemic chemotherapy using Cisplatin + Vincristine + Bleomycin (PVB) at 3-weekly intervals. After the chemotherapy, the patient was under regular follow-up and no recurrence was seen in 15 years after the operation.

Case 2

A 41-year-old female was admitted with abdominal mass for 2 months. There were no additional complaints such as abdominal pain or distension. She had normal menstruation and no abnormal vaginal bleeding. Upon abdominopelvic examination, a 5*6 cm in diameter, firm, unmovable mass without tenderness was detected posterior left of uterus. Vaginal ultrasonography revealed a heterogeneous, left ovarian mass with clear boundary and a diameter of 6.1*5.5*4.6 cm. There were no signs of metastasis, lymph node enlargement or ascites. No obvious blood flow signal was detected. Serum tumor markers were within normal limits except slightly elevated carcinoma antigen 125 (40.4 U/mL). By magnetic resonance imaging (MRI), a 48*62*60 mm in diameter, heterogeneous mass closely related to uterus was detected posterior left of uterus, and the possibility of subserosal fibroids was considered, with exception of adnexal tumors.

When performing a laparoscopic exploration, we found a 7*6 cm in diameter, solid mass with clear boundary originated from the left ovary without any peritoneal dissemination. The right ovary appeared full and the uterus normal. Ovarian cystectomy, sampling of right ovary and intraperitoneal washing were performed during surgery. After cutting open the mass, solid granular materials were present. Intraoperative pathological diagnosis was left ovarian follicular fibroma. However, a week later the final pathologic diagnosis turned to be fibrosarcoma of the left ovary and the mitotic counts were evaluated > 10 times 10 high-power fields (HPFs). Immunohistochemical study showed AE1/AE3 (-), Calretinin (-), Ki-67 (index 5%), p53 (-), α-inhibin (-). After surgery, the serum level of CA125 was 27.1 U/ml.

This case was diagnosed as FIGO stage I A. The patient refused to receive chemotherapy and remained disease-free with normal ovarian functions in 7 years of follow-up.

Case 3

A 76-year-old woman was admitted with abdominal pain and fever. She had been post-menopausal for 28 years without any vaginal bleeding after menopause. Fourteen years ago, the patient received an exploratory laparotomy due to acute abdomen, in the other hospital. During the operation, 2800 ml intraabdominal blood clots and non-clotting blood were sucked out, and a 3*3*2 cm in diameter, cauliflower-like tumor was seen around the left tubal umbrella with active bleeding. Complete hysterectomy plus bilateral salpingo-oophorectomy and omentectomy was performed. Postoperative pathological report showed: diffuse granular follicular cell tumor of left ovary with invasion of the left fallopian tube. The clinical FIGO stage was II C. After surgery, she received 3 cycles of systemic chemotherapy with Cisplatin + Cyclophosphamide (PC). Then the patient never came back for following up.

Four years later (10 years ago), the patient received the second exploratory laparotomy in another hospital due to abdominal pain and pelvic mass. During the operation, a 3 cm in diameter, solid-cystic mass was observed between the sigmoid colon and the left bladder bottom. In addition, a 1 cm in diameter nodule at the left bladder bottom and a 0.5 cm in diameter nodule on the surface of sigmoid colon was seen. The tumor lesions were completely removed. Postoperative pathological result reported granulosa cell tumor. After surgery, she received 1 cycles of chemotherapy with Taxol + Carboplatin. But after that the patient lost follow-up.

This time she was admitted with abdominal pain and fever lasting for 1 day. Ultrasound showed a 10*8.6 cm in diameter, irregular, cystic mass with unclear boundary in the pelvic cavity; the wall is uneven in thickness and the size of cystic part

is about 7.21*6.34 cm. MRI showed a double capsular structure in diameter of 8*9*7 cm was on the left side of the pelvic cavity. The mass was with thick wall and the edge was relatively clear, closely related to the right bowel. The cephalic size of the lesion was about 4*2*3 cm and the signal of the vesicle was slightly low. Vaginal and abdominal examinations confirmed the presence of a hypertonic, cystic mass with a diameter of 16 cm. The preoperative serum level of CA125 was 15.5 U/ml, Estradiol (E2) 25.8 pg/mL, Follicle Stimulating Hormone (FSH) 52.8mIU/mL

We performed exploratory laparotomy and secondary cytoreductive surgery. During the operation, a 10 cm in diameter, solid-cystic, multilocular mass was observed between the sigmoid colon and the left lateral wall of the bladder. After sucking out 600 ml of yellow intracapsular fluid, it was completely removed. Then we performed adhesion decomposition, repair of sigmoid colon, and partial ileotomy anastomosis. The tumor was totally removed. Pathological results were ovarian fibrosarcoma. Immunohistochemical study showed: Melan-A (+), Vimentin (+), AE1/AE3 (+/-), CD99 (-), Calretinin (-), α-inhibin (-), Ki-67 (index10%).

After surgery, she suffered from incomplete intestinal obstruction and received conservative treatment. The patient's condition gradually improved and fully recovered 2 weeks later. As the patient was elderly, she did not receive adjuvant chemotherapy. There were no signs of recurrence or increase of serum E2 level in more than 6 years after the operation.

Case 4

A 76-year-old woman was admitted with abdominal pain and abdominal mass. She had been post-menopausal for 28 years and had no abnormal vaginal bleeding. Ultrasound revealed a heterogeneous, irregular, hypoechoic mass without a clear boundary was at the upper right of the uterus, with a range of 11.4*13.5*8.6 cm. Punctiform blood flow signals could be seen in Color Doppler Flow Imaging (CDFI). MRI showed a large solid-cystic mass in the pelvic cavity, considering the possibility of malignant lesions from accessories, with the exception of mesenchymal tumors. Vaginal and abdominal examinations confirmed the presence of a hypertonic, cystic mass with a diameter of 12–15 cm and without pressing pain. Before surgery, the serum level of CA125 was 593.3 U/ml.

Her medical history included sleep apnea syndrome for more than 10 years and needed supplementary positive pressure ventilation at night

After multi-department consultation, surgical contraindications are eliminated and we performed an exploratory laparotomy. During the operation, bloody ascites about 100–200 ml were observed. A cystic-solid mass with a diameter of about 20 cm were seen below the incision. Cauliflower-like tumors could be seen on the surface of the mass with rich blood supply. The mass was widely adherent to the surrounding small intestine and colon, with cauliflower-like tumor lesions on the surface of bowels. The source of the mass and metastatic tumors was found to be the left accessory, so the left adnexa was removed. Pathological report revealed as malignant tumor with spindle cell, fibrosarcoma. The mitotic counts were evaluated as > 10 times/ 10 HPFs. Immunohistochemical study showed CA125 (-), CD10 (partial+), Desmin (-), Ki-67 (index40%), SMA (+), S-100 (-), Vimentin (+), p53 (-), α-inhibin (-).

Because of her medical complications and elderly age, the patient refused to receive adjuvant chemotherapy. One week later she discharged and went back home. The tumor relapsed 2 months later and she died within 1 year after the first operation.

Case 5

A 54-year-old woman was admitted with fever and abdominal dull pain. She had been post-menopausal for 18 months and had no abnormal vaginal bleeding. Physical examination confirmed the presence of a 10 cm in diameter, cystic mass on the right rear of the uterus, with clear boundaries, poor activity and no tenderness. The serum level of CA125 was 88.8 U/ml and CA199 was 40.4 U/ml. Vaginal ultrasonography showed: a cystic mass full of fine spots was in the right

ovarian area, with clear boundaries, irregular low echo protrusions on the wall and no blood flow signals in CDFI; a solid mass with clear boundaries and a diameter of 7.3*5.9*6.5 cm was below the former cystic mass, and abundant arteriovenous blood flow signals can be seen inside and around the mass.

Her medical history included 30 years of dysmenorrhea and 18 years of endometriosis and adenomyosis.

We performed an exploratory laparotomy. During the operation, small amount of bloody ascites was observed. We saw the size of uterine was about 6 weeks of pregnancy and no obvious abnormity was seen in the left ovarian area. A cystic-solid mass with a diameter of about 10*15 cm were seen in the right ovarian area. After sucking out 600 ml of thin, chocolate-like intracapsular fluid, we observed the mass was densely adherent to the surrounding pelvic peritoneum, with rectal pouch totally closed. The source of the mass was found to be the left accessory, so the left adnexa was completely removed. After cutting open the mass, the contents seemed as pale white, crisp and vortex-free, with chocolate-like liquid inside. Intraoperative rapid pathological report showed: right ovarian spindle cell tumor with large necrosis, considered as a sexostromal tumor, not excluding malignant tumor. After communicating with the patient's family, they asked to wait for the final pathological results before proceeding further surgery. Therefore, total hysterectomy and bilateral adnexectomy were performed.

However, 10 days later the final pathologic diagnosis turned to be fibrosarcoma of the right ovary, with extensive necrosis. The mitotic counts were evaluated > 40 times/ 10 HPFs. Immunohistochemical study showed: CD31 (+), Ki-67 (+ 70%), SMA (+), AE1/AE3 (-), CD34 (-), CD117 (-), ER (-), PR (-), Desmin (-). No tumor cell was found in the peritoneal washes.

After surgery, the serum level of CA125 was 109.0 U/ml and CA19-9 5.6 U/ml. The patient was given 1 cycles of systemic chemotherapy with Cisplatin + Epirubicin + Ifosfamide (PEI). After the 1 course of chemotherapy, the serum level of CA125 was 24.9 U/ml and CA19-9 4.3 U/ml.

Then we performed a second laparoscopic exploration, adhesion decomposition and partial removal of pelvic mass, at 5 weeks after the first surgery and 3 weeks after the chemotherapy. During operation, a hard solid mass of about 5 cm was palpable at the top of the stump, located below the adhesion of bladder and rectum. The surface of the mass was not visible. No obvious tumor lesions were seen at the pelvic peritoneal surfaces and visceral surfaces. Because of the tight adhesion, the separation was extremely difficult, and the mass was without capsule or boundaries. In the end, only 2/3 of the tumor was removed. Cutting open the mass, solid brittle gray materials were present.

Pathological report still revealed as fibrosarcoma. One week after the second surgery, the serum level of CA125 was 35.1 U/ml and she received 1 cycles of chemotherapy with Taxol + Carboplatin (TC). After the 1 course of TC, the serum level of CA125 was 32.9 U/ml. Then the patient stopped chemotherapy since and died within 1 year after surgery.

Discussion

Clinical features

Ovarian sex-cord stromal tumors account for 4.3% of ovarian tumors, of which fibroid tumor is the most common type and usually benign [2]. Ovarian fibroid tumor consists of fibroma, rich cell fibroma and fibrosarcoma. Ovarian fibrosarcoma is very rare and most previous literature were case reports. It may be primary or malignant transformation from fibroma. In case 3, the patient had received two surgeries before the third surgery because of pelvic mass. The first two surgeries all ended up with diagnosis of ovarian granulosa cell tumor while the third pathological result was fibrosarcoma. We are not sure about the accuracy of previous pathological reports and wondering whether the fibrosarcoma was primary or malignant transformation from fibroma. Ovarian fibrosarcoma is common in older women, with a median age of 49 years. Clinically, its manifestations are non-specific and the patients are mostly with pelvic mass or abdominal pain as the first

notable symptoms. The ovarian masses often occur as large solid tumors, ranging widely from 5 to 23 cm in size with an average of 11.5 cm [3]. Patients presenting symptoms are usually with advanced stages.

In the above 5 cases, the patients were 41, 51, 54, 76, 76 years old with initial symptoms of pelvic mass or pain. In accordance with previous reports, the manifestations on ultrasound in our cases are usually as unilateral pelvic masses, within which are uneven echo enhancement and larger solid areas. Blood flow signals may be abundant, but no other specific ultrasonic characteristics [4]. Ovarian fibrosarcoma is also lack of specific tumor markers. In review of literature and cases above, there was no significant increase in preoperative tumor markers such as serum CA125 and sex hormones. Therefore, preoperative diagnosis and recurrence monitoring of ovarian fibrosarcoma could mainly depend on imaging examination.

Pathology

Ovarian fibrosarcomas are difficult to diagnose clinically and histologically [5]. Its final diagnosis depends on postoperative histopathological results because preoperative diagnosis is quite difficult. On pathological examinations, the specimens are mostly smooth and lobulated, with gray-white sections, soft texture and fleshy shape. Focal hemorrhage and necrosis are often seen inside the tumor, as well as infiltrative margins that make adhesions with other pelvic organs. Microscopically, the tumor cells were spindle shaped and showed moderate to severe atypia, with large hyperchromatic nuclei and various shapes. The transformation of fibroma and fibrosarcoma could be seen in a few tumors [6].

The malignant potential of ovarian fibrosarcomas are usually assessed based on observed growth patterns, cellular atypia, and mitotic counts. According to previous reports [6, 7], mitotic counts are the most important criteria for the diagnosis of ovarian fibrosarcoma: mitotic counts ≤ 3/10HPFS are benign fibromas, and mitotic counts ≥ 4/10HPFS are fibrosarcomas. However, it has been reported later that patients with high mitotic counts have a good prognosis [8], so mitotic counts should be combined with cell atypia to make final diagnosis. Lin et al. suggested that ovarian fibrous tumors should be classified based on not only mitotic counts but also tumor size, growth speed, and Ki-67 proliferative index [9]. Therefore, for tumors with mitotic counts ≥ 4/10 HPFs but without severe nuclear atypia or other risk factors, mitotically active cellular fibroma should be considered [8, 9]. To avoid excessive treatment, especially in young nulliparous women, complete resection of the ovarian tumor is enough and adjuvant chemotherapy is not necessary [9].

Immunohistochemistry is not specific to ovarian fibrosarcoma, but it could be of some help in the pathological diagnosis. Ki-67 can reflect the proliferative activity of tumor cells, and its positive rate seems to be consistent with the degree of malignancy and prognosis of the tumor. To our attention, the highest positive rate of Ki-67 was 70% in case 5, while the patient suffered from the rapidest tumor progression. Her tumor quickly relapsed at 5 weeks after the first surgery and 3 weeks after the chemotherapy. Particularly, Ki-67 can be used as an indicator especially for cases with mitosis like 3–4/ HPFs, which has become an important indicator for assisting diagnosis in recent years [3, 10]. In addition, Vimentin, α-inhibin, SMA, estrogen receptor (ER) and progesterone receptor (PR) could also be positive [5].

Sometimes, intraoperative freezing pathology may indicate spindle-cell malignant tumors, but no cases confirmed by fast freezing pathology have been reported [10]. Therefore, paraffin pathology and immunohistochemistry are often required for final diagnosis. Because ovarian fibrosarcoma is uncommon and can look like other malignant spindle-cell tumors, the criteria of differentiation are not clear, especially between mitotically active fibromas and fibrosarcoma.

Therefore, ovarian fibrosarcoma is easily misdiagnosed when intraoperative frozen sections are used for pathological examinations, leading to inappropriate therapy. In our cases, intraoperative rapid pathological diagnosis in case 2 indicated follicular fibroma. In case 5, intraoperative frozen section showed spindle cell tumor with large necrosis, considering as a sexostromal tumor, not excluding malignant tumor. Based on our experiences, we suggest that gynecological surgeons take the diagnosis by frozen sections cautiously and wait for the final results from extensive

sampling. Gynecologists should evaluate other parameters intraoperatively to take malignant tumors in consideration, such as capsular disruption, necrosis, or adhesion that warns us the possibility of malignancy.

Treatments

Different from epithelial tumors, currently there have been no widely accepted standard treatments for the management of ovarian fibrosarcoma. In case 1 hysterectomy plus bilateral adnexectomy was performed. The patient was given 2 cycles of systemic chemotherapy using Cisplatin + Vincristine + Bleomycin (PVB) at 3-weekly intervals. No elevated CA125 or recurrence was seen at 8 years after the treatments. For case 2, ovarian cystectomy and sampling of right ovary were performed during surgery without postoperative chemotherapy. A secondary cytoreductive surgery was performed in case 3 and the tumor was totally removed, after which chemotherapy was also refused. In case 4, the left adnexa were removed without chemotherapy after surgery because of her medical complications and elderly age. Particularly, total hysterectomy plus bilateral adnexectomy were performed for the first surgery in case 5. Then we performed a second surgery as partial removal of pelvic mass at 5 weeks after the first surgery and 3 weeks after the chemotherapy with PEI. According to previous studies, early and thorough surgery is preferred, but there were significant differences in surgical methods reported in individual cases, from unilateral adnexectomy to complete cytoreductive surgery (hysterectomy + bilateral adnexectomy + omentectomy + appendectomy + pelvic and/or abdominal lymphadenectomy) [11–13]. During the operation, comprehensive exploration and surgical staging are necessary, and cytoreduction should be performed as complete as possible. For young patients with fertility requirements, whether to perform fertility preservative surgery is rather controversial.

After surgery, adjuvant radiotherapy and chemotherapy should be selected individually. Because of the high degree of malignancy and the high recurrence rate, the prognosis of ovarian fibrosarcoma is very poor. There are a few reports in which adjuvant chemotherapy improved the survival rate in fibrosarcoma and it is recommended that even patients of early stage should also be given c

hemotherapy [3]. But there is no unified standard regimen for ovarian fibrosarcoma. Previous case reports included various combined regimens, such as adriamycin + ifosfamide + Methina + azenimide (MAID), adriamycin + ifosfamide (IA), paclitaxel + cisplatin (TP), cisplatin + vincristine + bleomycin (PVB), and so on [1, 10–12]. It has also been reported that combination of paclitaxel and cisplatin is an effective regimen to improve survival rate after cytoreductive surgery [9, 10]. Therefore, at present, there is no consensus on all kinds of surgical and adjuvant therapies. In our cases, two patients refused to receive chemotherapy due to elder age and medical complications. Younger patients at age forties and fifties were lack of appropriate chemotherapy because of personal choice. The last patient in case 5 gave up on any treatments because her tumor relapsed so fast and we did have no better solutions for that.

Prognosis

Currently, the treatments and prognostic factors of ovarian fibrosarcoma are still under discussion. Although there have been several reported cases with long survival [14, 15], the prognosis of ovarian fibrosarcoma is still generally poor. According to previous reports, the OS of patients is generally less than two years due to resistance to adjuvant chemotherapy regiments and early metastasis via the bloodstream and tumor recurrence [3, 5].

Studies have shown that patients with different FIGO stages, Ki-67 positive rates and treatments may have different survival rates [13]. Compared with 2-year survival rate, patients with stage I (77.1% vs. 36.2%, P = 0.014) and the positive rate of Ki-67 < 10% (100% vs. 27.2%, P = 0.042) are better than others. From our experiences, the positive rate of Ki-67 may be indeed consistent with the degree of malignancy and prognosis of the tumor. The highest positive rate of Ki-67 was

70% in case 5, and the tumor quickly relapsed at 5 weeks after the first surgery and 3 weeks after the chemotherapy. We performed the second surgery as partial removal of pelvic mass. The overall survival is less than 1 year.

In our cases, there were significant differences in surgical methods, from ovarian cystectomy to secondary cytoreductive surgery. In addition, there is also no unified chemotherapy in the above 5 cases, of which two patients even refused to receive chemotherapy due to elder age and medical complications. Younger patients at age forties and fifties were lack of appropriate chemotherapy because of personal choice. The last patient in case 5 gave up on any treatments because her tumor relapsed so fast and chemotherapy is not sensitive. Sadly, we did have no better solutions for that. The overall survival was > 15, >7, > 6, <1, < 1 years for each patient. The first patient had the best postoperative outcomes with very rarely long survival. The reason seems to be that the sarcoma was well-differentiated, early stage (IC) and completely removed, though without enough cycles of chemotherapy.

As for the significance of treatments in prognosis, it has been reported that patients who received complete cytoreductive surgery combined with adjuvant chemotherapy were with better survival than others, such as patients with mere unilateral adnexectomy or surgery plus radiotherapy (100% vs. 27.9%, P = 0.002) [11, 13]. In multivariate analysis, FIGO staging and treatments were independent factors on prognosis, while age, tumor size, mitotic counts and other factors did not show statistical significance [3, 13]. However, different chemotherapy regimens were not for statistical comparison because of the small number of cases. Since the number of reported cases with ovarian fibrosarcoma are so small and the experiences are so limited, it is difficult to enroll enough patients to evaluate the prognostic factors and standard treatments are not established yet. Previous reports all recommended a radical surgery with staging and complete cytoreduction, after which patients could get a better prognosis and longer survival rate, with or without chemotherapy or radiotherapy [13].

Conclusion

Ovarian fibrosarcoma is a rare ovarian malignant tumor with poor prognosis, and the diagnosis should be based on postoperative pathology instead of intraoperative frozen sections. Patients with early stage and low positive rate of Ki-67 have better prognosis than others. At present, there is a lack of evidence-based large-scale case study and we suggested that complete cytoreductive surgery is essential. As for adjuvant therapy, regimens of malignant cord stromal tumors in NCCN guidelines are recommended. Due to the low incidence of ovarian fibrosarcoma, multi-center clinical studies and molecular studies are required to elucidate its clinical features and find new treatments to give patients better prognosis.

Declarations

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Authors’contributions

P-P and TT-S developed the idea for the case reports and performed the data collection and takes full responsibility for the integrity of the data. TT-S drafted the manuscript with inputs and critical discussion from P-P, NH-C and DY-C. The final version has been approved by all authors.

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Availability of data and materials

The dataset supporting the cases of this article is included within the article and its additional table.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Peking Union MedicalCollege Hospital.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1
Clinical characteristics of 5 patients with ovarian fibrosarcoma

NO.	Case 1	Case 2	Case 3	Case 4	Case 5
Age, (year)	57	41	76	76	51
Menopausal status	Yes	No	Yes	Yes	Yes
Gravidity/ Parity	1/1	2/1	4/4	1/1	1/1
Clinical presentations	Mass	Mass	Mass, pain, fever	Mass, pain	Mass, pain, fever
Ultrasound	Thickly capsulated, 9.6*8.2*5.2 cm, irregular, left; septa inside; small amount of blood flow signal; liquid depth 4.6 cm.	Heterogeneous, left, clear boundary, 6.1*5.5*4.6 cm.	Irregular, cystic, 10*8.6 cm, unclear boundary, uneven in thickness.	Heterogeneous, irregular, hypoechoic, unclear boundary, 11.4*13.5*8.6 cm; punctiform blood flow signals; liquid depth 1.6 cm.	Solid, clear boundaries, 7.3*5.9*6.5 cm, abundant arteriovenous blood flow signals.
Size of mass, cm	8*10	7*6	10	20	10*15
Side of mass	Right	Left	Left	Left	Left
CA 125, U/ml (normal range ≤ 35 U/ml)	9.9	40.4	15.5	593.3	88.8
Surgery	TAH + BSO	Ovarian cystectomy + sampling of right ovary.	Secondary cytoreductive surgery	Left adnexectomy	TAH + BSO; Partial removal of pelvic mass
FIGO Stage	IC	IA	-	IIIC	II
Intraoperative pathology	NA	Left ovarian follicular fibroma	NA	NA	Sexostromal tumor, not excluding malignant tumor.
Final pathology	Well-differentiated fibrosarcoma	Fibrosarcoma	Fibrosarcoma	Fibrosarcoma	Fibrosarcoma
Mitotic counts/ HPF	-	> 10	-	> 10	> 40
Ki-67	-	5%	10%	40%	70%
Immunohistochemistry	Vimentin (+), SMA (+), PR (±), ER (-), CD10 (-), Caldeson (-), Melan (-), α-inhibin (-).	AE1/AE3 (-), Calretinin (-), Ki-67 (index 5%), p53 (-), α-inhibin (-).	Melan-A (+), Vimentin (+), AE1/AE3 (+/-), CD99 (-), Calretinin (-), α-inhibin (-), Ki-67 (index10%).	CA125 (-), CD10 (partial+), Desmin (-), Ki-67 (index40%), SMA (+), S-100 (-), Vimentin (+), p53 (-), α-inhibin(-).	CD31(+), Ki-67(+ 70%), SMA(+), AE1/AE3(-), CD34(-), CD117(-), ER(-), PR(-), Desmin(-).
Adjuvant therapy	PVB*2	No	No	No	PEI; TC

Abbreviations: y, year; cm, centimeter; CA-125, cancer antigen 125; FIGO, Federation International Gynecology Obstetrics; PVB, Cisplatin + Vincristine + Bleomycin; PEI, Cisplatin + Epirubicin + Ifosfamide; TC, Taxol + Carboplatin; OS, overall survival.

NO.	Case 1	Case 2	Case 3	Case 4	Case 5
Relapse	No	No	No	Yes	Yes
OS, y	> 15	> 7	> 6	< 1	< 1

Abbreviations: y, year; cm, centimeter; CA-125, cancer antigen 125; FIGO, Federation International Gynecology Obstetrics; PVB, Cisplatin + Vincristine + Bleomycin; PEI, Cisplatin + Epirubicin + Ifosfamide; TC, Taxol + Carboplatin; OS, overall survival.