

Collision Tumor of Ovary: Invasive Serous Papillary Cystadenocarcinoma and Mature Cystic Teratoma

Cengiz Kocak^{1*}, Melike Nalbant²

^{1*}Department of Pathology, Faculty of Medicine, Dumlupinar University, Kutahya, Turkey

²Department of Pathology, Evliya Celebi Education and Research Hospital, Dumlupinar University, Kutahya, Turkey

***Corresponding author**

Cengiz Kocak

Email: dcengizkocak@hotmail.com

Abstract: Collision tumour is defined as coexistence of two distinct tumours in the same organ without any histological intermixing. Collision tumors involving ovaries are extremely rare. In this paper, we present a case of ovarian collision tumor composed of mature cystic teratoma with invasive serous papillary cystadenocarcinoma in a 83-year-old woman who had abdominal pain and abnormal uterine bleeding.

Keywords: Cystadenocarcinoma, malignant, mixed tumor, ovarian neoplasm, serous, teratoma.

INTRODUCTION

Collision tumour is defined as coexistence of two distinct tumours in the same organ without any histological intermixing. Although collision tumors have been reported in various organs including esophagus, stomach, thyroid gland, collision tumors arising from ovaries are extremely rare entities [1, 2]. Coexistence of tumors with different histologic combinations has been reported in the literature for the ovary, such as serous papillary cystadenocarcinoma and granulosa cell tumor, serous adenocarcinoma and steroid cell tumor, and teratoma with granulosa cell tumor [3-5]. However, ovarian collision tumors are most commonly composed of teratoma and cystadenoma or cystadenocarcinoma [6].

In this paper, we present a case of ovarian collision tumor composed of mature cystic teratoma with invasive serous papillary cystadenocarcinoma in a 83-year-old patient who had abdominal pain and abnormal uterine bleeding. Ovarian collision tumors are rare, but even rarer is the combination of mature cystic teratoma and another malignant ovarian tumors, as in our case.

CASE PRESENTATION

A 83-year old multiparous patient presented with complaints of abnormal uterine bleeding and abdominal pain. Patient had gone through menopause 20 years before. On physical exam, a mobile right adnexal mass was felt in abdomen. In laboratory examinations, carcinoembryonic antigen (CEA), cancer antigen 125 (CA 125), and cancer antigen 15-3 (CA 15-3) were above normal ranges. Abdominal ultrasound revealed a cystic calcified tumor in the right adnexal

location with a diameter of about 67 mm. In view of the clinical and radiological findings, prediagnosis of patient was considered as mature cystic teratoma. Patient underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy, and omentectomy.

Macroscopic examination of the adnexal mass revealed a multilobulated tumour mass 7 x 6.5 x 5 cm in size. At the cut surface, the tumor had a and pultaceous content composed of keratin, sebum, and hairs and showed a focal solid area (Figure 1). The first impression tended to mature cystic teratoma based on gross examination, but the histological sections taken from suspicious papillary and solid areas adjacent to the teratoma demonstrated the malignancy.

Hematoxylin and eosin (H&E) staining revealed that the tumor was a typical dermoid cyst composed of skin and appendages as well as connective tissue (Figure 2). Sections from the cystic part showed an epithelial neoplasm disposed in papillae which were lined by unilayered columnar cells having moderate amount of cytoplasm. This focus had an appearance similar to that of serous papillary cystadenocarcinoma elsewhere; solid nests of small, round cells (Figure 3). Numerous psammoma bodies were also noted. Upon immunohistochemical examinations (Roche Ventana Benchmark-Bios, Arizona, USA, and Thermo Fisher Scientific Inc. MI, USA), while the neoplastic cells showed positive immunoreactivity for cytokeratin 7 (CK 7) (Figure 4), negative immunoreactivity was seen for cytokeratin 20 (CK 20) and tumor protein 53 (P53). Considering all these features, the pathological diagnosis was collision tumour having serous papillary cystadenocarcinoma with mature cystic teratoma.

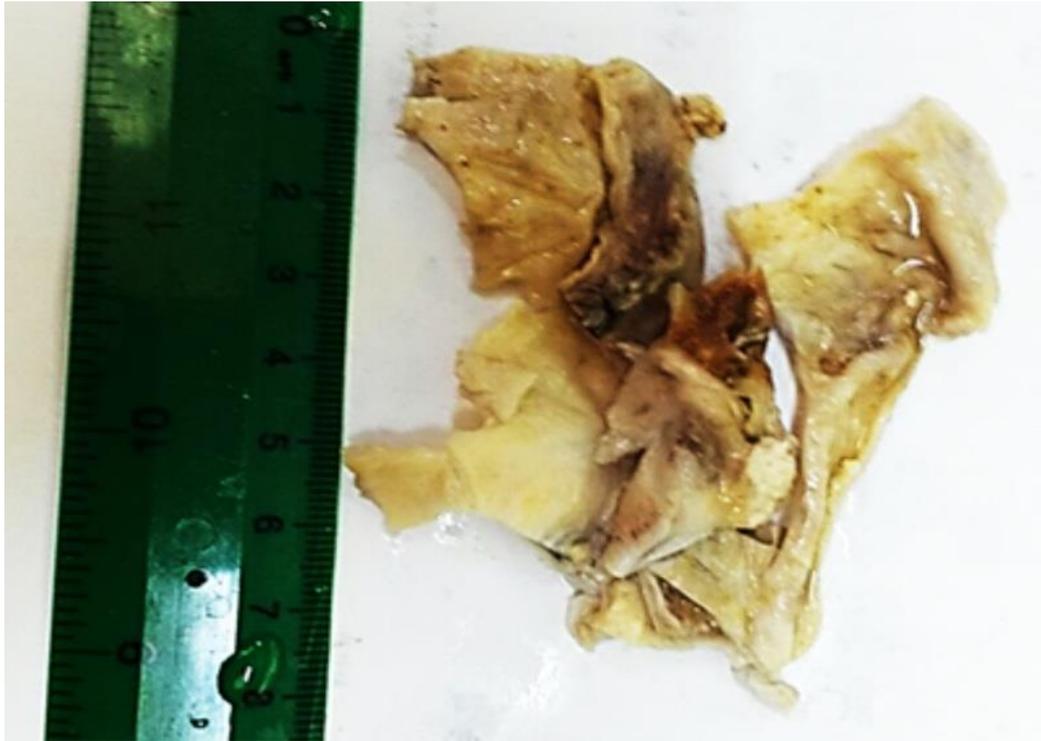


Fig 1: Macroscopy of specimen showing a ovarian cyst with papillary extensions and mature teratomatous components

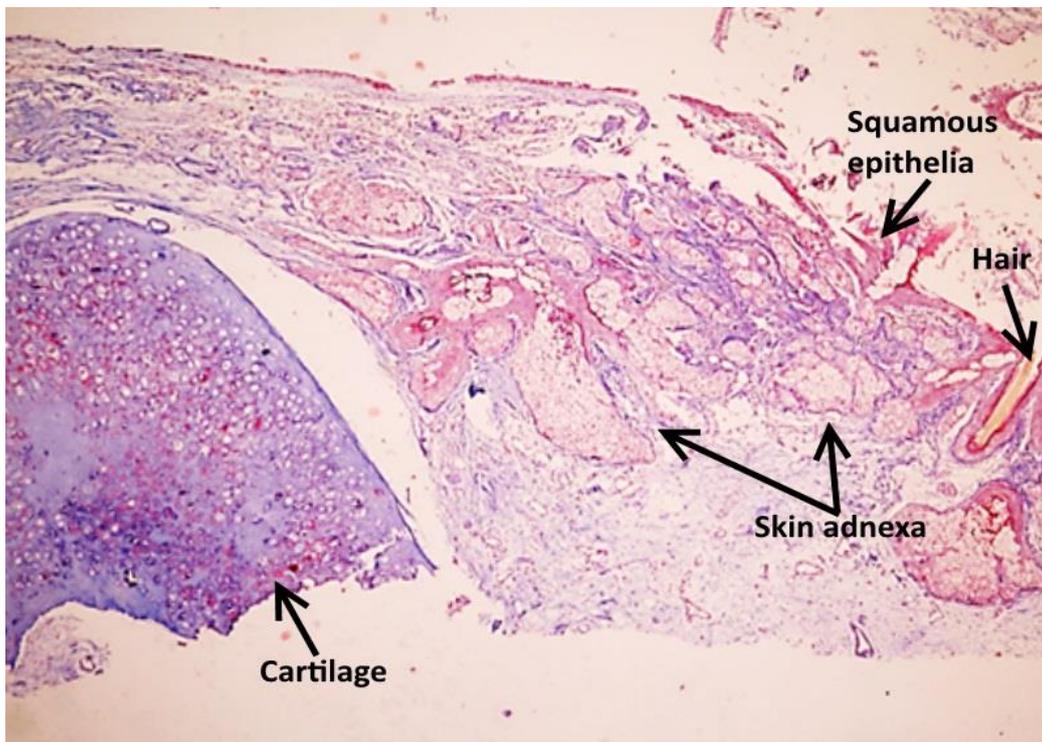


Fig 2: Microphotograph showing teratomatous component consisting of mature cartilage, skin adnexa, hair, and squamous epithelia (Masson Trichrome x 100).

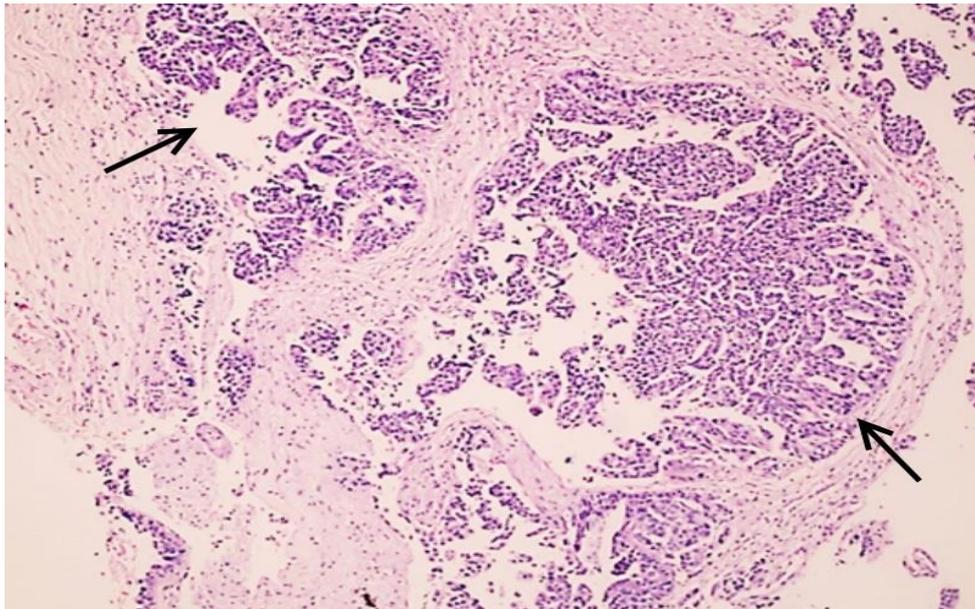


Fig 3: Microphotograph showing serous papillary cystadenocarcinoma components of ovarian cyst (H&E x 100)

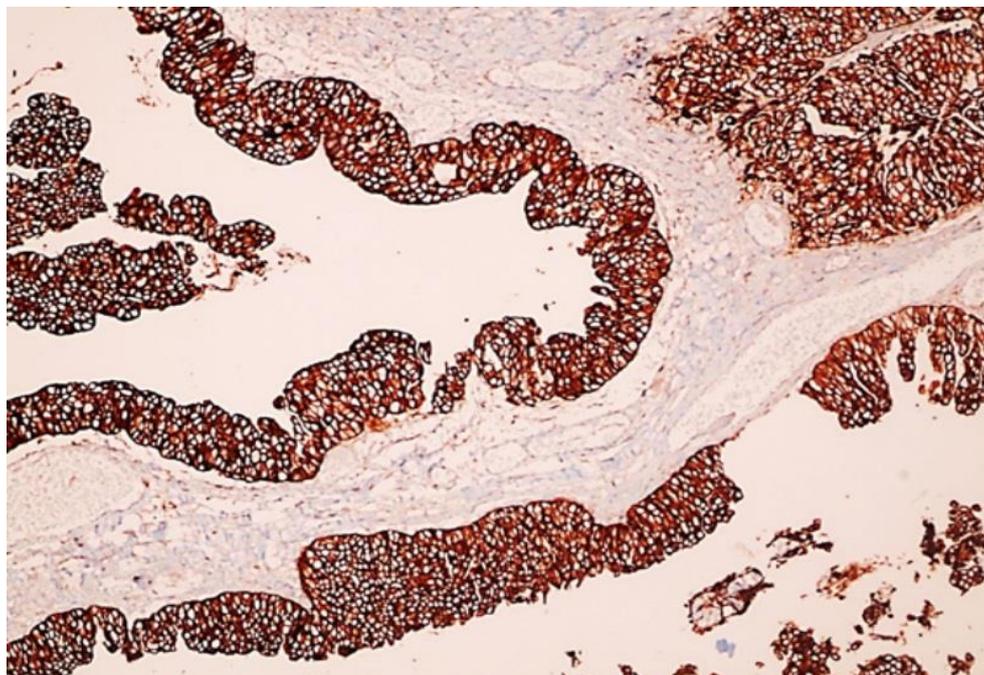


Fig 4: Microphotograph showing positive immunostaining for CK 7 in serous papillary cystadenocarcinoma components of ovarian cyst (CK 7 x 200).

DISCUSSION

Ovarian neoplasms are classified as epithelial, stromal and germ cell neoplasms according to the cell of origin. Mature cystic teratoma, commonly called dermoid cysts, is the most common benign germ cell tumors of the ovary [7]. Mature cystic teratom accounts for about 30-45% of all ovarian neoplasms and 60% of all benign neoplasms [8]. They occur primarily during the reproductive years, but may occur in the postmenopausal period or in childhood. Microscopically, it is composed of variable proportions

of tissue originating from the ectoderm, mesoderm, and endoderm. It may contain skin, hair follicle, sweat gland, sebum, bones, nail, and teeth. Despite the incidence less than 1%, a cystic teratoma can undergo malignant transformation and it occurs most frequently in postmenopausal women, and the prognosis is poor [9]. Mature cystic teratom is usually asymptomatic until they reach considerable size. Ultrasonography is usually diagnostic [10].

Ovarian epithelial tumors constitute about half of all the ovarian tumors and 40% of these constitute benign tumors and 91% of constitute malignant tumors [11]. Ovarian epithelial tumors occur most commonly in sixth and seventh decades of life as in the present case. The risk of the disease is inversely proportional to the number of lifetime ovulations. Approximately 10% of ovarian epithelial tumors are associated with inheritance of an autosomal dominant genetic aberration. Inheritance of a deleterious mutation in one of BRCA genes is associated with a 27% to 44% lifetime risk of ovarian cancer. The mean age of onset of ovarian cancer is significantly earlier in women with a BRCA1 mutation, 45 years, compared with over 60 years of age for those with a BRCA2 mutation [12]. Ovarian epithelial tumors are histologically classified into distinct morphologic categories: serous, mucinous, endometrioid, clear cell, transitional cell (Brenner tumors), mixed, and undifferentiated type. Papillary serous histology accounts for 75% of ovarian epithelial tumors, and its histological pattern simulates the lining of the fallopian tube. High-grade, poorly differentiated tumors are the majority and this histologic variant is often associated with concentric rings of calcification known as “psammoma bodies” [13]. Although pelvic examination, CA 125, and transvaginal ultrasound are currently used screening tests, ultrasound examination is the most useful noninvasive diagnostic test [12]. The level of CA 125 is increased in 80% of patients with ovarian carcinomas [14]. In our case, the levels of her CA 125, CEA as well as CA 15-3 were above normal ranges. Early diagnosis is the important to the successful treatment of ovarian cancer; however, ovarian epithelial tumors are rarely diagnosed at an early stage because the disease usually causes few specific symptoms when it is localized solely to the ovary. When it is diagnosed, 62% of ovarian epithelial tumors spread into the pelvis, upper abdomen, and distant organs. Surgery and subsequent histopathological examination are necessary for the diagnosis, staging, and treatment of ovarian epithelial tumors [15].

While the most common histologic combination of collision tumor of ovary is coexistence of teratoma with mucinous tumors (cystadenomas or cystadenocarcinomas), other histologic combinations are uncommon [16]. Several hypotheses have been suggested as mechanisms for collision tumors. The first hypothesis is coexistence of two primary tumors in the same tissue is due to “chance accidental meeting”. According to the second theory, it has been speculated that the presence of the first tumor alters the microenvironment, give rise to development of the second primary tumor. The third theory suggests that each primary tumor originates from a common stem cell [17]. The possibility of a collision tumor should be considered when an ovarian teratoma has imaging

findings that cannot be explained solely by an ovarian teratoma such as large size, irregular border [18]. The collision tumor can be diagnosed correctly by histopathological examination. However, the presence of an equivocal intermediate transitional zone between the tumors may make it more difficult to differentiate between a collision tumor and a true mixed tumor [16]. In the differential diagnosis of collision tumor, mixed epithelial tumors, mixed germ cell tumors, malignant mixed mesodermal tumor (carcinosarcoma), and teratomas with malignant transformation should be considered. The characteristic microscopic feature in mixed epithelial tumors is an intimate admixture of neoplastic components. Although mixed epithelial tumors closely resemble the collision tumors, the different neoplastic components in collision tumors are histologically distinct and are separated from each other by intact stroma [1,2].

Serous papillary cystadenocarcinoma coexisting with teratoma as in the present case is extremely rare. Rare cases of serous cystadenocarcinoma arising from a mature cystic teratoma have been reported before [19], but in our case, it was a collision tumor with no transitional zone between them. After a thorough search of the English literature, we could find only four references to ovarian collision tumor composed of mature cystic teratoma and serous cystadenocarcinoma [1, 2, 20, 21]. To the best of our knowledge, this is the fifth case presented in the English literature. In 2009, Bige *et al.*; [1] reported a case of a collision tumor composed of serous cystadenocarcinoma and dermoid cyst in the same ovary in a 45-year-old woman. The patient suffered from lower abdominal pain and distension. Preoperative radiologic findings revealed massive ascites, peritoneal carcinomatosis, and a malignant left adnexial mass. The preoperative diagnosis for the left adnexial mass was teratoma with secondary malignant transformation or collision tumor. Patient underwent total abdominal hysterectomy, bilateral salpingo-oophorectomy, bilateral pelvic and paraaortic lymphadenectomy, appendectomy and peritonectomy. Tissue sections taken from two different areas of the tumor revealed invasive serous cystadenocarcinoma and dermoid cyst. The different neoplastic components were histologically distinct and separated from each other by intact narrow stroma without histological signs of admixture as in the our case [1]. In 2014, Singh *et al.*; presented a case series of 4 cases of collision tumours of ovary [2]. Two cases had a combination of mucinous cystadenoma and teratoma whereas third case was a combination of serous papillary cystadenoma with teratoma and the fourth case had a combination of serous papillary cystadenocarcinoma and teratoma. In 2007, Kajo *et al.*; [20] reported a case of a collision tumor composed of invasive serous cystadenocarcinoma and mature cystic teratoma in the right ovary in a 45-year-old woman. The

tumour was considered suspicious for malignancy on ultrasonography. The patient subsequently underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy and partial omentectomy. Macroscopically, on the cut surface, two distinct tumour lesions with completely different gross characteristics could be clearly identified. Microscopically, sections taken from the dominant ovarian tumour displayed invasive serous carcinoma. The second ovarian tumour localized in close proximity to the serous carcinoma was classified as a dermoid cyst without any elements of endodermal origin. An intact layer of fibrous ovarian tissue was present between the two tumours as evidence of their independent growth without histological signs of admixture [20]. In 2015, Bhagat *et al.*; [21] presented a rare case of bilateral serous adenocarcinoma of the ovary with bilateral mature teratoma in a 50-year-old woman. Abdominal sonography revealed bilateral adnexal masses with moderate ascites. Her serum CA125 level was high. Preoperative diagnosis was bilateral ovarian carcinoma and total abdominal hysterectomy and bilateral salpingo-oophorectomy, with omentectomy was performed. Microscopic examination of the right ovary revealed a cyst lined by pseudostratified ciliated columnar lining epithelium along with mucinous glands and cartilage. The adjoining areas showed serous adenocarcinoma in the form of papillae. The left ovary revealed a cyst lined by stratified squamous epithelium and filled with keratin flakes. The adjacent areas showed high grade serous adenocarcinoma [21].

CONCLUSION

In conclusion, to the best of our knowledge this is the fifth reported case of mature cystic teratoma coexisting with invasive serous papillary cystadenocarcinoma in the same ovary. Ovarian collision tumors are rare, but even rarer is the coexistence with other malign ovarian tumors, as in our case. The preoperative suspicion of the existence of such tumors would increase the surveillance of the surgeon during the operation and support the pathologist to perform a careful and detailed examination of the excised mass, so as to avoid misdiagnosis of a second type of tumor. Histopathologist, surgeons, and oncologists to be aware of existence of such rare collision tumours, because it is important to correctly diagnose the component of tumour for subsequent treatment and outcome of the patient.

REFERENCES

1. Bige O, Demir A, Koyuncuoglu M, Secil M, Ulukus C, Saygili U; Collision tumor: serous cystadenocarcinoma and dermoid cyst in the same ovary. *Arch Gynecol Obstet* 2009;279:767-70.
2. Singh AK, Singh M. Collision Tumours of Ovary: A Very Rare Case Series. *J Clin Diagn Res* 2014;8:FD14-6.
3. Ozbey C, Erdogan G, Pestereli HE, Simsek T, Karaveli S. Serous papillary adenocarcinoma and adult granulosa cell tumor in the same ovary. An unusual case. *APMIS* 2005;113:713-5.
4. Nirenberg A, Ostör AG, Quinn MA; Collision tumor: serous adenocarcinoma and steroid cell tumor of the ovary. *Pathology* 1992;24:60-2.
5. Moid FY, Jones RV; Granulosa cell tumor and mucinous cystadenoma arising in a mature cystic teratoma of the ovary: A unique case report and review of literature. *Ann Diagn Pathol* 2004;8:96-101.
6. Papaziogas B, Souparis A, Grigoriou M, Tsiaousis P, Kogia E, Panagiotopoulou K, *et al.*; A Rare Triple Coexistence of a Collision Tumor, a Benign Mature Cystic Teratoma and a Hemorrhagic Follicular Cyst of The Ovaries. *Int J Surg* 2007; 14:1-5.
7. Templeman CL, Fallat ME, Lam AM, Perlman SE, Hertweck SP, O'Connor DM; Managing mature cystic teratomas of the ovary. *Obstet Gynecol Surv* 2000;55:738-45.
8. Patni R; Squamous cell carcinoma arising in mature cystic teratoma of ovary. *J Midlife Health* 2014;5:195-7.
9. Okonta PI, Mofon C; Huge Benign Ovarian Cystic Teratoma in a Patient with a History of Hansen's Disease. *Case Rep Obstet Gynecol* 2014;2014:345767.
10. Sait K, Simpson C; Ovarian teratoma diagnosis and management: case presentations. *J Obstet Gynaecol Can* 2004;26:137-42.
11. Agrawal SP, Rath SK, Aher GS, Gavali UG; Large Ovarian Tumor: A Case Report. *Int J Sci Stud* 2015;3:143-45.
12. Jelovac D, Armstrong DK; Recent progress in the diagnosis and treatment of ovarian cancer. *CA Cancer J Clin* 2011;61:183-203.
13. Silverberg SG; Histopathologic grading of ovarian carcinoma: a review and proposal. *Int J Gynecol Pathol.* 2000;19:7-15.
14. Cannistra SA; Cancer of the ovary. *N Engl J Med* 2004;351:2519-2529.
15. Goff BA, Mandel L, Muntz HG, Melancon CH; Ovarian carcinoma diagnosis. *Cancer* 2000;89:2068-2075.
16. Bostanci MS, Yildirim OK, Yildirim G, Bakacak M, Ekinci ID, Bilgen S, *et al.*; Collision Tumor: Dermoid Cysts and Mucinous Cystadenoma in the Same Ovary and a Review of the Literature. *Obstet Gynecol cases Rev* 2015; 2:1-3.
17. Brandwein-Gensler M, Urken M, Wang B; Collision tumor of the thyroid: a case report of metastatic liposarcoma plus papillary thyroid carcinoma. *Head Neck* 2004;26:637-41.

-
18. Kim SH, Kim YJ, Park BK, Cho JY, Kim BH, Byun JY; Collision tumors of the ovary associated with teratoma: clues to the correct preoperative diagnosis. *J Comput Assist Tomogr* 1999;23:929-33.
 19. Black JD, Roque DM, Pasternak MC, Buza N, Rutherford TJ, Schwartz PE, *et al.*; A series of malignant ovarian cancers arising from within a mature cystic teratoma: a single institution experience. *Int J Gynecol Cancer* 2015;25:792-7.
 20. Kajo K, Machálek K.; Collision of invasive serous adenocarcinoma and mature cystic teratoma in the ovary. *APMIS* 2007;115:769-71.
 21. Bhagat P, Dey P; Bilateral Serous adenocarcinoma of Ovary coexisting with mature cystic teratoma-Case report and review of literature. *APALM* 2015;2:71-74.