*Received: October 31, 2024*
*Accepted: November 28, 2024*

*Acad Med J 2024;4(3):148-153*
UDC: 618.11-006.2-089.87
https://www.doi.org/10.53582/AMJ2443148ks
*Case report*

# YOLK SAC TUMOR OF THE OVARY WITH SYNCHRONOUS IPSILATERAL AND CONTRALATERAL BENIGN CYSTIC TERATOMA

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## Abstract

Yolk sac tumor and teratoma are germ cell tumors, the former showing preferential differentiation toward yolk sac structures, while teratoma consists of tissues that originate from at least two embryonic germinal layers. The yolk sac tumor is characterized by significantly elevated serum alpha fetoprotein level.

The aim of this study was to present a rare case of yolk sac tumor of the ovary in a young female with synchronous ipsilateral and contralateral mature cystic teratoma.

A Caucasian 19-year-old female presented with severe abdominal pain and abdominal swelling. Ultrasound examination revealed a large, 15 cm in diameter tumor of the right ovary with suspicion for adnexal torquation and tumor rupture. Immediate surgery was performed and right uterine adnexa was removed. The pathologic examination showed predominantly solid ovarian tumor. A few centimeters in diameter cysts were also evident, filled with sebum, keratin debris and hair. Microscopic examination revealed tumor composed of meshwork of anastomosing spaces and cysts lined by a single layer of tumor cells. Schiller–Duval bodies were also present. Postoperative ultrasound follow-up one week after the initial surgery confirmed the intraoperative suspicion of ovarian tumor in the contralateral ovary. The left ovarian tumor was resected and histopathology revealed a mature cystic teratoma measuring 5 centimeters in maximal diameter.

Benign teratoma can appear synchronously or metachronously with yolk sac tumors in the ipsilateral or contralateral ovary. Recognition of the benign nature of the teratomatous component is important to avoid misinterpretation of mixed germ cell tumor and possible overtreatment of these patients.

**Keywords:** yolk sac tumor, teratoma, ovary, germ cell tumors, synchronous

## Introduction

Germ cell tumors typically arise in the gonads, however they may also apear at extragonadal sites, typically in midline structures along the presumed migration path of germ cells during embryogenesis[1–4]. In the ovary, germ cell tumors are the second most frequently encountered primary ovarian neoplasm, following surface epithelial tumors[5]. They are histologically heterogeneous group of tumors originating from a primitive germ cell.

Therefore, these tumors can resemble primordial germ cells, such as in dysgerminomas, or they can differentiate into complex embryonic structures, such as in teratomas[3]. This diverse group of benign and malignant neoplasms occur in a wide age range, with a predilection for younger age group[2,3,6]. The most frequently encountered germ cell tumor is the mature cystic teratoma[3,6]. Malignant germ cell tumors are uncommon and frequently pose diagnostic challenges, since their morphology is sometimes similar to other epithelial and sex cord tumors. In these cases, a panel of immunohistochemical stains often facilitates the correct diagnosis[3,5,6].

**Case presentation**

A 19-year-old female patient presented with a diffuse stomach pain lasting for several days, with loss of appetite and skin paleness. Upon physical examination of the patient, her abdomen was distended, painful on palpation; the pain was most intensive over the lower left quadrant of the abdomen. Due to positive left renal percussion, abdominal ultrasound examination was performed. It showed presence of ascitic fluid and normal configuration of the left kidney without signs of calculosis or obstruction. However, a 15-cm in diameter, oval, partly solid-partly cystic heteroechoic tumor with central necrosis was observed, located above the uterus and urinary bladder. Uterine adnexal origin was suspected by the radiologist performing the ultrasound, and subsequently a contrast CT abdominal scan was performed using DLP 725mGy-cm. The CT imaging confirmed the presence of pelvic tumor mass with lobulated outlines, with areas reminiscent of fat tissue, teeth, calcifications, lobulated cysts and solid areas. After the application of intravenous contrast, hypervascularization was noted in the solid part of the tumor, raising the suspicion for possible malignancy. The tumor measured 161 mm in maximal diameter. The patient was immediately referred to the gynecologist. Due to suspicion for adnexal torquation and tumor rupture, immediate surgery was performed and the right uterine adnexa was removed. Preoperative suspicion for ovarian tumor rupture was confirmed by the surgeon. The surgeon also noted a presence of small tumor in the contralateral ovary, but due to the patient's age and desire to preserve her fertility, he decided to wait for the pathology report of the initial tumor first.

Subsequent pathologic examination showed predominantly solid ovarian tumor with grey to brown smooth surface with multiple lacerations. On cut surface the tumor tissue was homogenous, grey to pink in color, containing multiple areas of necrosis and hemorrhage. A few centimeters in diameter cysts were also evident, filled with sebum, keratin debris and hair. Bone tissue was also present. Microscopic examination revealed tumor composed of meshwork of anastomosing spaces and cysts lined by a single layer of tumor cells (Fig. 1). Schiller–Duval bodies consisting of round or elongated tumor cell–lined papillae with a large central vessel, protruding into a cystic space surrounded by tumor cells were also present (Fig. 2). There were less common areas containing vesicles and cysts within cellular stroma. Tumor cells had atypical large nuclei with prominent nucleoli and clear cytoplasm with rare hyaline globules. Subsequent immunohistochemistry showed that tumor cells were diffusely positive for the immunohistochemical markers glypican-3 and SALL4 (Fig. 3). The positivity for alpha-fetoprotein in the tumor cells was only focal (Fig. 4). The cysts were lined by mature squamous epithelium and contained mature tissue elements from different embryonic layers (Fig. 5). Immature tissue elements were not found in any of the thoroughly analyzed samples. Postoperative ultrasound follow-up one week after the initial surgery confirmed the intraoperative suspicion of ovarian tumor in the contralateral ovary. The left ovarian tumor was resected and histopathology revealed mature cystic teratoma measuring 5 centimeters in maximal diameter. Due to the patients' age and desire to preserve fertility, she was referred to the *in vitro* fertilization clinic for consultation about egg cryopreservation before starting the oncologic treatment. The patient is alive and without disease after 8 months of follow-up.

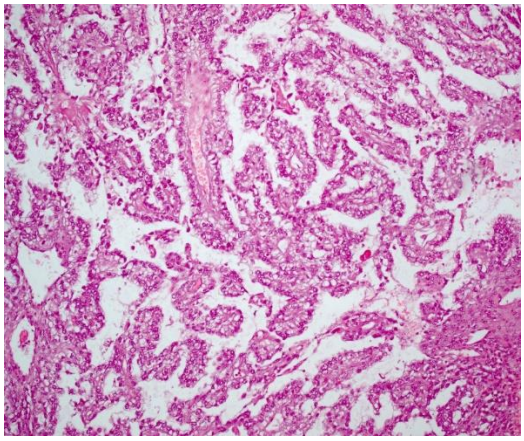

**Fig 1.** Microscopic appearance of the tumor, showing meshwork of anastomosing spaces and cysts lined by a single layer of tumor cells (HE, x100)

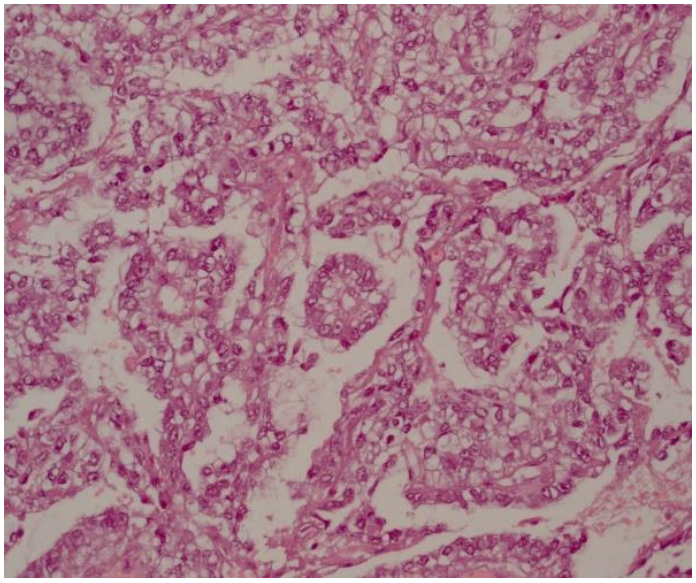

**Fig. 2.** Microscopic appearance of the tumor, Schiller–Duval bodies (HE, x200)

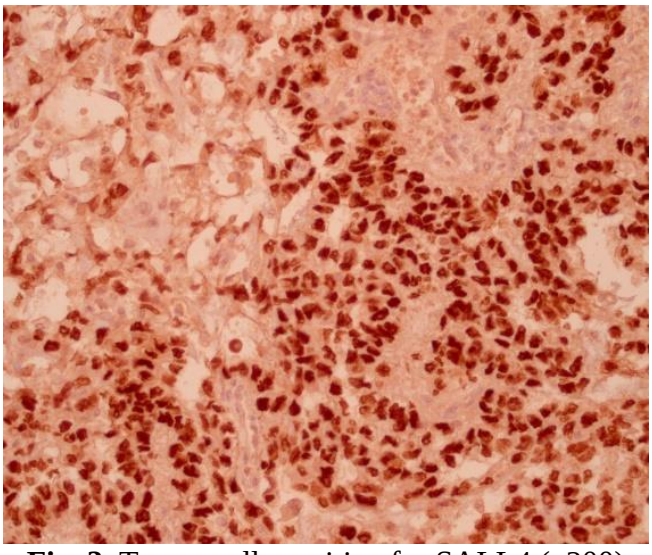

**Fig. 3.** Tumor cells positive for SALL4 (x200)

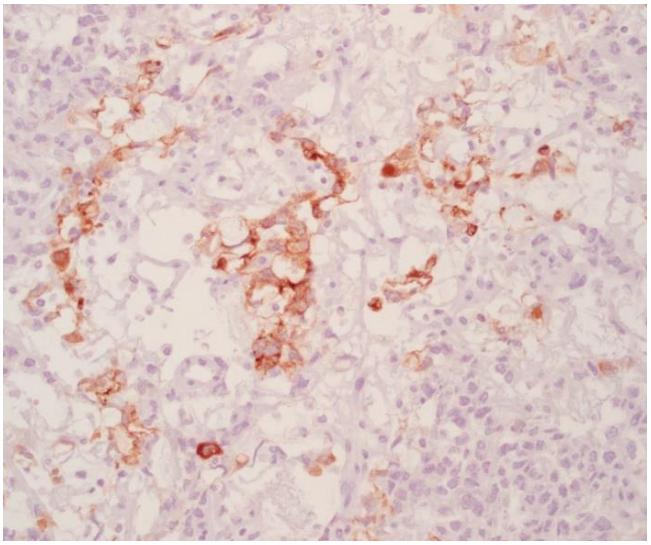

**Fig. 4.** Tumor cells positive for AFP (x200)

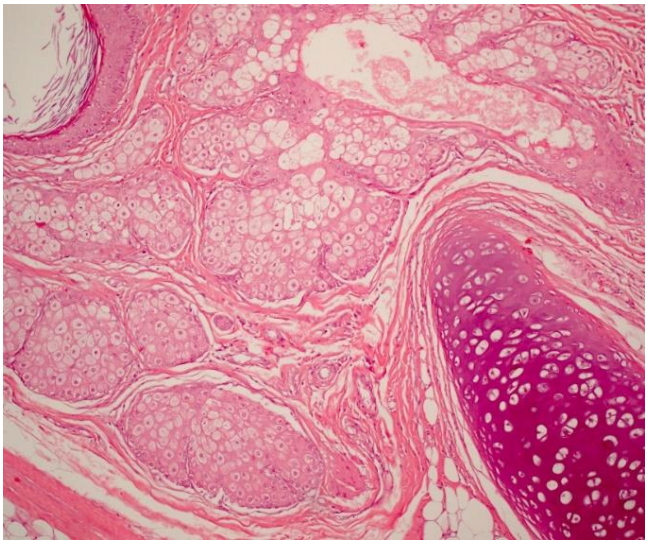

**Fig. 5.** Microscopic appearance of the teratoma component (x100)

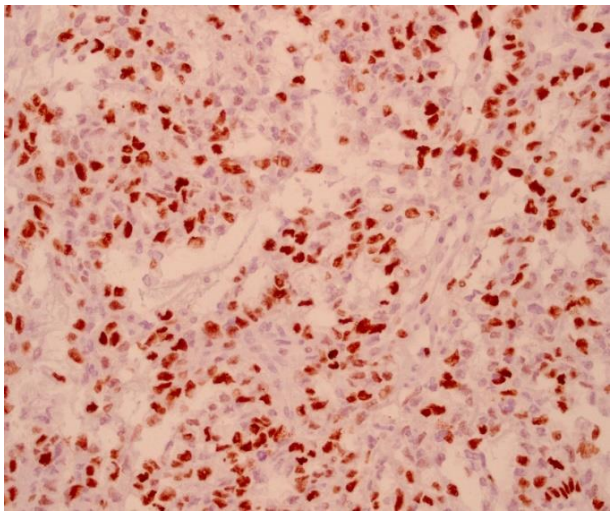

**Fig. 6.** Tumor with high Ki-67 proliferative index (x200)

**Discussion and conclusion**

Yolk sac tumor and teratoma both belong to the category of germ cell tumors. The yolk sac tumor shows preferential differentiation toward yolk sac structures, while teratoma consists of tissues that originate from at least two embryonic germinal layers[7]. Mature teratomas tend to be benign, although somatic malignant transformation can rarely occur. Occasional recurrence of teratoma was reported, most frequently in cases of immature teratomas[7]. It is extremely rare for a second germ cell tumor to occur at the same site and with a different histological type[7].

Young *et al.* (2022) presented a review of 150 cases of yolk sac tumors of the ovary in patients from 1 to 61 (mean: 21.5) years of age. Seventy-five percent of patients in their study were in the second and third decades of life, similar to our case. Clinical manifestations were typically related to a fast-growing adnexal mass, whereas endocrine manifestations (hirsutism) were present in only 2 cases. All tumors were unilateral and 70% were ≥15 cm. These findings correlate with our case, who also presented with abdominal pain, without endocrine manifestations. The authors found an associated dermoid cyst present in 20 cases (13.3%). However, contralateral teratoma was not reported in their comprehensive study[8]. Other authors also reported occurrence of teratoma with yolk sac tumor in the ipsilateral ovary or at extraovarian sites[9–11].

Kwon *et al.* (2009) reported a case very similar to ours, a yolk sac tumor of the ovary associated with mature cystic teratoma and teratoma in the contralateral ovary[9]. Kommoss *et al*. (1999) presented a case of metachronous yolk sac tumor and teratoma of the contralateral ovary after previously removed and misdiagnosed yolk sac tumor of the other ovary[12].

Yolk sac tumors can cause diagnostic difficulty due to their resemblance to other epithelial and germ cell tumors, such as clear cell carcinoma, embryonal carcinoma, Sertoli-Leydig cell tumor, and juvenile granulosa cell tumor[5,8,13]. The patient's age and marked elevation of the serum alpha-fetoprotein level is helpful in many of these considerations[8].

The overtly malignant gross appearance of most yolk sac tumors contrasts with certain other tumors in the differential diagnosis and the association of some yolk sac tumors with dermoid cyst and many clear cell carcinomas with endometriosis may be helpful[8]. The most common histologic patterns of ovarian yolk sac tumors are the characteristic reticular and cystic patterns[8]. In difficult cases, immunohistochemistry for alpha-fetoprotein and glypican 3 can be helpful, but overlap exists and these results must be considered in the context of the overall clinical, gross, and microscopic features[8].

Benign teratoma can appear synchronously or metachronously with yolk sac tumors in the ipsilateral or contralateral ovary. Recognition of the benign nature of the teratomatous component, especially if located in the contralateral ovary, is important to avoid misinterpretation of bilateral mixed germ cell tumor and possible overtreatment of these patients.

*Conflict of interest statement*. None declared.

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