Primary endodermal sinus tumor originating from the sacral ligament:a case report and review of the literature

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Abstract

Endodermal sinus tumor rarely originates from sacral ligament. Here we reported a case presenting with lower abdominal pain and verified by postoperative pathology. Through my case and literature reviews, we reminded gynecologists the possibility of endodermal sinus tumor for adolescent female, even there is no lesion in ovary.

Introduction

Endodermal sinus tumor (EST), also known as yolk sac tumor (YST), is a typical germ cell tumor (GCT), which can occur in the gonads or extra-genital glands. Germ cell tumors are more common in the testes and ovaries. Extra-gonadal germ cell tumors are very rare, with an overall incidence of 1.8 to 3.4 per 1 million in the United States[1]. In China, the incidence of EST ranks the first among ovarian germ cell tumors, and about 1/3 of patients are diagnosed before menstruation. EST have a high incidence at the age of 1-35 years, with insidious onset (especially extra-gonadal tumors), rapid progression, susceptibility to metastasis, and poor prognosis[2]. Extra-ovarian EST is a rarely seen in pelvic localization. Here we reported a case of EST, which occurred in the sacral ligament.

Case presentation

A 14 years old girl was admitted in our hospital complaint with severe lower abdominal pain accompanied with nausea and vomit, which occurred during dinner. Menarche is 11 years old and the menstrual cycle is irregular. Physical examination showed mild tenderness and rebound tenderness. General hematological parameters such as blood routine and electrolyte check were normal. Ultrasonography showed the bilateral ovaries and fallopian tubes was normal, but an uneven slightly higher echo photophore was found at the back of the uterus, the size was about 72x64x50mm, the boundary was unclear, the morphology was irregular. But the boundary of the ovaries was very clear. Meanwhile, we found a lot of fluid in liver and kidney fossa and bilateral iliac fossa (Figure.1).

Considering relief of the pain and the possibility of intra-abdominal bleeding, we performed laparoscopy. During the operation, we found massive blood in the abdomen (Figure.2a). After sucking those blood, we saw a mass about 8 cm in size with irregular morphology, uneven surface, dark red clot and ruptured capsular (Figure.2b). Bilateral fallopian tubes and ovaries were normal. At last, we found the lesion was next to the left sacral ligament (Figure.2c).

When removing the mass, we detected some rotten fish fleshy tissue (Figure.2d). Rapid pathological examination suggested germ cell tumors with the possibility of endodermal sinus tumor. We retrospectively detected the value of AFP, which was 1162.3 ng/ml. Postoperative paraffin pathology verified the diagnosis

with AFP (+), SALL4 (+), Glypican-3 (+), PLAP (-), CDX2 (partial +), CD117 (-), CK7 (-), Calretinin (-), ki67 about 80% (+) (Figure.3).

Postoperative pelvic MRI showed omental metastases, and the patient underwent chemotherapy with the BEP regimen.

Discussion

90% of GCT are found in the gonad and 10% of case existed in different extra-gonadal sites. Moreover, the most common extra-ovarian sites of EST are mediastinum, vagina, brain and retroperitoneum[3]. EST originating from the endometrium or broad ligament have been reported in previous article, but these extra-gonadal EST are very rare as in our case[4]. When the tumor grows to a certain size, different clinical manifestations may appear according to the tumor site, mostly pain or masses, which are not specific. Endodermal sinus tumors are prone to hematogenous metastases in early stages, and most patients are already in advanced stages when they are diagnosed with vascular invasion or metastases that are difficult to remove cleanly by surgery, thus patients usually have a poor prognosis[5].

Serum AFP measurement has an important role in the diagnosis of EST, assessment of efficacy and monitoring of recurrence or metastasis[3,6].On ultrasound examination, malignant ovarian EST tend to be unilateral, large, multifoveal solid or solid, with finely textured tissue, slightly hyperechoic, and richly vascularized[7]. On MRI, EST may show areas of hemorrhage and are valuable in assessing the presence of metastases to the lymph nodes, greater omentum, lung, liver, or bone[8].

However, the diagnosis still depends on pathological examination. Typical histological features include reticular microcystic areas with hyaline globules and amorphous acellular basement membrane material[9]. Among the recognized histologic patterns yolk sac tumors are considered to usually exhibit a combination of 2 or more of the following structural patterns: microcystic/reticular, papillary, solid, festoon, polyvesicular-vitelline, glandular pattern, and hepatoid. Typical Schiller-Duval vesicles can be seen. The typical immunophenotype is positive for immunoreactivity for alpha-fetoprotein (AFP), Glypican 3 and SALL4. Notably, AFP is very specific for the diagnosis of EST, but is not sufficiently sensitive. Glypican 3 and SALL4 are sensitive markers in EST, but are insufficiently specific and a differential diagnosis that needs special mention is clear cell carcinoma[10,11]. In our case, AFP, SALL4 andGlypican-3 were all strongly positive, which was consistent with literature reports.

Extra-glandular germ cell tumors are rare and are found in most structures along the midline, with a 46% probability of occurrence in the brain. The mechanism of extra-gonadal EST is still not well defined. Traditionally, the hypothesis of the pathogenesis of extra-gonadal germ cell tumors relies on the malignant transformation of primordial germ cells in the first trimester of pregnancy, with locations such as the retroperitoneum, sacrococcygeal region, mediastinum, and brain thought to originate from germ cells misplaced or blocked in embryonic migration[12]. And there are two main theories. The first theory is that tumors arise from abnormal differentiation of somatic cells, such as EST in the stomach, endometrium, or lungs. The second theory is that tumors originate from primitive germ cells that either originate outside the gonads or are transferred from germ cells inside the gonads. In general, the pathogenesis of extra-gonadal germ cell tumors has been hypothesized to be primarily the malignant transformation of germ cells during early gestation, which mistakenly spread to the midline during migration during early gestation[13]. McKenney et al, however, suggests that extra-gonadal tumors may correspond to the spread of an occult undiagnosed or regressive malignant lesion in the gonads[14]. This is also supported by the "regressive" features of the peripheral lesions with signs of scarring[15].

Our case was a typical extra-gonadal germ cell tumors, which was characterized by a female teenager who was admitted to the hospital with abdominal pain, a mass located in the pelvic cavity with normal ovary structure, and an increased AFP value. The tumor was found to be originated from the left sacral ligament, and no definite tumor lesion was seen in the rest of the pelvic and abdominal organs. Maybe, it results from the misplace during embryonic migration. The mass envelope was ruptured with bleeding, which may have contributed to the patient's abdominal pain. The mass was seen to be rotten fish-like with abundant

blood flow. After complete resection of the mass, intraoperative rapid pathology and postoperative paraffin pathology demonstrated the diagnosis of endodermal sinus tumor by the above mentioned tumor marker.

Conclusions

To be exact, we made a misdiagnosis for no testing of tumor markers, such as AFP and did not resect the omentum during the operation. In conclusion, we must remind the existence of extra-gonadal germ cell tumors, especially for those teenager who present with mass in pelvic, but no lesion in the ovary, which helps us to make appropriate treatment for them.

Author Contributions

HL and DSJ contributed to the conception and writing of the manuscript. SRS oversaw the details of the manuscript regarding the procedure. HL and SRS contributed to the collection and interpretation of images and examination results. SRS has critically revised the content of the manuscript. All authors read and approved the final manuscript.

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Conflict of Interest Statement

There were no competing interests among authors.

Data availability statement

Data supporting the results of this study are available from the corresponding author. Due to privacy or ethical restrictions, these data are not publicly available.

Consent

Written informed consent for publication of their clinical details and/or clinical images was obtained from the patient's parents. A copy of this consent form is available for review by the editors of this journal.

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Figure Legends:

Figure.1: Ultrasound Imaging before operation. **a.** An uneven slightly higher echo photophore is found at the back of the uterus and is surrounded by a large volume of fluid. **b.** Normal morphology of the left and right ovary. **c.** Pelvic and abdominal effusion.**d.** Liver and kidney fossa effusion.

Figure.2: Intraoperative images. **a.** Exposure of the uterus, the bilateral ovaries and fallopian tubes and abdominal blood. **b.**An approximately 8 cm mass with irregular morphology, uneven surface, dark red clot and ruptured capsular is exposed. **c.** The lesion was originated from the left sacral ligament. **d.** The image after removal of the lesion.

Figure.3: Light microscopic appearance and immunohistochemical staining of EST originating from the left sacral ligament. **a.** Endodermal sinus tumor (H and E, 1 × 40). **b.** Glypiacan-3 (+). **c.**AFP (+). **d.** ki67 (+).