Low-Grade Astrocytoma Arising in a Mature Ovarian Teratoma in an Adolescent

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Clinical Practice Points

- Tumors of neuroepithelial tissue origin arising in ovarian teratomas encompass medulloblastomas, medulloepitheliomas, neuroblastomas, and gliomas. Gliomas arising in mature ovarian teratomas are exceedingly rare.
- To the authors' knowledge, 43 cases of different types and grades have been reported so far. This report presents the case of a 15-year-old girl who presented with a 1-month history of suprapubic pain before admission.
- Radiographs showed a large multiloculated cystic mass arising from the right ovary. The patient underwent right salpingo-oophorectomy. Histopathologic examination found mature tissues from all 3 germ cell layers, and a 3-cm focus showed a low-grade astrocytoma.

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Introduction

Germ cell tumors comprise about 20% of all ovarian tumors, most of which occur in children and young adults. Approximately 95% of these are mature cystic teratomas. Mature cystic teratoma is composed of well-differentiated tissues derived from the 3 germ cell layers. Neuroepithelial tissues have been reported to be present in around four-fifths of all ovarian teratomas.[1,2] Malignant transformation is a rare complication of mature cystic teratoma and usually takes the form of malignant epithelial tumor, mostly squamous cell carcinoma.[3] Gliomas of different types and grades may arise in ovarian teratomas. The purpose of this article is to report a case of low-grade astrocytoma arising on a background of mature ovarian teratoma in an adolescent.

Clinical History

A previously healthy 15-year-old girl presented to the Department of Obstetrics and Gynecology, University of Jordan, with a 1-month history of suprapubic pain before admission. Urine examination was normal. Physical examination of the abdomen was unremarkable. Abdominopelvic magnetic resonance imaging with contrast showed a large right ovarian mass causing significant displacement of adjacent bowel loops and compression of the right ureter, leading to hydroureteronephrosis. The mass measured 13 × 8 × 5 cm. The serum tumor markers (β—human chorionic gonadotropin, α-fetoprotein, and lactate dehydrogenase) were normal. The patient then underwent right salpingo-oophorectomy with resection of part of the omentum.

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Materials and Methods

The specimen was sent to the histopathology laboratory and fixed in 10% formaldehyde. Gross examination of the salpingo-oophorectomy specimen found it to be a cystic mass that measured 13 × 8 × 5 cm, and upon opening, a cheesy-yellow material along with hair shafts exuded. The cyst had a solid area that measured 7 × 6 × 5 cm. A total of 13 sections were submitted, processed, and stained with hematoxylin-eosin. Step sectioning of several fragments of fatty tissue from the omentum measuring 2 × 1 × 0.5 cm was unremarkable. Microscopic examination found a focus of astrocytoma; therefore, an extra 7 sections were submitted, and 3 slides were stained with GFAP (glial fibrillary acidic protein), tumor protein p53, and MIB-1 antibody immunostains.

Results

By microscopic examination, the mass was mainly cystic and lined by keratinized squamous epithelium with underlying hair follicles and sebaceous glands (Figure 1). The solid component showed mature smooth muscles, fat, duodenal tissue, and foci

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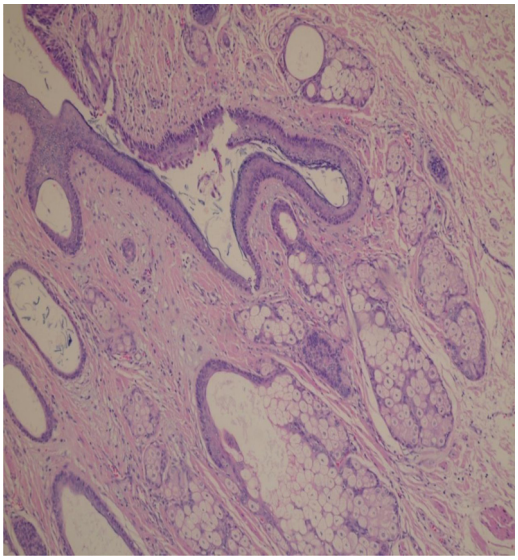
Figure 1 Histologic Detail. The Ovarian Tumor Is Mainly Cystic and Focally Lined By Squamous Epithelium With Underlying Sebaceous Glands (Hematoxylin-Eosin)

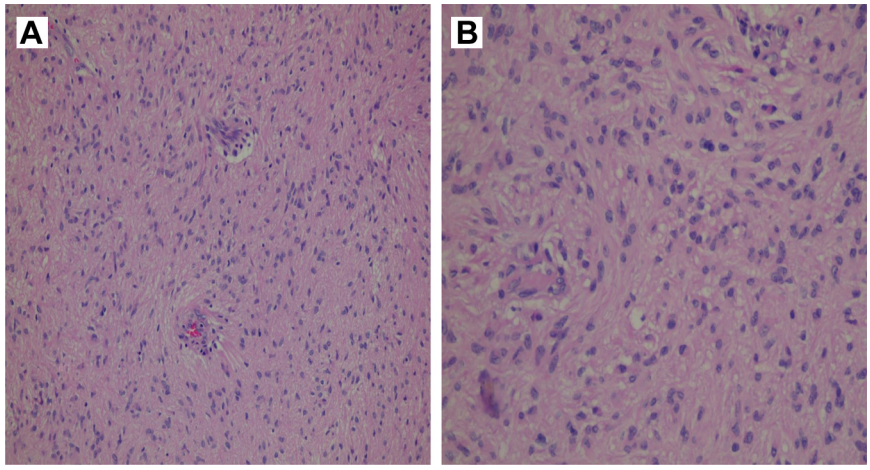


representing respiratory epithelium with underlying minor salivary gland tissue and mature cartilage. Multiple areas of mature glial tissues were identified and were composed of mature neurons, astrocytes, oligodendroglial cells, and ependymal canals. No immature tissue was seen. Within the glial tissue, a nodule measuring 3 × 3 × 2 cm was identified (Figure 2) and showed a hypercellular tumor composed of proliferation of neoplastic astrocytes having oval nuclei with a minimal degree of pleomorphism and sparse mitotic figures. The background was fibrillary. No evidence was found of microvascular proliferation, fibrin thrombi, or tumor necrosis. Immunohistochemical studies were performed and found that the proliferating cells were strongly and diffusely positive for GFAP and p53. MIB-1 immunostain showed an average proliferative index of 3%; the overall picture was consistent with a low-grade astrocytoma arising on a background of mature ovarian teratoma. At the time of this report, clinical, laboratory, and imaging studies remained negative 1 year postoperatively.

Discussion

Ovarian teratomas include mature, immature, and monodermal teratomas. Teratomas are composed of tissues that may resemble those derived from any of the 3 germ cell layers (ectoderm, mesoderm, and endoderm). Well-differentiated neuroepithelial tissues have been reported to be present in around four-fifths of all ovarian teratomas.[1,2] Astrocytic, ependymal, and oligodendrocytic components can be seen. Cavities lined by nerve ganglia of the sympathetic type, nerve bundles accompanied by Schwann cells, and choroid plexus are all reported findings.[2] Mature cystic teratomas are the most common ovarian tumors in children and adolescents.[1] Malignant transformation is a rare complication of mature cystic ovarian teratomas, occurring in approximately 2% of cases. The most common type of malignant transformation is to squamous cell carcinoma.[3] Primary neuroectodermal tumors of the ovary are rare, usually take the form of monodermal teratomas, and encompass medulloblastomas, medulloepitheliomas, neuroblastomas, and gliomas.[4] Gliomas arising in ovarian teratomas are rare. To the authors' knowledge, 43 cases of different types and grades have been reported so far.[1,2,5-18] Although some cases of ovarian gliomas such as ependymomas were reported to be in the form of monodermal teratomas, the remaining cases of gliomas were reported to arise on a background of ovarian teratoma of either the mature or immature types. Astrocytomas of different grades make up the majority of gliomas. Among the reported cases, 4 cases were low-grade fibrillary astrocytoma, 2 of which were described by Berger and Pochaczevsky in 1969[2] and 2 of which were reported by Malkasian et al (cited by

Figure 2 Cellular Detail. A, B, The Lesion Is Mildly Hypercellular and Is Composed of Mildly Pleomorphic Cells With Oval Nuclei Present in a Fibrillary Background (Hematoxylin-Eosin)



Berger and Pochaczevsky[2]) in their series of malignant ovarian tumors; 13 cases were astrocytoma grade IV (glioblastoma).[1,5,6] One case of ovarian glioblastoma had an initial clinical presentation as metastatic brain tumor. Of the remaining gliomas, 1 was a pilocytic astrocytoma,[7] 9 were oligodendrogliomas,[8-11] and 16 were ependymomas,[12-18] of which 1 was of the myxopapillary type.[12] Of these gliomas, 21 cases (11 glioblastomas, 4 oligodendrogliomas, 1 pilocytic astrocytoma, 4 low-grade fibrillary astrocytomas, and 1 myxopapillary ependymoma) were reported to arise from mature cystic teratomas. Seven cases were reported to arise on a background of immature teratomas (2 glioblastomas and 5 oligodendrogliomas). All ovarian ependymomas except that of myxopapillary type were in the form of monodermal teratomas.

Disclosure

The authors have stated that they have no conflicts of interest.

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