Case Report

Gliomatosis Peritonei: Report of Two Cases and Literature Review

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Gliomatosis peritonei (GP) is a rare condition characterized by intraabdominal (peritoneal, nodal and omental) implants of glial tissue. GP is believed to be commonly associated with immature ovarian teratoma and possesses favorable prognosis. However, the origin of GP is controversial and its clinical outcomes vary. Here we reported 2 cases of GP arising in mature and immature ovarian teratoma, respectively. Recent literature is also reviewed.

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INTRODUCTION

Gliomatosis peritonei (GP) is a rare condition defined as presence of mature glial tissue in the peritoneum.[1,2] Due to its rarity, this condition is still incomprehensible in many aspects, including the followings: Although the implanted tissue is composed of mature glia, GP is still paradoxically considered as metastasis by most authors. In addition, little is known about the derivation of the lesional tissue/cells. Moreover, the clinical features of this condition are not fully understood yet.

GP is most commonly seen in peritoneum. In rare cases, the lesional glial tissue can appear in different locations such as ventriculoperitoneal shunting,[3] scrotum,[4] endometriosis externa,[5] rectovaginal septum,[6] thoracic tissue,[7,8] pleura tissue [9] and lymph node.[10-12] GP is often believed to be associated with immature ovarian teratoma, especially in the early literature, but can also been seen in mature ovarian teratoma, retroperitoneal teratoma and growing teratoma syndrome.[13-15] The largest series with 21 cases was reported recently by Liang, et al.[16]

The origin of GP is still unknown. In this regard, three theories have been proposed by different groups:[17-23] GP may arise from (1) immature teratoma by maturation or metastasis, (2) peritoneal stem cells undergoing neural differentiation, or (3) peritoneal mesenchymal pluripotent stem cells. It should be pointed out that all the three hypotheses have no confirmatory experimental or clinical data available yet.

As described in the limited number of reported cases (about 100 cases in total), GP has a broad range of biological behavior with inconclusive prognosis and clinical features. The predictive factors for this condition have not been identified either. Therefore, there is no consensus on treatment and follow-up for this condition so far. Due to the maturity nature of the lesional tissue, GP is usually an indolent condition. Reportedly, the lesions are often resectable with excellent prognosis. On extremely rare occasion, the lesion even regresses spontaneously.[8] However, accumulating clinical data demonstrate that recurrence, malignant transformation and metastasis do occur.[22-26]

Herein, we reported 2 cases of GP that occurred in mature and immature ovarian teratoma, respectively. Recent relevant literature is also reviewed.

CASE REPORT

Case 1

The patient was a 24-year old asymptomatic female with a left pelvic mass. Her tumor markers were negative (serum CEA<0.5 ng/ml, AFP<1.3 ng/ml, CA125 9U/ml). Intraoperative inspection showed a 3000-gram left ovarian mass with pink-tan, smooth and glistening surface. The mass measured 20 x 10.5 x 3 cm. No intraabdominal or retroperitoneal spread or adhesion was identified. No enlargement of abdominal lymph nodes was noted. Gross pathology examination demonstrated multiple multiloculated cysts with necrosis, hair, and firm calcified areas. The cysts contained approximately 500 ml of straw-colored clear fluid within thin and smooth cystic walls. Microscopically, cyst wall was mainly composed of mature tissue elements **(Figure 1, A-B)** with focal immature primitive neuroepithelial tissue **(Figure 1, C-D)**, which yielded the diagnosis of immature teratoma, grade 2. The multiple minute peritoneal nodules consisted of mature glial tissue **(Figure 1, E-F)**.

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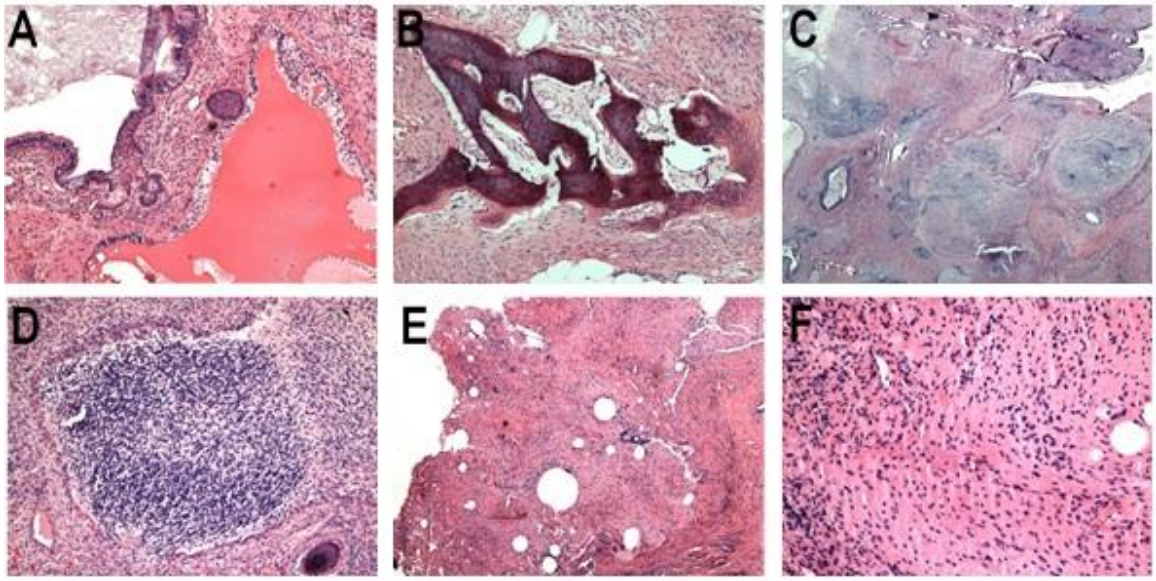

Figure 1. Gliomatosis peritonei in immature ovarian teratoma. **A, B:** Mature tissue (100x). **C, D:** Immature neuroepithelial components (40x and 100 x, respectively). **E, F:** Peritoneal gliomatosis peritonei (40x and 200 x, respectively). Post-surgery follow-up for radiology and serum tumor markers (AFP, HCG, CEA, LDH, neuron specific enolase) for 6 years revealed no recurrence or metastasis.

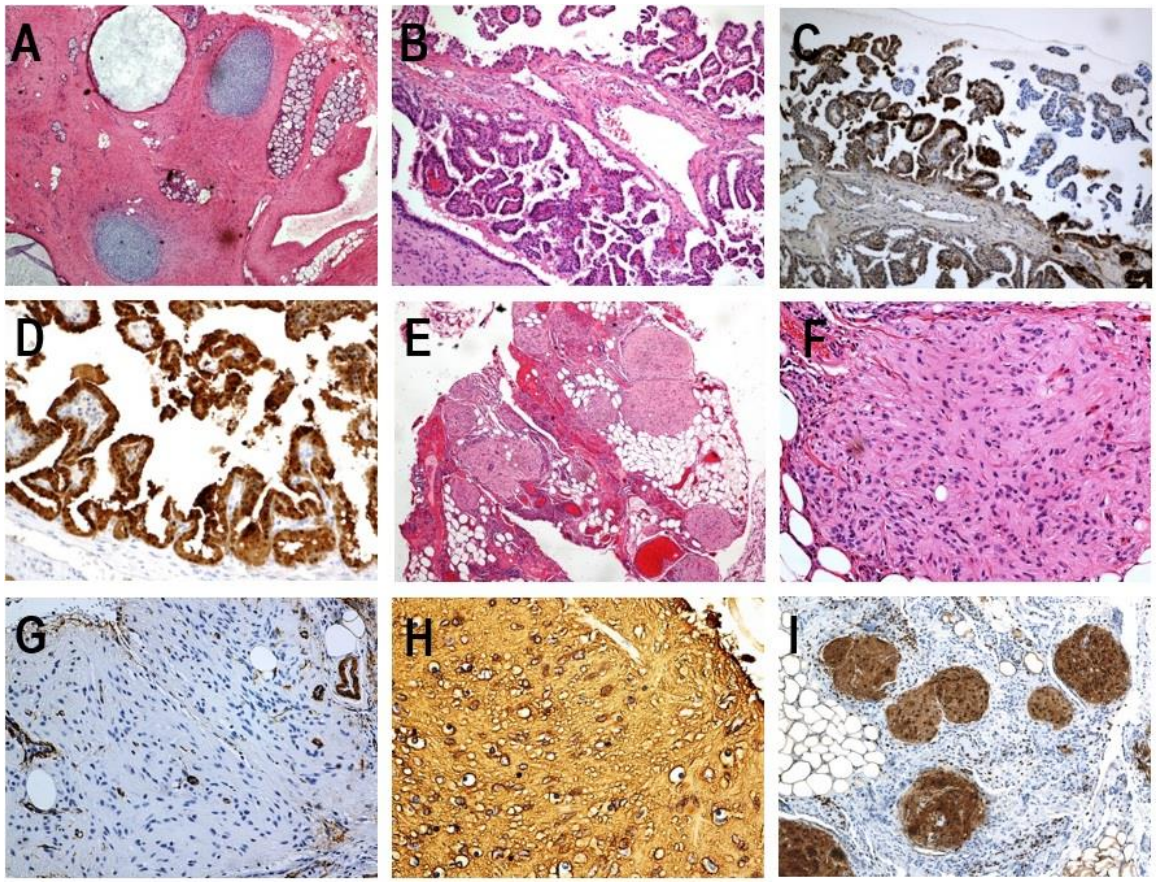

Figure 2. Gliomatosis peritonei in a mature ovarian teratoma. **A**, mature sweat gland, adipose tissue, cartilage and focal calcification (40 x). **B-D:** Mature choroid plexus tissue (100 x). (**C,** GFAP staining; **D,** S100 staining). E to I: Omental gliomatosis peritonei (**E, F,** H&E, 40 x and 200 x, respectively; **G,** α-smooth muscle actin staining, 100 x; **H,** GFAP staining, 200 x; I, S100 staining, 100 x). The patient was postoperatively treated with bleomycin and has been followed up for 20 months. No clinical, radiologic or biochemical evidence (AFP, CEA, LDH, CA125) of recurrence or metastasis has been detected.

Case 2

The patient was a 6-year old female presented with increasing abdominal girth for one week with minor abdominal discomfort, but no vaginal bleeding or discharge. Physical exam revealed one non-tender right abdominal mass extending from lower abdomen to xyphoid process. Abdominal CT showed a 20.5 x 17.1 x 11 cm multicystic heterogeneous mass in the mid, lower abdomen and upper pelvis with calcifications and fat density. The lab tests demonstrated elevated serum lactate dehydrogenase (LDH 336 U/ml) and α-fetoprotein (AFP 18.9 ng/ml). Intraoperative examination revealed an 18 x 14 x 13 cm pink-tan, fleshy solid tumor with yellow-gray appearance, intact and glistening outer surface. The tumor contained multiple cysts that ranged in size from 0.5 x 0.5 x 0.5 cm up to 4 x 3 x 2 cm. The thin-walled cysts consisted of clear fluid or red-brown bloody fluid. Hairs, yellow-tan greasy material and calcifications were also identified within the tumor. There was neither intraperitoneal nor retroperitoneal disease spread. But slight adhesion of the omentum to the mass was noted. Right salpingo-oophorectomy and partial omentectomy were performed. Gross examination of the specimen revealed a 770-gram well circumscribed mass with pink-tan smooth and glistening outer surface. The mass had pink-tan, fleshy, solid, yellow-gray cut surfaces with multiple cysts ranging in size from 0.5 x 0.5 x 0.5 cm to 4 x 3 x 2 cm and containing clear to red-brown fluid and hairs, yellow-tan greasy material and focal calcifications. Microscopic examination revealed mature tissue elements consistent with cystic teratoma for the mass **(Figure 2, A-D)** and gliomatosis peritonei for the omentum nodules **(Figure 2, E-I)**.

DISCUSSION

In consistent with the findings by other authors, we demonstrated that GP could occur in a background of immature or mature teratoma or both.[14,16,18,27-33] Also, our cases did not show recurrence or metastasis yet, which most likely indicated relative good prognosis. Occasionally, it can be a part of growing teratoma syndrome in the increasing growth of metastatic teratoma often seen in patients receiving chemotherapy for malignant germ cell tumor.[13-15]

The origin of GP has been the focus of debate for more than 40 years.[2,16,17,20] There multiple lines of anatomical pathologic evidence supporting the notion that GP arises from teratoma. These observations include: (1) Teratomatous material can directly protrude into GP through capsular defects. (2) Mature glial tissue can be found in mesenteric, para-aortic, and retroperitoneal lymph nodes in immature teratomas, indicating a lymphatic spread. (3) GP sometimes contains all three germ layers including immature neural elements.

However, molecular study with polymorphic microsatellite detection has shown that GP is genetically related to normal peritoneal tissue, but not to teratoma, either in mature or immature teratoma.[17] This finding shed light on the stem cell origin of GP, i.e., pluripotent Mullerian/paramesnephric stem cells, which can develop into peritoneal surface cells or subcoelomic mesenchymal cells. If this is the case, which stage of the differentiation of stem cell does give rise to GP? On the other hand, although Mullerian duct normally develops into endometrium, fallopian tube, etc, endometrium and fallopian tube tissues are rarely seen in teratoma and associated with GP. Taking into consideration the fact that GP can be seen in scrotum,[4] we cannot exclude the possibility that GP may also develop from stem cells other than paramesnephric tube derived. Last, another key point is that, from standpoint of clinical outcome, GP seems to behave independent of the maturation of teratoma. In other words, the clinical presentation of teratoma does not necessarily predict the behavior of GP.

Taken together, GP may take multiple roots by either directly spreading from teratoma component or arising from stem cells of Mullerian or other lineage(s). Further clinical data and molecular features are required for accurate classification of this condition.

CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

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