ORIGINAL ARTICLE

MORPHOLOGICAL SPECTRUM OF MATURE OVARIAN TERATOMA

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ABSTRACT

Background: Teratomas are usually derived from all the three germinal layers. They present as cysts filled with abundant sebaceous material with hair and may contain cartilage, teeth and bone. Solid teratomas pose diagnostic problems especially when the usual ectodermal components are missing on histological examination. The aim of the study is to determine the morphological spectrum of mature ovarian teratoma and to create awareness about the unusual features.

Material & Methods: A prospective study consisting of 247 cases of ovarian lesions received at the Department of Pathology, Peshawar Medical College, Peshawar, from January 2012 to October 2013 from its attached teaching hospitals. The patients' data, gross appearance of the ovarian lesions and microscopic findings were recorded.

Results: A total of 247 cases were included in this study out of which 234(94.7%) were benign and 13(5.3%) malignant. The commonest benign lesion was hemorrhagic luteal cyst in 50(20.2%) cases, followed by follicular cyst and serous cystadenoma in 49(19.8%) each. The mature teratoma was found in 42(17%) of cases. Left sided were 27(64.3%) and right sided 15(35.7%). About 90.5% were cystic and more than half of the lesions (71.4%) were monolocular. The multiloculation usually comprised of 3 to 4 compartments but in two cases, tiny cysts were found to be scattered all over the cut surface along with solid areas. The size was less than 10 cm diameter in 64.3% of the lesions. On gross examination, cheesy material with hair was found in 32(76.2%), serous fluid in 4(9.5%), mucinous fluid in 3(7.1%) and chocolate colored fluid in one (2.4%) and teeth and bone in 5(11.9%) cases. Histologically, all of the mature teratomas consisted of tissues derived from ectoderm and mesoderm. Eight (19%) of them in addition also showed tissues derived from endoderm.

Conclusion: The possibility of mature teratoma must be considered both grossly and microscopically in an ovarian tumor even in the absence of usual ectodermal elements and sebaceous secretions.

KEY WORDS: Ovarian neoplasms; Teratomas; Mature teratoma; Benign teratoma; Cystic teratoma.

This article may be cited as: Khan MM, Sharif N, Ahmad S. Morphological spectrum of mature ovarian teratoma. Gomal J Med Sci 2014; 12:76-80.

INTRODUCTION

Teratomas (from the Greek teraton for monster) are the most common germ cell tumors (GCT) of ovary. Mature teratoma, termed as dermoid cyst by the clinicians, accounts for nearly one third of all benign ovarian neoplasms.[1,2] They consist of adult-type differentiated components such as skin, cartilage and glandular epithelium.[3]

Immature teratomas contain tissues with partial somatic differentiation similar to that in fetal tissues.[4] Teratomas with malignant transformation demonstrate aggressive neoplastic growth of one or more of the histological components.[5] Grossly they are usually cystic with abundant sebaceous material and hair. Other components such as cartilage, teeth and bone may also be present.[6]

Histologically teratomas comprise of tissues from all the three germinal layers. The most common is ectoderm in the form of skin, hair and abundant sebum. The usual mesodermal elements include fibro-adipose and fibro-muscular tissues and the endodermal component is in the form of glandular structures.[3]

The difficulty in diagnosis arises when one of the commonly found components is missing especially skin, hair and sebaceous material.

The aim of this study was to determine the morphological spectrum of mature ovarian teratomas so that those with unusual gross and histologic features may not be missed by the pathologist and diagnostic accuracy may be improved.

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MATERIAL AND METHODS

This descriptive study was carried out at the Department of Pathology, Peshawar Medical College, Peshawar, from January 2012 to October 2013.

The specimens were received from its attached Mercy and Kuwait Teaching Hospitals. We received 247 cases of ovarian lesions in the above-mentioned period. The data included patients' age, clinical presentation, operative findings, size of tumor, gross appearance and microscopic features. Representative sections were taken after gross examination and processed as per standard procedure. The slides were stained with Hematoxylin and Eosin (H&E) and examined under light microscope.

RESULTS

A total of 247 cases were included in this study. Out of these 234 (94.7%) were benign and 13 (5.3%) were malignant. The commonest benign lesion diagnosed was hemorrhagic luteal cyst in 50 (20.2%), followed by follicular cyst and serous cystadenoma in 49 (19.8%) each. Mature teratoma was found in 42 (17%) of cases. Malignant tumors included cystadenocarcinoma along with its variants, viz., papillary 4 (1.6%), mucinous 2 (0.8%) and serous one (0.4%). The other malignant tumors included clear cell adenocarcinoma 2 (0.8%), yolk cell tumor 2 (0.8%) and granulosa cell tumor 1 (0.4%). (Table 1)

Regarding 42 cases of mature teratoma; Left sided teratomas were 27 (64.3%) and right sided 15 (35.7%). About 90.5% were cystic and more than half of the lesions (71.4%) were monolocular. The multiloculation usually comprised of 3 to 4 compartments but in two cases, tiny cysts were found to be scattered all over the cut surface along with solid areas. The size was less than 10 cm diameter in 64.3% of the lesions however in some cases (7.1%) reached $\geq$15 cm.

On gross examination, cheesy material with hair was found in 32 (76.2%), serous fluid in 4 (9.5%), mucinous fluid in 3 (7.1%) and chocolate colored fluid in one (2.4%) and teeth and bone in 5 (11.9%) cases. (Table 2)

Histologically, all of the mature teratomas consisted of tissues derived from ectoderm and mesoderm. Eight (19%) of them in addition also showed tissues derived from endoderm. (Fig. 1-3)

The ectodermal tissues consisted of skin with adnexa, nervous tissue and nerve fibers, uveal tissue, transitional epithelium, choroid epithelium and keratin material. Mesodermal derivatives included spindle shaped cells, hematopoietic tissue,

Table 1: Frequency of ovarian lesions (n=247).

Type	Diagnosis	Number	Percentage
Benign	Hemorrhagic luteal cyst	50	20.24
	Follicular cyst	49	19.84
	Serous cystadenoma	49	19.84
	Mature teratoma	42	17.00
	Mucinous cystadenoma	13	5.26
	Endometriotic cyst	12	4.86
	Chronic nonspecific salpingoophritis	9	3.64
	Serous cystadenofibroma	5	2.02
	Ectopic pregnancy	2	0.81
	Fibroma	1	0.40
	Infarcted	1	0.40
	Thecoma	1	0.40
Malignant	Papillary cystadenocarcinoma	4	1.62
	Clear cell adenocarcinoma	2	0.81
	Mucinous cystadenocarcinoma	2	0.81
	Yolk cell tumor	2	0.81
	Granulosa cell tumor	1	0.40
	Serous cystadenocarcinoma	1	0.40
	Transitional Cell Carcinoma	1	0.40

Table 2: Gross features of mature ovarian teratoma.

Gross Features		Number	Percentage
Site	Left	27	64.3
	Right	15	35.7
Loculation	Single	30	71.4
	Multiple	12	28.6
Appearance	Soft and cystic	39	90.5
	Firm and solid	4	9.5
Size	<10cm	27	64.3
	>10cm	15	35.7
Content	Cheesy material and hair	32	76.2
	Teeth and bone	5	11.9
	Serous fluid	4	9.5
	Mucinous fluid	3	7.1
	Chocolate colored fluid	1	2.4

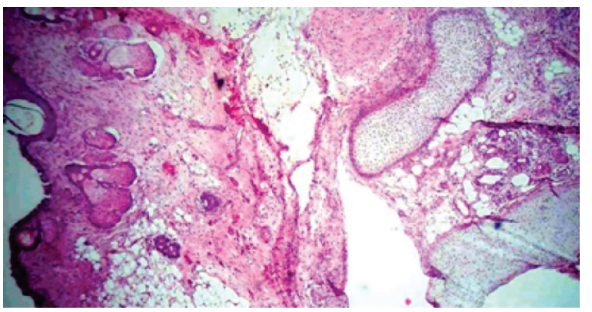

Figure 1: Mature teratoma lined by skin on left side with underlying adnexal structures, hematopoietic tissue, cartilage and small glandular spaces.

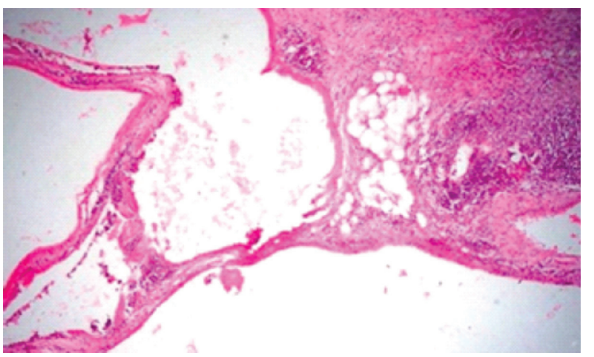

Figure 2: Mature teratoma showing multiple cystic spaces, fibroadipose and hematopoietic tissue.

blood vessels, adipose tissue, fibromuscular tissue, cartilage, skeletal muscle fibers, fibrocollagenous tissue, myxoid tissue and lymphatics. Endodermal derivatives appeared in the form of glands and ducts, thyroid tissue, respiratory and intestinal epithelium. (Fig. 4-6)

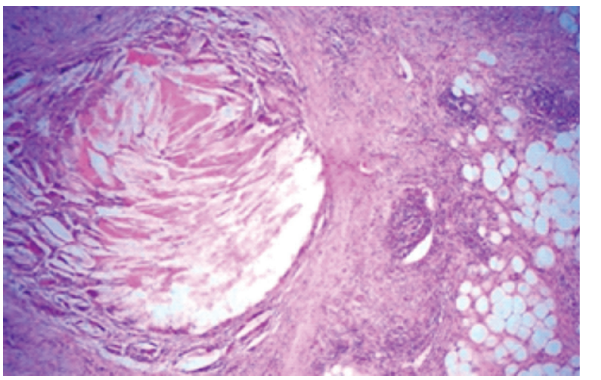

Figure 3: Mature teratoma showing areas of fat necrosis surrounded by foreign body giant reaction, cholesterol clefts, fibroadipose tissue and inflammatory infiltrate.

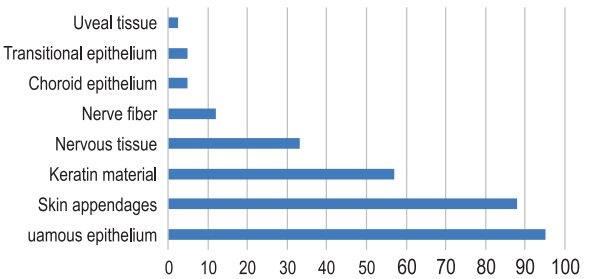

Figure 4: Frequency of ectodermal tissues found in mature teratoma.

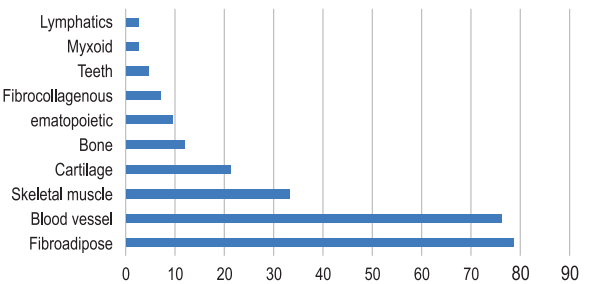

Figure 5: Frequency of mesodermal tissues found in mature teratoma

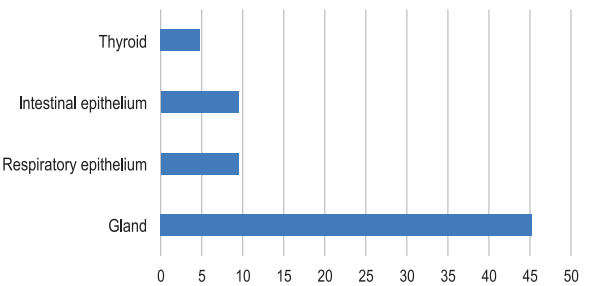

Figure 6: Frequency of endodermal tissues found in mature teratoma.

DISCUSSION

In this study we determined the morphological spectrum of mature ovarian teratomas. Its frequency in our study was 17% among all ovarian neoplasms.

Other studies from Khyber Pakhtunkhwa province by Sumaira et al[7] and Samina et al[8] showed the frequency of mature teratoma to be 18% and 19.35% respectively which is consistent with our study. However a retrospective study carried out by Ahmad et al[9] at Agha Khan University Karachi found benign teratomas to be 35.17% of all benign ovarian tumors which may highlight the differences in referral types. Internationally the frequency of mature cystic teratomas account for 10-20% of all ovarian neoplasms.[10]

In our study we analyzed mature ovarian teratomas both on gross and microscopic examination. Grossly, we considered its size, laterality, number of loculations and its contents. Microscopically, the details of various mature tissues were studied.

The tumor size ranged from 3 to 30 cm with 35.7% having diameter >10 cm in our study. Other studies reported sizes ranging from 5 to 10 cm in diameter in 60% of mature teratomas.[10-14]

In our study the majority of teratomas i.e. 64.3% were located on the left side. This is in contrast to Ismail RS[14]and Chun et al[15] who found 72.2% and 55.4% of benign teratomas on right side respectively. These findings may be coincidental.

In our study, most of the teratomas were unilocular (71.4%) whereas Outwater et al[16] and Jung et al[17] both found it to be 88%. We found cystic nature of teratoma in 90.5% of the cases which is consistent with results of Morillo et al[18] who found it to be 96%.

In our study, the ectodermal elements consisted of squamous epithelium 95.2%, skin appendages 88.1%, keratin material 57.1%, nervous tissue 33.3%, nerve fibers 11.9%, choroid epithelium 4.8%, transitional epithelium 4.8% and uveal tissue 2.4%. The mesodermal elements included fibroadipose tissue 78.6%, blood vessels 76.2%, skeletal muscle fibers 33.3%, cartilage 21.4%, bone 11.9%, hematopoietic tissue 9.5%, fibro-collagenous tissue 7.1%, teeth 4.8%, myxoid tissue and lymphatics 2.4% each. The endodermal elements included glandular structures 45.2%, respiratory epithelium and GIT epithelium 9.5% each and thyroid 4.8%.

In spite of our meticulous literature review we could not find many articles which described the microscopic details of benign mature teratomas except for one study carried in 1970 by Caruso et al in which he gave a detailed description of various components. According to him the skin constituted 99.3% of all the benign cystic teratoma with skin appendages found in 96.8%. In his study of 305 cases other prominent contents of mature teratoma were fibroadipose tissue 67.4%, cartilage 38.6%, nervous tissue 32.3%, bone 18.6%, respiratory epithelium 17.5%, teeth 7.7%, thyroid tissue 7% and gastrointestinal epithelium 7%.[19] This means that the various constituents of benign cystic teratoma of ovary have not been given their due importance because of the fact that most of them are diagnosed easily on gross examination when they contain hair and abundant sebaceous secretions.

In the absence of usual ectodermal features and sebaceous secretions there is a possibility of missing benign cystic teratomas on gross and microscopic examination. This happened with two of our cases in which their outer surface was lobulated and grayish white to grayish brown. Their consistency was soft to firm and cystic and their cut surfaces had solid appearance with tiny cystic areas scattered all over containing serous to mucinous secretions. In the absence of the usual ectodermal elements the diagnosis of mature teratoma was based on the disorganized presence of various endodermal and mesodermal tissues along with cystic spaces lined by epithelial cells. In one of these cases there was prominent inflammatory and giant cell reaction around foci of fat necrosis. (Fig. 3)

CONCLUSION

The possibility of mature teratoma must be considered both grossly and microscopically in an ovarian tumor even in the absence of usual ectodermal elements and sebaceous secretions.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.