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Epidemiologic study of 230 cases of testicular/paratesticular tumors or masses: 15-year experience of a single center

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ABSTRACT

Purpose: This study retrospectively investigated the cases of testicular tumors/masses treated in our center from 2002 to 2017 and analyzed their epidemiologic features.
Methods: Data were collected by searching our center's database using "testicular tumor" or "testicular mass" as keywords. Patients not operated in our hospital were excluded. Preoperative serum alpha-fetoprotein (AFP) levels were reviewed in germ cell tumor (GCT) cases and analyzed to predict malignancy in various age groups.
Results: In total, 230 cases were identified: 151 were benign (78 in the left, 72 in the right, and 1 bilateral) with 3.63 years mean age during the operation, and 79 were malignant (42 in the left, 36 in the right, and 1 bilateral) with 2.21 years mean age during the operation. Main pathological diagnoses were mature teratoma (92, 40.00%), yolk sac tumor (53, 23.04%), dermoid cyst (23, 10.00%), embryonic carcinoma (15, 6.53%), immature teratoma (14, 6.09%), benign cyst (8, 3.48%), Leydig cell tumor (6, 2.61%), and paratesticular rhabdomyosarcoma (5, 2.17%). All GCT cases with AFP >1000 ng/ml, >100 ng/ml, >20 ng/ml were malignant in <7-, 7–9-, and ≥10-month-old groups, respectively.
Conclusions: Radical inguinal orchiectomy without biopsy is suggested in 7–9- and ≥10-month-old cases with AFP >100 ng/ml and >20 ng/ml, respectively.
Type of study: Retrospective Study.
Level of evidence: Level III-IV.

Testicular tumors are rare with an incidence from 0.3–2/100,000 in children and adolescents or young adults [1–3], or 0.98–1.29/100,000 in <14 years population [4,5]. Most prepubertal testicular tumors are germ cell tumors (GCTs) comprising various histologic subtypes. Previous studies reported various distributions of histological types of GCTs [4,6–10].

Alpha-fetoprotein (AFP) is the most important tumor marker for testicular tumors. Serum AFP levels are elevated in malignant GCTs. However, few articles reviewed the correlation of the preoperative AFP levels and the possibility of malignancy, especially the boundary AFP value of malignant GCTs.

We retrospectively studied the cases of testicular/paratesticular tumors or masses treated in our center, from 2002 to 2017, and analyzed their epidemiologic features.

1. Methods

We searched for testicular tumor cases in the database of our institution using the keywords of "testicular tumor", "testicular-occupying lesion", "benign testicular tumor" or "malignant testicular tumor". Data before 2002 are not available in this database. Patients who were not operated in our hospital were excluded from this study.

A retrospective chart review was conducted. Age upon operation, laterality of tumor, pathologic diagnosis, and preoperative serum AFP levels were reviewed. In GCT cases, preoperative serum AFP levels were analyzed to predict malignancy in different age groups (<7, 7–9, and ≥10 months). Preoperative serum AFP levels were correlated with final histological outcome to determine the diagnostic accuracy of AFP for the preoperative detection of testicular malignancies. AFP values were taken common logarithm as lgAFP in graphing because of their wide distribution.

Commercially available enzyme-linked immunoassay kits (Roche Diagnostics, Indianapolis, IN, USA) were used for AFP clinical laboratory test in our hospital.

The study was approved by the ethics committees at the Children's Hospital of Fudan University.

2. Results

A total of 230 cases with testicular/paratesticular tumor or lesion were enrolled in this study, 206 (89.57%) were primary testicular

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tumors. One hundred fifty-one cases were benign (65.65%, including 8 non-tumor lesions), comprising 78 cases in the left, 72 in the right, and one bilateral with the mean age of 3.63 (0.15–13.77) years during operation. However, 79 cases were malignant (34.35%), comprising 42 in the left, 36 in the right, and one bilateral with the mean age 2.21 (0.21–13.35) years during operation. Fig. 1 shows cases of each pathological diagnosis. Table 1 shows the median age, 25th–75th percentile age and age range of main histologic types of tumor.

These 230 case were grouped into 3 groups based on their ages, 177 (76.96%), 36 (15.65%), and 17 (7.39%) of whom were 0–4, 5–9, and 10–14 years old, respectively. The most frequent histologic types in each group were mature teratoma, dermoid and mature teratoma, respectively (Fig. 2).

Of these 230 cases, 199 were GCTs, including 129 (64.82%) benign, with the mean age of 3.33 (0.15–13.77) years during operation; and 70 (35.18%) were malignant, with the mean age of 1.83 (0.21–6.75) years during operation. Histologic subtypes were 92 (46.23%) MT, 53 (26.63%) YST, 23 (11.56%) dermoid, 15 (7.54%) EC, 14 (7.04%) IT, 2 (1.01%) MGCT.

Preoperation serum AFP levels were available in 196 GCT (except for three mature teratoma) cases, ranging from 0.5 ng/ml to 550 ng/ml in benign cases and 31.8–96,970 ng/ml in malignant ones. These 196 cases were divided into three groups based on age: <7, 7–9, and ≥10 months. Twenty-two cases were grouped into <7-month group, including 10 MT, 9 IT, and 3 YST with 14.57–223.4, 31.63–550, and 2664–39,620 ng/ml AFP ranges, respectively. Twenty-three cases were grouped into 7–9-month group, including 14 MT (AFP ranging from 3.63-72 ng/ml), 4 IT (AFP ranging from 12.07–69.9 ng/ml), 4 YST and 1 MGCT (in malignant cases AFP ranging from 1502 to 12,610 ng/ml, 2 cases >1210 ng/ml). One hundred fifty-one cases were grouped into ≥10-month group, including 64 MT (AFP ranging from 0.54–12.4 ng/ml, one case <0.605 ng/ml), 1 IT (AFP 1.6 ng/ml), 24 dermoid (AFP ranging from 0.5–7.85 ng/ml, one case <0.605 ng/ml), 46 YST, 15 EC and 1 MGCT (in malignant cases AFP ranging from 31.8–96,970 ng/ml, 8 cases >1210 ng/ml, one case >3000 ng/ml).

There were two cases with AFP <0.605 ng/ml, 10 cases with AFP >1210 ng/ml and one case with AFP >3000 ng/ml. We used their upper limiting value (0.605) or lower limiting value (1210 or 3000) in statistics and diagram analysis. Fig. 3a-c shows the lgAFP and month of age distribution of all cases.

Table 1
Patient age during operation of different histologic types of testicular/paratesticular tumor.

	n	Median (years)	25th–75th percentiles (years)	Range (years)
Benign tumors				
Mature teratoma	92	1.29	0.78–2.78	0.15–11.77
Immature teratoma	14	0.51	0.41–0.62	0.30–1.39
Dermoid cyst	23	8.14	5.63–9.71	2.58–13.77
Leydig cell tumor	6	7.85	6.67–8.45	4.86–10.79
Benign cyst	8	0.47	0.37–1.19	0.26–11.76
Malignant tumors				
Yolk sac tumor	53	1.46	1.03–2.07	0.21–6.75
Embryonal carcinoma	15	1.32	1.15–1.75	0.85–6.27
Paratesticular RMS	5	3.49	2.58–6.03	0.76–13.35

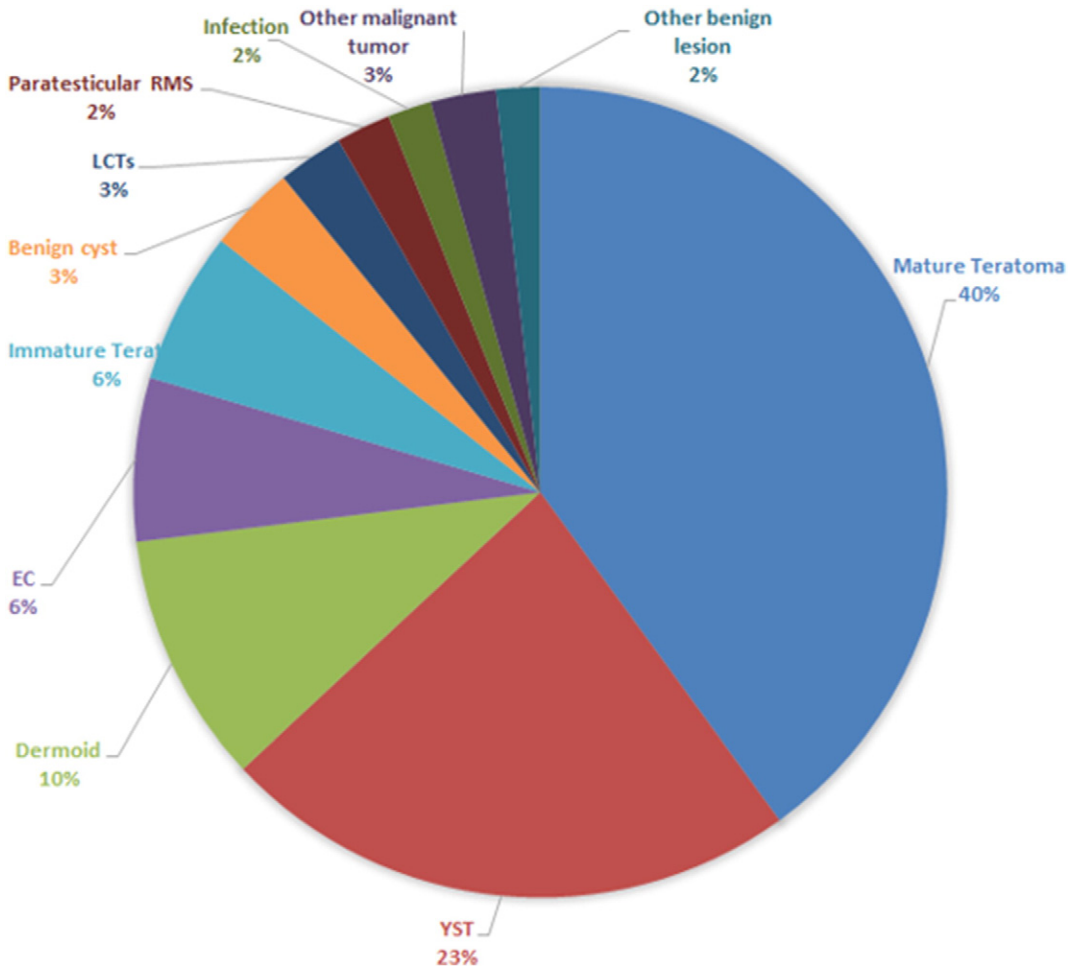

Fig. 1. Pathologic diagnosis of 230 testicular/paratesticular tumor or mass cases. Case numbers: MT, mature teratoma 92; YST, yolk sac tumor 53; dermoid cyst 23; EC, embryonic carcinoma 15; IT, immature teratoma 14; benign cyst 8; LCT, Leydig cell tumor 6; PT-RMS, paratesticular rhabdomyosarcoma 5; inflammation/infection 4; MGCT, mixed germ cell tumor 2; leukemia 2; lymphoma 2; other benign lesions 4 (fibrous tissue 1, Kaposi hemangioendothelioma 1, necrosis of torsional testis 1, calcification 1).