RESEARCH ARTICLE

Distribution of Testicular Tumors in Lebanon: A Single Institution Overview

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Abstract

Background: Testicular tumors constitute a rare type of cancer affecting adolescents and young adults with recent reports confirming an increase in incidence worldwide. The purpose of this study was to estimate the epidemiological characteristics and histological subtypes of testicular tumors in the Lebanese population according to the WHO classification of testicular and paratesticular tumors. Materials and Methods: In this single institutional retrospective study, all patients diagnosed with a testicular tumor in Hotel-Dieu de France Hospital University in Beirut between 1992 and 2014 were enrolled. The age, subtype based on the 2004 WHO classification and body side of tumor were analyzed. Results: A total of two hundred and forty-four (244) patients diagnosed with a testicular tumor in our institution were included in the study. Two hundred and one patients (82.4% of all testicular tumors) had germ cell tumors (TGCT). Among TGCT, 50% were seminomatous tumors, 48% non-seminomatous tumors (NST) and 2% were spermatocytic seminomas. The NST were further divided into mixed germ cell tumors (63.9%), embryonic carcinomas (18.6%), teratomas (15.4%) and yolk sac tumors (2.1%). The mean age for testicular tumors was 32 years. The mean age for germ cell tumors was 31 years and further subtypes such as seminomatous tumors had a mean age of 34 years, 28 years in non-seminomatous tumors and 56 years in spermatocytic seminoma. Patients with right testicular tumor were the predominant group with 55% of patients. Three patients (1.2%) presented with bilateral tumors. Conclusions: The distribution of different subgroups and the mean age for testicular tumors proved comparable to most countries of the world except for some Asian countries. Germ cell tumors are the most common subtype of testicular tumors with seminomatous tumors being slightly more prevalent than non-seminomatous tumors in Lebanese patients.

Keywords: Testicular tumors - WHO classification 2004 - germ cell tumor - epidemiology - Lebanon

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Introduction

Testicular tumors have been increasing steadily in the United States (Ghazarian et al., 2014), in North Europe (Richiardi et al., 2004), in Africa and in Asia (Ferlay et al., 2013). It represents a relatively rare disease and it accounts for approximately 1% of all tumors (Ferlay et al., 2013). In Lebanon, according to the National Cancer Registry results of 2008, 65 new cases of testicular cancer were diagnosed per year. It accounts for 3.3/100,000 Lebanese male patients and 1.4% of all new cancers. It is more common between 25-40 year old (2008).

Advances in treatment modalities have given the hope of cure for more than 95% of young patients diagnosed with a testicular tumor and in more than 80% of patients with metastases (Hanna and Einhorn, 2014). Known risk factors for developing testicular tumor include cryptorchidism, birth weight, gestational age, inguinal hernia and twinning (Looijenga et al., 2014).

The 2004 WHO classification of testicular and paratesticular tumors include seven large subgroups: germ cell tumors, sex cord/gonadal stromal tumors, mesenchymal tumors of the spermatic cord and testicular adnexa, hematopoietic tumors, tumors of paratesticular structures, miscellaneous tumors and secondary tumors of the testis (Eble et al., 2004).

The literature is poor regarding the distribution of testicular tumors and its subtypes in the Middle Eastern population. The purpose of this study is to determine the epidemiological characteristics of patients diagnosed with testicular tumors in our institution and subsequently in Lebanon, according to the WHO classification, which could reflect its real epidemiological distribution in our region.

Materials and Methods

This is a single institutional retrospective study. It enrolled all patients diagnosed with a testicular tumor at Hotel-Dieu de France University Hospital in Beirut,

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Lebanon, between January 1992 and December 2014. Hotel-Dieu is a multidisciplinary and a tertiary Hospital with more than 600 beds, where around 20% of Lebanese cancer patients are diagnosed and treated (Lebanese cancer epidemiologic features according to a single institution records, non-published data).

All pathology reports were collected from the computerized database. Patients with non-diagnostic specimens were excluded. Two pathologists most often established the diagnosis and an expert pathologist in urological tumors reviewed all discordant results. The age of the patient, the side of the tumor (left, right or bilateral) and its subtype based on the 2004 WHO classification were collected for analysis. Germ Cell Tumors, the most frequent subtype of testicular cancer, are further divided into: seminomas, nonseminomas and spermatocytic seminomas for descriptive purposes.

Results

Main results are summarized in Table 1. Two hundred and forty-four (244) patients were collected during 22 year period. Two hundred and one (82.4%) had germ cell tumors. Among germ cell tumors, seminomatous type (50%) were slightly more frequent than non-seminomatous (48%); only four patients (2%) were diagnosed with a spermatocytic seminoma. The most frequent subtype of non-seminomatous tumors was mixed germ cell tumors with 63.9%, followed by embryonal carcinoma (18.6%), teratoma (15.4%) and yolk sac tumor (2.1%).

Other subtypes according to the 2004 WHO classification of the testicular and paratesticular tumors represented all together 17.6%. They were divided into sex cord/gonadal stromal tumors (5.3% with a mean age of 36 years), mesenchymal tumors of the spermatic cord

Table 1. Histological Subtypes of Testicular Tumors

Type of tumor	Number of cases	Mean Age (years)	Proportion	Right tumors
Germ cell tumors	**201**	**31**	**82.40%**	**57%**
Seminoma	100	34	50%	54%
Non-Seminoma	97	28	48%	60%
Embryonal carcinoma	18	29		
Yolk sac tumor	2	2		
Trophoblastic tumours	0	-		
Teratoma	15	31		
Mixed Germ Cell Tumors	62	28		
Spermatocytic seminoma	4	56	2%	
Others	**43**	**36**	**17.60%**	**48%**
Sex cord/gonadal stromal tumors	13	36		
Leydig cell tumor	9	34		
Tumours of the thecoma/fibroma group	1	25		
Unclassified	1	45		
Incompletely differentiated	1	28		
Sex cord/gonadal stromal tumors, mixed forms	1	63		
Mesenchymal tumors of the spermatic cord and testicular adnexa	14	27		
Hematopoietic tumours	9	48		
Tumors of paratesticular structures	5	47		
Miscellaneous tumors of the testis	1	46		
Secondary tumors of the testis	1	5		
Total	244	32		

Table 2. Comparison of Different Testicular Tumors Subtypes and Age Distribution in Different Countries

	Asia				America	Europe				Others	
	Lebanon	Saudi Arabia	Japan	Pakistan	USA	Denmark	England	Germany	France	Australia	Morocco
		(El-Hsseiny, 2001)	(Miki et al., 2014)	(Mushtaq et al., 2007)	(Trabert et al., 2014)	(Richiardi et al., 2004)	(Horwich et al., 2013)	(Ruf et al., 2014)	(Walschaerts et al., 2008)	(Baade et al., 2008)	(Raiss et al., 2011)
Year	1991 - 2014	1975 - 1997	2005-2008	2001 - 2006	1973 - 2004	1943 - 1999	1994-2003	1976-2010	1980-1999	1982-2004	1996 - 2009
Number of cases	244	270	1121	107		9138	649	2482	1012	11052	396
TGCT	201 (82%)	270	1121	72 (62%)	0.98	8762 (96%)	649	2482	1012	10690	396
ST	100 (50%)	147 (54%)	694	30 (44%)	0.55	4929 (56%)	360 (55%)	1179 (48%)	458 (45%)	6086 (57%)	160 (40%)
NST	97 (48%)	123 (46%)	427	42 (56%)	0.44	3833 (44%)	289 (45%)	1303 (52%)	554 (55%)	4538 (42%)	232 (59%)
SS	4 (2%)	/		/	0.01					66 (1%)	4 (1%)

TGCT, testicular germ cell tumors; ST, seminomatous tumors; NST, non-seminomatous tumors; SS, spermatocytic seminomas

and testicular adnexa (5.7% with a mean age of 27 years), hematopoietic tumors (3.7% with a mean age of 48 years), tumors of paratesticular structures (2.1% with a mean age of 47 years), miscellaneous tumors (0.4% with a mean age of 46 years) and secondary tumors of the testis (0.4% with a mean age of 5 years).

The mean age for testicular tumor was 32 years. Patients diagnosed with germ cell tumors had a mean age of 31 years (standard deviation of 10 years). Those diagnosed with seminoma had a mean age of 34 years (standard deviation of 7 years) while in the non-seminomatous subgroup, the mean age was 28 years (standard deviation of 10 years). Patients diagnosed with spermatocytic seminoma had a mean age of 56 years (standard deviation of 20 years).

In our analysis, the right testis (55%) was more frequently affected than the left testis (44%). Bilateral tumors were found in 3 patients, and represented 1% of all testicular cancer. The right predominance of testicular tumors concerned both the non-seminomatous group (60%) and the seminomatous group (54%).

Discussion

Rare are the studies published in the past few years on testicular cancer in Asia. It represents 10.5% of all male reproductive cancers in India (Takiar and Kumar, 2014) and 12.8% in Iran (Basiri et al., 2014). In our study, testicular germ cell tumors (TGCT) represented 82% of all testicular cancers, and constituted the largest proportion of testicular tumors. These findings are consistent with numbers in the literature (Table 2). In Asia, TGCT have a lower incidence in Pakistan (Mushtaq et al., 2007) and Nepal (Karki and Bhatta, 2012) (62.28% and 62.5% respectively). Conversely, this subtype constitute a much higher proportion of testicular tumors in Australia (Baade et al., 2008), the United States (Trabert et al., 2014) and several European countries such as Germany (Ruf et al., 2014) and some Scandinavian countries (Richiardi et al., 2004) with proportions exceeding 95%.

A further analysis of the subgroups of TGCT showed 50% of seminomatous tumors, 48% of non-seminomatous tumors and 2% of spermatocytic seminomas. The slightly higher rate of seminomatous tumors was also reported in Saudi Arabia (El-Hsseiny, 2001), in Japan (Miki et al., 2014), in the United States (Trabert et al., 2014), in Scandinavian countries (Richiardi et al., 2004), in England (Horwich et al., 2013) and in Australia (Baade et al., 2008). Non-seminomatous tumors were however more frequent in Pakistan (Mushtaq et al., 2007), Morocco (Raiss et al., 2011) and France (Walschaerts et al., 2008). Our proportion of spermatocytic seminoma (2% of TGCT) is similar to the one reported in several countries like Morocco (Raiss et al., 2011), USA (Trabert et al., 2014) and European countries (Richiardi et al., 2004), estimated at 1%. Among the non-seminomatous tumors, mixed germ cell tumors (MGCT) constituted the most frequent subgroup with 63.9% of patients followed by embryonal carcinoma and teratomas. The same order of frequency has been reported in Japan, yet with different proportions relative to MGCT (76.3%), embryonic carcinoma (11.6%) and malignant teratoma (5.7%) (Miki et al., 2014). The predominance of mixed germ cell tumors among non-seminomatous tumors has also been reported in Turkey (Ozgun et al., 2013). Few studies have approached the subject of distribution of non-seminomatous tumors, probably due to limited clinical or therapeutic impact.

On the other hand, the mean ages for patients diagnosed with a testicular tumor and TGCT were respectively 32 years and 31 years. Among the patients diagnosed with TGCT, the mean age at diagnosis of seminoma cases was 34 years, which is similar to the mean age published in the United States, in Germany and in Pakistan. However, the mean age of patients diagnosed with non-seminomatous tumors in our study was 28 years, while it reached 31 years in Germany, 25 years in the United States and 23 years in Pakistan. This confirms the known younger age of patients with non-seminomatous tumors compared to the seminomatous subtype (McGlynn et al., 2003; Mushtaq et al., 2007; Ruf et al., 2014). Patients with spermatocytic seminoma are in the middle-age range, which is compatible with the literature (mean age of 56 years in our population, 54 years in the US and 45 years in Morocco) (McGlynn et al., 2003; Raiss et al., 2011).

In our study, right testis tumors (55%) were more frequent than left testis tumors (44%). In a Japanese study, a similar distribution was found with 52% of right testis tumors and 47% of left testis tumors (Miki et al., 2014). Another Pakistani study reports 54.3% of right testis tumors and 41.7% of left testis tumors (Bhatti et al., 2014). One can explain this side discrepancy by the fact that cryptorchidism, which is associated with 2-4 increased fold risk of testicular cancer, is more prevalent in the right testis (Boyle and Zaridze, 1993; Moller and Skakkebaek, 1996; Swerdlow et al., 1997). Bilateral tumors were found in 1% of all our testicular tumors, which is comparable to the literature with rates ranging from 0.5 to 4 % (Coogan et al., 1998; Hentrich et al., 2005; Miki et al., 2014). In fact a large study, performed on 4000 patients in Memorial Sloan Kettering Cancer Center, found 1.5% of bilateral tumors and most importantly confirmed similar outcomes to patients with unilateral tumors. Based on these findings, routine contralateral testicular biopsy is not recommended in patients with TGCT (Holzbeierlein et al., 2003).

In conclusion, distribution of testicular tumors in our institution and subsequently in Lebanon shows over 80% of testicular cancer cases to be TGCT. Half of those tended to be seminomatous tumors. Among non-seminomatous tumors, two thirds of the cases were MGCT. Patients diagnosed with seminomatous or non-seminomatous tumors were respectively in their 4th and 3rd decade. In our study, we report a slightly higher prevalence of right-sided testis tumors.

This confirms that the distribution in our population is comparable to most of the world countries. However, the incidence of TGCT among all testicular cancers seems lower in other Asian countries.

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