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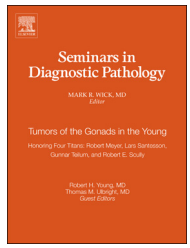

Testicular and paratesticular tumors and tumor-like lesions in the first 2 decades

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ABSTRACT

The spectrum of testicular tumors and tumor-like lesions that affect young patients (defined for purposes of this article as less than 20 years old) differs significantly from that in an older age group. Although germ cell tumors remain the single largest category, they are a smaller proportion than in adults. Furthermore the pathogenesis and behavior of comparably named germ cell tumors differ depending on whether or not they have developed in prepubertal or postpubertal patients. This is most apparent for the teratomas, which are almost uniformly benign in children but, with some notable exceptions, malignant in the older patients. But even the most common malignant tumor of the testis in children, the yolk sac tumor, despite its identical morphology, lacks the association with other germ cell tumor types, including intratubular germ cell neoplasia, and more aggressive behavior that typify the adult tumors. Among the sex cord–stromal tumors, the juvenile granulosa cell tumor predominates in children, mostly occurs in those under 1-year old, and, for all intents and purposes, is not seen in the postpubertal period. It has a distinctive morphology and, to date, a uniformly benign outcome. There are additional tumors in the sex cord–stromal group that are mostly seen in young patients, including the large cell calcifying Sertoli cell tumor and intratubular large cell hyalinizing Sertoli cell neoplasia. The former is sometimes associated with the Carney syndrome and, to date, all of the latter with the Peutz–Jeghers syndrome. The subtypes of lymphomas and leukemias that involve the testis in children are rare in older patients, and similar remarks pertain to the metastatic tumors, where neuroblastoma (especially) and Wilms' tumor are most common but may be mimicked by primary tumors originating in the paratestis. The pseudoneoplastic lesion, the testicular "tumor" of the adrenogenital syndrome, is usually found in young patients and bears a strong resemblance to the Leydig cell tumor, although there are features that allow its distinction, which is important given its frequently bilateral nature and amenability to medical management through glucocorticoid administration. One of the preferential sites for embryonal rhabdomyosarcoma is the paratestis of young patients, where the spindle cell variant predominates. The melanotic neuroectodermal tumor (retinal anlage tumor) usually occurs in the first year of life, typically involves the epididymis, and uncommonly metastasizes. Occasional cases of the desmoplastic small round cell tumor present in the paratestis of teenagers, and some distinctive tumor-like lesions of the paratestis may also be seen, including meconium periorchitis and splenic–gonadal fusion (occupying both testis and paratestis). These tumors and tumor-like lesions and many others are discussed in this review with the hope it will

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provide the diagnostic pathologist aid in recognizing the lesions and providing some insight into their clinical significance.

Introduction

Testicular and paratesticular tumors and tumor-like lesions differ in their frequency, and in some instances behavior, in children and teenagers in comparison to adults. This is partly illustrated by the experience at a university-based practice, where the relative frequency of testicular tumors in patients less than 15 years of age compared to those 15 years and older was 1:19,[1] and in the findings of the British Testicular Tumour Panel (BTTP), where among 952 cases of testicular tumors, 2% were in boys 0–14 years old.[2] As a consequence many pathologists are not familiar with the morphologic spectrum and clinical behavior of these neoplasms. For purposes of this essay we restricted our analysis to those under 20 years of age. Although puberty could have been used as a breakpoint as it marks a significant milestone for the germ cell tumors, it is only as males age beyond 20 years that they acquire the highest risk for this group of tumors. If the age of 30 years is the breakpoint in females, beyond which the "usual" ovarian tumors occur with appreciable frequency, we believe 20 years represents the comparable cutoff in the males. Accordingly, this discussion will be confined to patients less than 20 years of age, with recognition that this is an arbitrary line. This essay reviews the common as well as uncommon tumors and tumor-like conditions that occur in and adjacent to the testis of young patients in an effort to call attention to features, if any, unique to this era and differences that may exist between the two gonads. Also, some lesions of the young tend to receive limited consideration when the entire field of testicular tumors and tumor-like lesions is considered, and this article offers an opportunity to give these lesions particular attention.

Before considering each neoplasm and tumor-like lesion in turn, we will first consider the broad differences in frequencies of the various categories in the first 2 decades as compared to all males. Further differences within the first 2 decades will be considered when individual entities are discussed.

General remarks concerning the overall frequency of entities in the first 2 decades

The first decade

The most overt difference when only children in the first decade are considered is the decreased proportion of germ cell tumors compared to males as a group (Table 1). For practical purposes the only germ cell tumors that are seen in this decade are the yolk sac tumor and teratoma, with cases in the old literature designated as "infantile embryonal carcinoma," all now being regarded as yolk sac tumors. An interesting aspect of the germ cell tumors in this group is their stable incidence,[3] contrasting sharply with the steadily increasing incidence seen in the "usual" postpubertal germ cell tumors throughout the 20th century. One distinctive sex cord tumor, the juvenile granulosa cell tumor, is virtually confined to this decade and even has a particular tendency to occur in the youngest patients within the decade (see below). Other tumors in the sex cord–stromal group, including Sertoli cell tumors and unclassified sex cord–stromal tumors, may also be seen in this age group and represent a higher proportion of testicular tumors than in later years.

The relative frequency of leukemia in the early years of life makes it a significant issue in the first decade. The additional occurrence of occasional lymphomas makes hematopoietic tumors more or less as common at this time as in males as a whole, in whom the single greatest contribution to testicular neoplasia in men over 50 years old is due to lymphomas. Metastases to the testis are exceptionally rare, but some contribution comes from spread of neuroblastoma and Wilms' tumor. Occasional benign mesenchymal tumors of the testis (e.g., hemangiomas) and paratestis (lipomas, leiomyomas, and miscellaneous others) may be seen at this time, as well as rare cases of juvenile xanthogranuloma in either location. In the paratestis, rhabdomyosarcomas are

Table 1 – Comparison of the relative frequencies of different types of primary testicular tumors in children and all males.[a] (Data derived in part from Ross et al.[4])

Classification	Children (<12 years)	All males
Germ cell tumors	85%	95%
Yolk sac tumor (pure)	62%	<1%
Teratoma (pure)	23%	4%
Seminoma (pure)	<1%	48%
Embryonal carcinoma (pure)	<1%	10%
Mixed germ cell tumor	<1%	31%
Choriocarcinoma	rare	0.2%
Sex cord–stromal tumors	11%	4%
Unclassified	4%	<1%
Granulosa cell tumor (juvenile)	3%	0%
Granulosa cell tumor (adult)	0%	<1%
Sertoli cell tumor	3%	1%
Leydig cell tumor	1%	2%
Metastasis of carcinoma	Vanishingly rare	Occasional

[a] Because of the difficulty in distinguishing primary from secondary testicular lymphoma, no clear data are available for lymphoma as a primary neoplasm in children. Only entities with any appreciable difference are listed.