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***Research Article***

# HISTOPATHOLOGICAL STUDY OF TESTICULAR TUMORS IN NORTH-WEST RAJASTHAN (BIKANER REGION)

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## ABSTRACT
Purpose of the work was to study the incidence of testicular tumors in North West Rajasthan (Bikaner region) and classify them according to WHO classification. 36 cases of testicular malignancy, admitted to department of surgery were included in this study. The cases for the present study was constituted by all the cases diagnosed as testicular tumors histopathologically and registered in available record files in histopathological section of the Department of Pathology of S.P. Medical College, Bikaner. In the present study 36 cases of testicular tumors were studied out of which 23 cases (63.89%) the tumor involved right testis, in 13 (36.11%) left testis was involved. We found that germ cell tumors constituted the major portion (34 cases; 94.44%) in the present study.
The most common tumor was seminoma (17 cases; 47.22%) followed by Yolk sac tumor and Mixed germ cell tumors each contributing 6 cases (16.67%) of all testicular tumors. Embryonal carcinoma was third in number followed by teratoma contributing 3 cases (8.33%) and 2 cases (2.55%) of all testicular tumors respectively. Among mixed germ cell tumors, teratocarcinoma was predominant with 5 cases (13.88%) in all testicular tumors. Remaining one case (2.77%) was of yolk sac tumor with embryonal carcinoma.
Testicular tumors are rare malignancies of males. Most of the tumors are seen in 3$^{rd}$ and 4$^{th}$ decade of life with mean age of presentation being 31.01 years. Germ cell tumors are most common testicular tumors with seminoma being commonest of all. Teratocarcinoma is most common mixed germ cell tumor. Non-Hodgkin's lymphoma, Yolk sac tumor was most common tumor of old age and children respectively.

***Keywords*:** *Testis, Seminoma, Yolk Sac Tumor, Embryonal Carcinoma, Teratoma, Teratocarcinoma, Non-Hodgkin's Lymphoma*

## INTRODUCTION
Testicular cancers are rare in most parts of the world, with age standardized incidence rate ranging from 1/100,000 in Asian and African/ African American populations to 9.2/100,000 in Denmark (Parkin *et al.*, 1997).
Testicular cancers are rare in most parts of the world. Its incidence has been increasing since the middle of twentieth century in many Western countries, (Liu *et al.*, 1999; Zheng *et al.*, 1996; Bergstrom *et al.*, 1996; Dos *et al.*, 1999) with the potential exception of children ages 14 years or less, where little variation is observed (McGlynn *et al.*, 2003; Moller *et al.*, 1995).
The incidence increases shortly after onset of puberty and reaches maximum in men in late twenties and thirties (15-34 years). It decreases to a very low level in men in their sixties and older. A distinct peak in incidence of testicular tumors occurs in infants.
Testicular tumors comprise approximately 1% of all cancers in men, but only about 0.1% of cancer deaths in males because the majority of these tumors are curable (Eble *et al.*, 2004; Moller and Evans, 2003). The testicular tumors are almost entirely limited to three age groups, infancy and childhood, young adults and old age with peak incidence in 35-39 years (Gilbert and Hamilton, 1940; Mostofi, 1973).
The histopathological type and behaviour of these tumors significantly vary in each age group. Seminoma is not seen in infants in whom the commonest testicular tumor is yolk sac tumor (Khan and Chowdhary, 1997). Seminoma, embryonal carcinoma and teratoma are common in fourth decade of life, whereas spermatocytic seminoma, lymphoma and secondary deposits are seen in old age (Mostofi, 1973; Khan and Chowdhary, 1999; Abell and Holtz, 1968).

Extragonadal germ cell tumors accounts 1-5% of all germ cell tumors and considered as metastasis from occult or burned out gonadal cancer until proved otherwise. They affect men during third and fourth decade of life (Shaw, 2008; Shinagare *et al.*, 2012).

## MATERIALS AND METHODS

The study was carried out in the department of Pathology, Sardar Patel, medical college and associated group of hospitals, Bikaner. The study was hospital based prospective and retrospective study, including all the patients with testicular tumor who attended hospital.

Data were collected in a pre-set pro-forma. Detailed history with clinical presentationThe present study was conducted on records of 5 years (from January 2009 to December 2013; both retrospective and prospective study).

The case records from Pathology department and from registration office of PBM hospital, Bikaner were used as documents giving information as regard clinical knowledge. The paraffin section stain with hematoxylin and eosin (H and E) formed the basis of histological identification of testicular tumors which are classified according to nomenclature proposed by World Health Organization (W.H.O.). Whenever needed fresh sections were obtained from representative paraffin blocks.

***Inclusion Criteria:*** All testicular tumors diagnosed clinically, radiologically but histologically proven (primary, metastatic and from paratesticular region involving testis) were included.

***Exclusion Criteria:*** Non-neoplastic testicular lesion like cryptorchidism, orchitis and tumors of paratesticular region if not involving testis were excluded from the study.

In the situation of difficulty in diagnosis by H and E staining, special stains were used to clear the dilemma.

The special stains used are Periodic Acid Schiff's (PAS), PAS with diastase and Reticulin (Snook's Method).

Biopsies and whole specimens were received in 10% formalin. Gross features of the specimens were recorded. Representative sections were taken and after processing, tissue embedded in paraffin wax to make blocks. After making sections in microtome, staining was carried out with Haematoxylin and Eosin (H and E) stain.

## RESULTS AND DISCUSSION

### *Results*

This retrospective and prospective study on testicular tumors was conducted during a period spanning from January 2009 to December 2013.

During this period of consideration, 8471 male biopsies were received in the department, of which 1565 were male malignancies. Among these malignancies 210 cases were malignancies of male urogenital system of which 36 (17.14%) were testicular tumors.

So, this was a study of 36 cases of testicular tumors. These cases were further categorized in variants as per WHO classifications of testicular tumors. Out of 36 cases, in 23 cases (63.89%) the tumor involved right testis, in 13 (36.11%) left testis was involved. Hence, right testis was predominantly involved. None of the patient presented with bilateral involvement.

Major clinical presentation was painless scrotal swelling only, which was present in 27 (75%) of 36 cases followed by swelling with pain in 7 (19.45%) cases and cryptorchidism in two patient (5.55%).

The major presenting clinical features of the patients with testicular tumors wasscrotal swelling only (27; 75%), while scrotal swelling with pain was presenting feature in 7 (19.45%) cases. Two cases (5.55%) presented as cryptorchidism. None of the patients presented with gynaecomastia and history of testicular trauma.

Painless scrotal swelling was predominant finding in seminoma, yolksac tumor, Embryonal carcinoma, teratoma and mixed germ cell tumors. Both cases of NHL presented with scrotal swelling with pain. There were two cases of undescended testis, both were seminoma. Two cases of teratocarcinoma were also showing pain in addition to scrotal swelling.

**Table 1: Histopathological Distribution of Testicular Tumors (Classification as per WHO)**

| Histopathological Type of Tumor (n=36) | Number of Cases (% of total) |
|---|---|
| Germ Cell Tumor 34(94.44%) | |
| a.) Tumor of one histological type | |
| Seminoma | 17(47.22) |
| Yolk Sac Tumor | 6(16.66) |
| Embryonal carcinoma | 3(8.33) |
| Teratoma | 2(5.55) |
| b.) Tumor of more than one histological type | |
| Teratoma with Embryonal carcinoma (Teratocarcinoma) | 5(13.88) |
| Yolk Sac tumor with Embryonal carcinoma | 1(2.77) |
| Haematopoietic Tumor (Non-Hodgkin's Lymphoma) | 2(5.55) |
| Total | 36(100) |

On histopathological analysis of biopsy material and nomenclature of tumors as proposed by WHO we found that germ cell tumors constituted the major portion (34 cases; 94.44%) in the present study (Table 1).Twenty eight cases (77.78%) were tumors with one histological type and 6 cases (16.67%) were tumors of more than one histological type.

The most common tumor was seminoma (17 cases; 47.22%) followed by Yolk sac tumor and Mixed germ cell tumors each contributing 6 cases (16.67%) of all testicular tumors. Embryonal carcinoma was third in number followed by teratoma contributing 3 cases (8.33%) and 2 cases (2.55%) of all testicular tumors respectively. Among mixed germ cell tumors, teratocarcinoma was predominant with 5 cases (13.88%) in all testicular tumors. Remaining one case (2.77%) was of yolk sac tumor with embryonal carcinoma

Besides germ cell tumors, two cases were diagnosed as Non-Hodgkin's lymphoma (5.55% of all testicular tumors). No case of trophoblastic tumors, sexcord/gonadal stromal tumors or other tumors was found.

**Table 2: Age Incidence of Testicular Tumors**

| Age Group | Number of Cases | Percentage |
|---|---|---|
| 0-10yrs | 6 | 16.66% |
| 11-20yrs | 1 | 2.77% |
| 21-30yrs | 13 | 36.11% |
| 31-40yrs | 7 | 19.44% |
| 41-50yrs | 6 | 16.66% |
| 51-60yrs | 2 | 5.55% |
| >60yrs | 1 | 2.77% |

**Mean age of Presentation – 31.01 years**

Table 2 shows age wise incidence of testicular tumors.

To analyze the age related incidence of testicular tumors in this part of India we categorized patients into seven age groups, 0-10 yrs, 11-20 yrs, 21-30 yrs, 31-40 yrs, 41-50 yrs, 51-60 yrs and >60 yrs and we found 6,1,13,7,6,2 and 1 cases of testicular tumors respectively. Most cases were found in 3$^{rd}$ and 4$^{th}$ decade of life.The mean age of presentation was found to be 31.01 yrs.

We found that right testis was predominantly involved in seminoma (76.47%), Embryonal carcinoma (66.66%) and NHL (100%) while left testis was predominantly involved in teratocarcinoma (60%) and yolk sac tumor with Embryonal carcinoma (100%). Equal incidence of involvement was there in yolk sac tumor and teratoma. Overall, involvement of right side predominated (63.89%).

**Table 3: Frequency Distribution of Various Germ Cell Tumors (n=34)**

| S. N. | Tumor Type | Number of Cases | Percentage of Total GCTs |
|---|---|---|---|
| | **Tumors of One Histological Type (n=28; 82.35%)** | | |
| 1. | Seminoma | 17 | 50 |
| 2. | Yolk Sac Tumor | 6 | 17.64 |
| 3. | Embryonal carcinoma | 3 | 8.82 |
| 4. | Teratoma | 2 | 5.88 |
| | **Tumor of More Than One Histological Type (n=6; 17.64%)** | | |
| 1. | Teratocarcinoma | 5 | 14.70 |
| 2. | Yolk sac tumor with Embryonal carcinoma | 1 | 2.94 |

Table 3 shows frequency distribution of various tumor variants of germ cell tumors.
Of 34 cases of Germ Cell Tumors, 28 cases (82.35%) were tumors of one histological type and rest 6 cases (17.64%) were showing more than one histological type.

***Discussion***

Testicular cancers are rare in most parts of the world. Its incidence has been increasing since the middle of twentieth century in many Western countries (Liu *et al.,* 1999; Zheng *et al.,* 1996; Bergstrom *et al.,* 1996; Dos *et al.,* 1999), with the potential exception of children ages 14 years or less, where little variation is observed (McGlynn *et al.,* 2003; Moller *et al.,* 1995).
The incidence increases shortly after onset of puberty and reaches maximum in men in late twenties and thirties (15-34 years). It decreases to a very low level in men in their sixties and older. A distinct peak in incidence of testicular tumors occurs in infants. Testicular tumors comprise approximately 1% of all cancers in men, but only about 0.1% of cancer deaths in males because the majority of these tumors are curable (Eble *et al.,* 2004; Moller and Evans, 2003). The testicular tumors are almost entirely limited to three age groups, infancy and childhood, young adults and old age with peak incidence in 35-39 years (Gilbert and Hamilton, 1940; Mostofi, 1973).
Of all testicular tumors, 95% are germ cell tumors (GCT's). Fifty percent of GCT's are seminomas, 40% NSGCT while rest 10% include tumors containing both seminomatous and non-seminomatous elements (Eble *et al.,* 2004; Jemal *et al.,* 2009; Carver and Sheinfeld, 2005; Baade *et al.,* 2008).
The histopathological type and behaviour of these tumors significantly vary in each age group. Seminoma is not seen in infants in whom the commonest testicular tumor is yolk sac tumor (Khan and Chowdhary, 1997). Seminoma, embryonal carcinoma and teratoma are common in fourth decade of life, whereas spermatocytic seminoma, lymphoma and secondary deposits are seen in old age (Mostofi, 1973; Khan and Chowdhary, 1999; Abell and Holtz, 1968).
Extragonadal germ cell tumors accounts 1-5% of all germ cell tumors and considered as metastasis from occult or burned out gonadal cancer until proved otherwise. They affect men during third and fourth decade of life (Shaw, 2008; Shinagare *et al.,* 2012).
Currently the most comprehensive and widely accepted system of classification is the one proposed by the World Health Organization (WHO) (Eble *et al.,* 2004).

***Conclusion***

Testicular tumors are rare malignancies of males. Most of the tumors are seen in 3$^{rd}$ and 4$^{th}$ decade of life with mean age of presentation being 31.01 years. Germ cell tumors are most common testicular tumors with seminoma being commonest of all. Teratocarcinoma is most common mixed germ cell tumor. Scrotal swelling is major presenting feature and there is right sided predominance in testicular involvement. Non-Hodgkin's lymphoma, though a tumor of old age but can occur in any age group. Yolk sac tumor is most common tumor in children followed by teratoma.
Further studies over a larger sample and over a longer period of time is needed to study uncommon tumor variants and frequency distribution of testicular tumors.

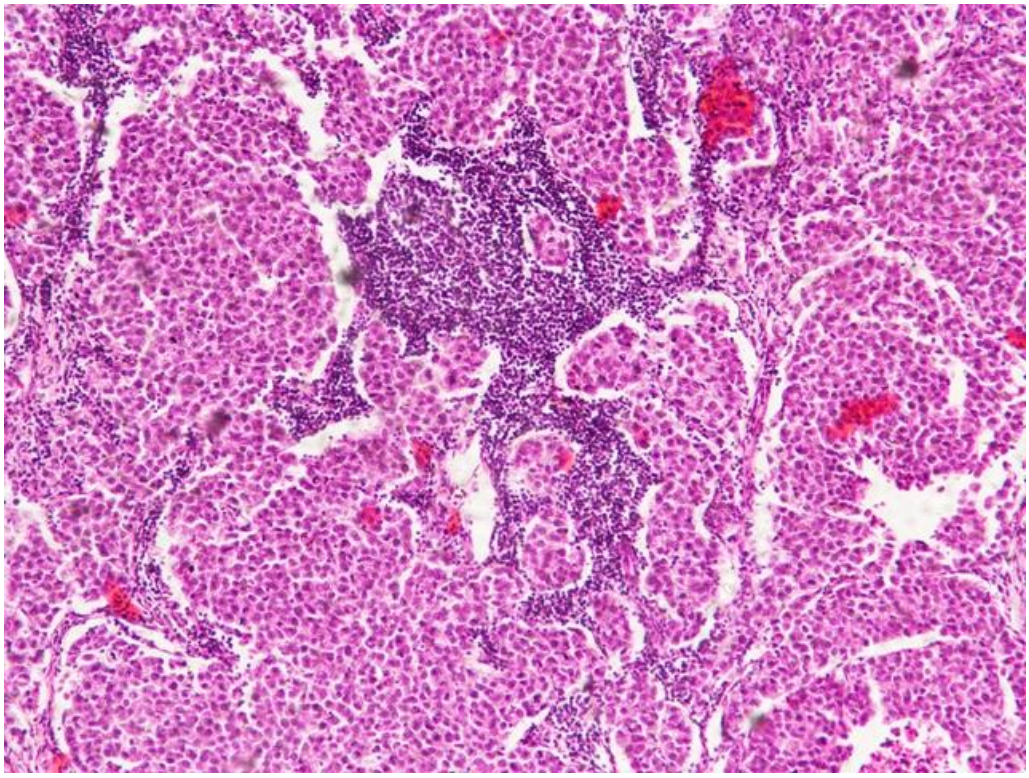

**Figure 1: Seminoma: Microphotograph Showing Diffuse Sheets and Nests of Tumor Cells Separated by Fibrous Trabeculae Containing Lymphocytes (H & E, 10X)**

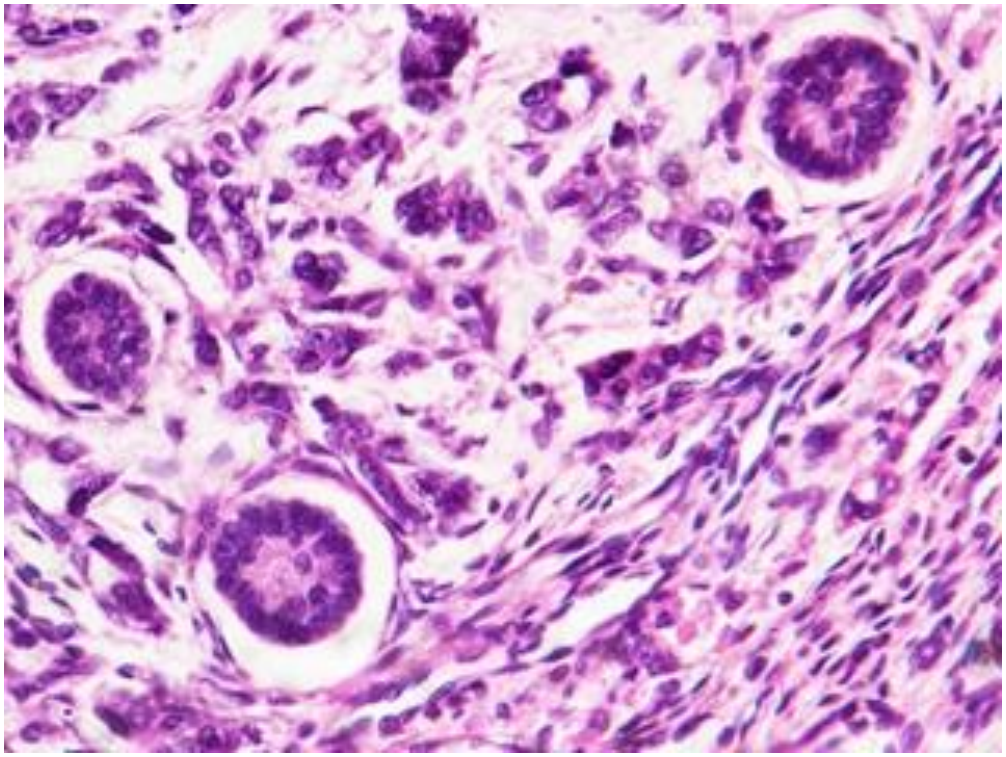

**Figure 2: Yolk Sac Tumor: Microphotograph Showing Schiller Duval Bodies (Perivascular Structures) (H& E, 40X)**

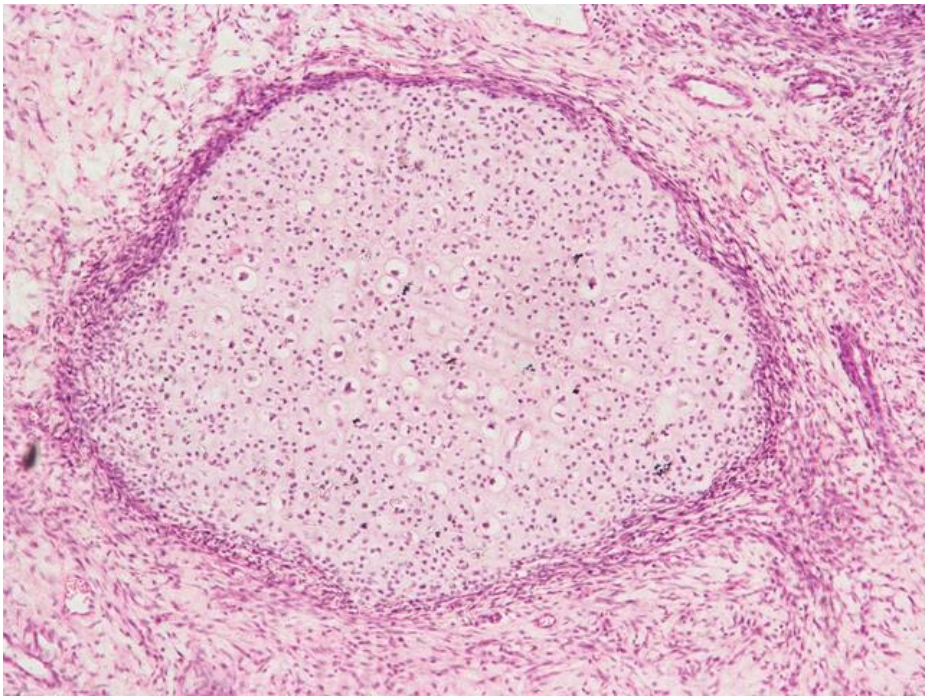

**Figure 3: Teratoma: Microphotograph Showing Teratoma Component of Tumor (Cartilage) (H & E, 10X)**

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