



Original Article

Histopathological spectrum of testicular lesions at the tertiary care center of Nepal

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ABSTRACT

Keywords:

Cryptorchidism;
Germ cell neoplasm;
Seminoma;
Testis;
Testicular torsion

Background: Testis is affected by both neoplastic and non-neoplastic conditions. Testicular malignancies are rather uncommon as compared to non-neoplastic conditions. Testicular malignancies make up less than 1% of all male cancers and are most prevalent in the 15-35 years' age group. The objective of this study was to assess the clinico-pathological spectrum of neoplastic and non-neoplastic lesions of the testis among patients seeking care at a tertiary care hospital of Nepal.

Materials and Methods: This is a retrospective descriptive study conducted in the Department of Pathology, Dhulikhel hospital. This study included all cases of orchidectomy specimens received in the Department of Pathology from January 2020 to January 2025. Data pertaining to histopathological diagnosis, age of the patient, and laterality of lesions were evaluated.

Results: Non-neoplastic lesions of the testis are more common than neoplastic lesions. 80.95% were non-neoplastic, and 19.05% were neoplastic. Testicular lesions were more common on the right side than on the left side. Among the 34 non-neoplastic lesions, the most common diagnoses were testicular atrophy and testicular torsion/infarction. Among neoplastic lesions, adenomatoid tumor, seminoma, and mixed germ cell tumors were equally distributed.

Conclusions: Testicular atrophy and torsion/infarction were the most frequent non-neoplastic findings, while seminoma, adenomatoid tumor, and mixed germ cell tumor were the common neoplasms. Testicular lesions showed a wide age distribution, with torsion occurring more frequently in younger individuals and neoplastic lesions clustering in middle-aged adults. These findings highlight the importance of histopathological evaluation in the accurate diagnosis and characterization of testicular lesions.

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INTRODUCTION

The testis, a male gonad, is an important organ of the male reproductive system and is homologous with the ovary of the female genital system. Both neoplastic and non-neoplastic lesion can affect the testis.¹ Testicular lesions typically manifest as scrotal swelling, pain, and abdominal mass. Non-neoplastic testicular lesions include cryptorchid (undescended) testis, testicular torsion, testicular atrophy, epidermoid cysts, infections of the testis, like tuberculosis, infertility, malakoplakia, and vasculitis.²

About 1% of boys aged one-year have cryptorchidism, the most prevalent genital abnormality in boys.³ Cryptorchidism is a significant risk factor for the development of testicular malignancy.⁴ Cryptorchidism, orchitis of mumps, liver cirrhosis, estrogen administration, radiation exposure, chemotherapy, and radiation exposure may cause testicular atrophy.⁵ Testicular torsion, commonly seen in 10-25 years of age, is a surgical emergency.⁶ Nonspecific epididymo-orchitis can be caused by infections. Tubercular epididymo-orchitis is a common manifestation of genitourinary tuberculosis and may be mistaken for testicular neoplasm.⁴

Testicular cancers are rather uncommon.^{7,8} Testicular malignancies make up less than 1% of all male cancers and are most prevalent in the 15-35 years' age group.^{9,10} Testicular cancer is also a rare malignancy in Nepal, where it represents 0.12% of all cancers and has a 5-year prevalence rate of 0.56 per 100,000 population.¹¹ Over the past 50 years, testicular neoplasm incidence has increased in Western countries.¹² Over the past few decades, the incidence has more than doubled globally and has been gradually increasing.¹³ There are various risk factors for the development of testicular tumors, such as undescended testis, infections, trauma, and genetic and environmental factors.¹⁴ Germ cell tumors account for about 95% of malignant tumors that develop in the testes.¹⁴ These are some of the most treatable malignancies in people, even though the majority of them act aggressively.¹⁴ Testicular malignancies exhibit a clear racial and geographic distribution.^{4,15} Testicular malignancies have a different age distribution than other types of cancer.¹⁶

To reach a conclusive diagnosis, histopathological examination is crucial.¹⁷ The prognosis and available treatments are determined by histopathological features.⁴ Local data on testicular lesions in Nepal are sparse, with only three hospital-based studies reporting malignancies in 11–15% of cases.^{15,16,18} Therefore, the objective of this study was to assess the histopathological spectrum and clinical findings of neoplastic and non-neoplastic lesions of the testis and contribute to the limited regional literature.

MATERIALS AND METHODS

This is a retrospective cross-sectional descriptive study conducted in the Department of Pathology, Dhulikhel Hospital. This study included data from January 2020 to January 2025. The study was initiated after ethical approval from the institutional review committee. All the cases of orchidectomy specimens received in the Department of Pathology during the 5 years were included. Bilateral orchidectomy specimens for prostatic adenocarcinoma and small testicular biopsies were excluded from the study. A consecutive non-probability sampling method was used for selection of cases. The data of histopathological diagnosis

and clinical features were retrieved from the data archived in the department of pathology digital registry and record book. The histopathological diagnoses were made by the pathologists working in the Department of Pathology, Dhulikhel Hospital. The tumors were classified as per the World Health Organization classification of tumors, urinary and male genital tumors, 4th and 5th editions.^{19,20} The variables such as histopathological diagnosis, age of the patient, and laterality of the lesions were entered in Microsoft Excel 2016. The mean, frequency, and percentage were calculated, and cross-tabulation was done using Statistical package for social sciences (SPSS), version 26.

RESULTS

A total of 42 cases of orchidectomy were included in our study over a period of five years (January 2020 to January 2025). The histopathological diagnoses are shown in Table 1.

Table 1: Histopathological spectrum of testicular lesions

Histopathological Diagnosis	Frequency (%)
Adenomatoid tumor	2 (4.8)
Seminoma	2 (4.8)
Mixed germ cell tumor	2 (4.8)
Granulosa cell tumor (adult type)	1 (2.4)
Rhabdomyosarcoma (embryonal)	1 (2.4)
Cryptorchidism	3 (7.1)
Necrotizing granulomatous inflammation	1 (2.4)
Nonspecific epididymo-orchitis	5 (11.9)
Normal testicular tissue	4 (9.5)
Testicular abscess	1 (2.4)
Testicular atrophy	10 (23.8)
Testicular infarction/torsion	10 (23.8)
Total	42 (100)

The mean age of the patients in our study is 46.45±24.10 years. The patients' ages ranged from 6 years to 84 years. The majority of testicular lesions were non-neoplastic (34 cases, 80.95%), while neoplastic lesions accounted for 8 cases (19.05%). (fig.1)

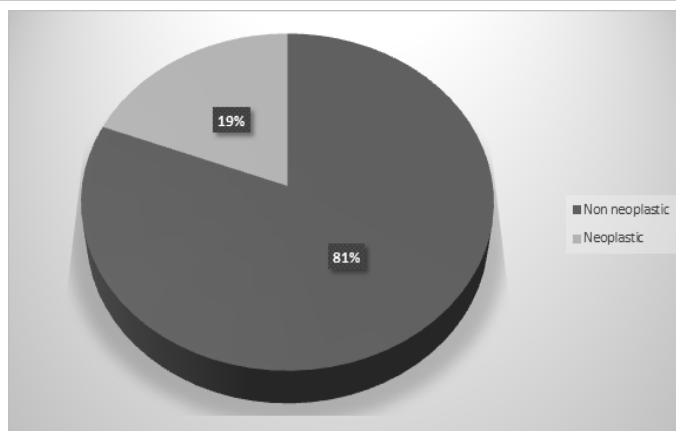


Figure 1: Nature of testicular lesions

Both the neoplastic and non-neoplastic testicular lesions showed a wide age distribution (Tables 2 and 3).

Table 2: Age-wise distribution of non-neoplastic testicular lesions

Histopathological Diagnosis	Age distribution (years)									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	
Cryptorchidism	0	0	2	0	0	0	0	1	0	3
Necrotizing granulomatous inflammation	0	0	0	0	0	0	1	0	0	1
Nonspecific epididymo-orchitis	0	0	0	1	0	2	1	1	0	5
Normal testicular tissue	0	0	0	0	0	0	0	4	0	4
Testicular abscess	0	0	0	0	0	0	0	1	0	1
Testicular atrophy	1	1	2	2	2	1	0	1	0	10
Testicular infarction/torsion	1	3	3	0	1	0	0	1	1	10
Total	2	4	7	3	3	3	2	9	1	34

Table 3: Age-wise distribution of neoplastic testicular lesions

Histopathological Diagnosis	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Adenomatoid tumor	0	0	0	0	0	2	0	0	2
Granulosa cell tumor (adult type)	0	0	1	0	0	0	0	0	1
Mixed germ cell tumor	0	0	2	0	0	0	0	0	2
Seminoma	0	0	0	0	1	0	0	1	2
Rhabdomyosarcoma	1	0	0	0	0	0	0	0	1
Total	1	0	3	0	1	2	0	1	8

Non-neoplastic lesions showed the highest frequency in the 71-80 years (9 cases), followed by the 21-30 years age group (7 cases). Testicular torsion was more common in young age groups (0-30 years). Atrophy and inflammation were seen across all age groups. Among the neoplastic cases, the 31-40 years age group had the highest number of neoplastic cases (3 cases), followed by the 61-70 years (2 cases). One case of

rhabdomyosarcoma occurred in a 17-year-old and one case of seminoma in an 83-year-old. Among the 34 non-neoplastic lesions, the most common diagnoses were testicular atrophy and testicular torsion/infarction (10 cases each). There were 5 cases of nonspecific epididymo-orchitis and 4 cases showed normal testicular tissue. Among neoplastic lesions, adenomatoid tumor, seminoma, and mixed germ cell tumors

were equally distributed (two cases each). Granulosa cell tumor and rhabdomyosarcoma accounted for one case each. Testicular lesions were more common on the right side (25 cases) than on the left side (17 cases). (fig. 2)

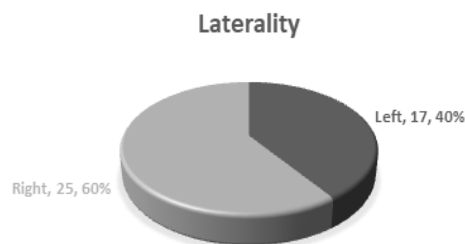


Figure 2: Laterality of testicular lesions

Among the neoplastic cases, 5 (62.5%) occurred on the right and 3 (37.5%) occurred on the left. Similarly, among non-neoplastic cases, 20 (58.8%) occurred on the right and 14 (41.2%) occurred on the left.

DISCUSSION

This retrospective study provides a comprehensive histopathological overview of testicular lesions in a tertiary care center in Nepal. The mean age of patients in our study was 46.45 ± 24.10 years. The findings align with global and regional studies, where non-neoplastic lesions outnumber neoplastic lesions.^{5,15,16} The high frequency of non-neoplastic lesions is consistent with studies from similar settings in South Asia, where inflammatory, ischemic, and developmental anomalies constitute the majority of orchidectomy specimens.^{4,5,7} Our study demonstrates a bimodal age distribution for non-neoplastic lesions, with peaks in young adulthood (21-30 years) and late adulthood (71-80 years). Testicular torsion, often seen in younger age groups (0-30 years), is a urological emergency, and our data corroborate this, with cases noted in adolescents and young adults.⁶ This age-related susceptibility is attributed to the high mobility of the testis before complete fixation of the tunica vaginalis, and anatomical anomalies such as the bell clapper deformity.²¹ Our findings were similar to previous studies conducted by Jain et al. (30.53% cases).⁷ The study conducted by Baidya et al. in Kathmandu, torsion and infarction were the most common non-neoplastic findings, which concurs with our findings.¹⁵ However, in the study conducted by Tekumalla et al and Dhawle et al, nonspecific epididymo-orchitis was the most common (38.5% & 35.08% cases, respectively).^{9,22} In our study, nonspecific epididymo-orchitis showed a broader age distribution, notably in the middle-aged to older adults in the 5th to 8th decades. The study conducted by Tekumalla et al. also had findings similar to ours.²² This may be due to associated urinary tract infections, prostatitis, or instrumentation in this age group.^{23,24} Likewise, undescended testis were the most common finding in the study conducted by Sharma et al. and Charak et al. (39.62% & 46.1% cases, respectively).^{1,4} Testicular atrophy was also the most common finding in our study, whereas it was the second most common finding in a similar study conducted by Reddy et al. and Tekumalla et

al. (19.8% & 23% cases, respectively).^{8,22} The second peak of non-neoplastic testicular lesions in the 71-80 years age group was dominated by normal testicular tissue, which is due to incidental orchidectomy in hernia repair surgery, often in frail elderly patients. There was a single case of necrotizing granulomatous inflammation and testicular abscess in an elderly patient, highlighting the importance of considering infections (including tuberculosis) in endemic regions. In a similar study conducted by Baidya et al., there was also a single case of granulomatous orchitis, and cases with tubercular epididymo-orchitis (9.8% cases) and testicular abscess (15.6% cases).¹⁵

Neoplastic lesions, though fewer, presented across a remarkably wide age spectrum (17-83 years), underscoring that testicular tumors are not exclusive to young adults. The concentration of cases in the 31-40 years and 61-70 years age groups suggests a bimodal neoplastic pattern as well. Neoplastic lesions accounted for 19% of cases, which is slightly higher than a study from Kathmandu conducted by Karki et al. and Baidya et al. (11.4% & 15% cases, respectively).^{15,16} The higher proportion of neoplastic cases (83%) reported by Bastakoti et al. in Bharatpur, Nepal, may be due to their study being conducted in a tertiary cancer center, accounting for the discrepancy with our findings.¹⁸ Germ cell tumors were the most common malignant tumors in our study, which aligns with studies conducted by Karki et al., Baidya et al., and Bastakoti et al.^{15,16,18} Malignant tumors included seminoma, mixed germ cell tumors, and a rare rhabdomyosarcoma in an adolescent. Among the neoplastic lesions in our study, seminoma and mixed germ cell tumors were the most frequent lesions, similar to the studies conducted by Bastakoti et al., Tekumalla et al., and Dhawle et al.^{9,18,22} Adenomatoid tumor was the most common benign tumor in our study. There was also a single case of adenomatoid tumor in the study conducted in Bharatpur, Nepal.¹⁸ This highlights the fact that adenomatoid tumor is rare and incidentally diagnosed. The presence of granulosa cell tumor (adult type), a rare sex cord stromal tumor, and rhabdomyosarcoma highlights the histopathological diversity encountered in clinical practice.

The right-sided predominance (59.5%) is notable in cases where a single testis was involved, echoing findings from other studies.^{7,8,22} However, the left testis was more involved in the study conducted by Bastakoti et al.¹⁸

Our findings underscore the importance of histopathological evaluation in diagnosing testicular lesions, particularly in differentiating neoplastic from non-neoplastic conditions. In resource-limited settings where advanced imaging and biomarkers are not readily available, histopathology remains the gold standard. This study provides baseline data for future research.

CONCLUSIONS

This study highlights the histopathological spectrum of testicular lesions in a Nepalese population, revealing a predominance of non-neoplastic conditions and a diverse array of neoplasms. The findings contribute to

the regional understanding of testicular pathology and underscore the critical role of histopathology in diagnosis. This study is a single-center, retrospective design, which may limit generalizability. Furthermore, the lack of immunohistochemistry and molecular profiling may compromise diagnostic accuracy. Prospective, multicenter studies with larger cohorts are needed to validate our findings and explore etiological factors, including genetic and environmental influences.

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Conflict of interest: None

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