Case Series

Primary paratesticular embryonal rhabdomyosarcoma – An unusual presentation

Priyanka Singh[1], Garima Anandani[2], Riddhi Parmar[2]

[1]Department of Pathology, VMMC and Safdarjung Hospital, New Delhi, India, [2]Department of Pathology, All India Institute of Medical Sciences (AIIMS), Rajkot, Gujarat, India

Abstract

Paratesticular embryonal rhabdomyosarcoma (RMS) is a very rare and aggressive mesenchymal tumor. It is usually seen in children and adolescents presenting as a painless intrascrotal mass, localized in the paratesticular region. Hereby, we report two cases of paratesticular embryonal RMS in adults. One case was clinically suspected to be a testicular abscess, whereas the other presented with testicular swelling and lung metastasis. Localized forms have a good prognosis, whereas tumors presenting with metastases show a poor outcome. A treatment based on surgery and chemotherapy yields good results. Sperm cryopreservation and endocrine follow-up improve the overall survival and quality of life of these patients.

Keywords: Metastasis, paratesticular mass, rhabdomyosarcoma

Introduction

Paratesticular rhabdomyosarcoma (RMS) accounts for merely 7% of all the cases of RMS.[1] It commonly arises in pediatric and young age groups in the form of a painless scrotal mass. An embryonal RMS presenting as intrascrotal mass is an unusual presentation. It is an infrequent, aggressive mesenchymal tumor located in the paratesticular region, such as the epididymis or spermatic cord.[2] Hereby, we report two cases which depict that the clinical and radiological findings may misguide about the diagnosis and an ultrasound guided needle biopsy (UNB) should be opted for histopathological diagnosis of paratesticular RMS. Post surgery and post chemoradiotherapy, the fertility of these young patients is hampered; hence, sperm freezing should be done before commencing it.

Address for correspondence: Dr. Garima Anandani, 212, Department of Pathology, AIIMS Rajkot Permanent Campus, Khanderi, Rajkot - 360 110, Gujarat, India.
E-mail: garima_anandani@yahoo.in

Received: 28-02-2023 **Revised:** 26-06-2023
Accepted: 28-06-2023 **Published:** 30-09-2023

Access this article online

Quick Response Code:

Website: http://journals.lww.com/JFMPC

DOI: 10.4103/jfmpc.jfmpc_397_23

Case presentation

Case 1

A 23-year-old male presented with a right scrotal mass which had increased in size over the past 1 month. On examination, the patient was pale with a firm, slightly painful swelling in the right scrotum measuring 7 × 6.5 × 5 cm in size. The skin overlying the swelling was tense and inflamed along with the presence of dilated veins. The left testis was normal on examination. The inguinal lymph nodes were not palpable bilaterally. There was mild anemia and mild leucocytosis. Serum lactate dehydrogenase (LDH), beta-human chorionic gonadotropin (β-HCG), alpha-fetoprotein (AFP), and carcino-embryonic antigen (CEA) levels were not elevated. Clinically provisional diagnosis was right testicular abscess. An ultrasonography (USG) was done, which also showed findings suggestive of a testicular abscess of right testis. A simple right-sided inguinal orchiectomy was performed, and the specimen was sent for histopathological examination.

Grossly, a solid tumor with a pale, fish-like appearance was identified measuring 5 × 4 × 3 cm in the paratesticular region

How to cite this article: Singh P, Anandani G, Parmar R. Primary paratesticular embryonal rhabdomyosarcoma – An unusual presentation. J Family Med Prim Care 2023;12:2176-80.

displacing the surrounding congested testis with an intact capsule [Figure 1a and b]. The cut surface of the tumor was whitish and firm in consistency.

Microscopically, there was a highly cellular tumor composed of pleomorphic predominantly round [Figure 1c and d] to few spindle cells, tadpole or strap-like cells. A few rhabdomyoblasts which are large cells having an abundant granular eosinophilic cytoplasm and cross-striations, along with an eccentrically placed large vesicular nucleus and prominent nucleoli, were identified. A few areas showed clear cell change [Figure 2]. Frequent mitoses were present. Numerous sections were studied in an attempt to find other elements of germ cell tumor, but none could be found. The testis was unremarkable and not infiltrated by the tumor.

On immunohistochemistry (IHC), the tumor cells were positive for vimentin, desmin, myogenin, and MyoD1, whereas these cells were negative for alpha-smooth muscle actin (α-SMA), placental alkaline phosphatase (PLAP), CD-117, S-100, MDM2, pancytokeratin, CD34, and epithelial membrane antigen (EMA), and hence, the possibility of liposarcoma and leiomyosarcoma was ruled out. Ki-67 expression was 30% in the tumor cells. The final diagnosis was primary paratesticular embryonal RMS. The peripheral resection margin and seminal vesicle were not infiltrated by the tumor cells. Vascular or perineural invasion was not seen.

The patient underwent a corrective surgery for completion of a radical inguinal orchidectomy with nerve-sparing retroperitoneal lymph node dissection (RPLND). Lymph node metastases was absent. Computed Tomography (CT) scans were done, which did not show any distant metastasis.

Post-surgically, the patient underwent three cycles of chemotherapy every 21 days, with vincristine, actinomycin D, and cyclophosphamide for 5 days. The patient visited for follow-up 3 months after the last chemotherapy cycle and showed good clinical improvement. CT scans were also performed during the follow-up visit, which did not reveal any metastasis.

Case 2

A 21-year-old male presented with a large painless left testicular swelling. AFP, β-HCG, and CEA were normal, whereas serum LDH was elevated. USG showed features suggestive of testicular malignancy. Left radical inguinal orchidectomy was performed, and the specimen was sent for histopathological evaluation. Grossly, a solid tumor measuring 13 × 8 × 7 cm was identified in the left paratesticular region displacing the surrounding testis. The cut surface of the tumor was whitish and firm in consistency with a few areas of hemorrhage and necrosis [Figure 3]. Microscopic and immunohistochemical findings were similar to those of the previous case, and hence, the case was diagnosed to be a primary paratesticular embryonal RMS. Microscopically, there was a highly cellular tumor composed of pleomorphic round to spindle cells and tadpole-like cells. The tumor cells were immunopositive for desmin, myogenin, and MyoD1 but immunonegative for α-SMA, PLAP, CD-117, S-100, MDM2, pancytokeratin, CD34, and EMA. Ki-67 expression was around 90% in the tumor cells. Post-surgically, the patient underwent three cycles of chemotherapy and was disease-free and on regular follow-up.

After 6 months, the patient presented with right testicular swelling and shortness of breath. Contrast-enhanced CT (CECT) scan of the lung showed multiple nodules, and that of the pelvis showed large retroperitoneal lymph nodes of 7 cm to 8 cm in size. Right radical inguinal orchidectomy with RPLND was performed, and the specimen was sent for histopathological evaluation.

A similar tumor was identified in the right paratesticular region, and the RPLN was also infiltrated by the tumor. Ki-67 expression

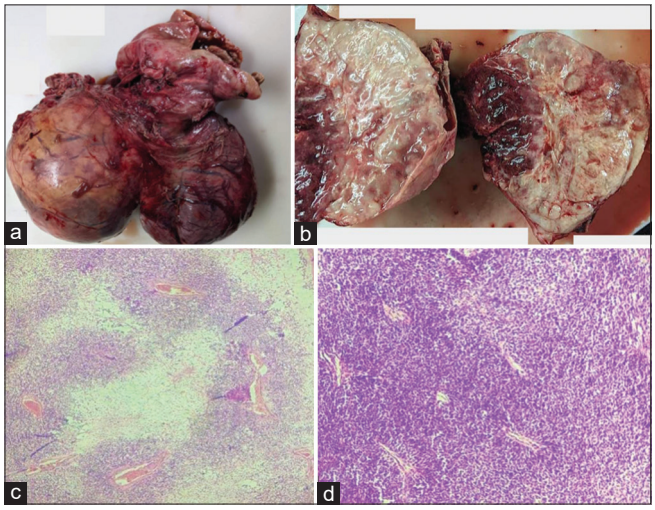

Figure 1: (a and b) Right orchidectomy specimen with a fish-flesh like whitish tumor having focal areas of hemorrhage and necrosis. The tumor is composed of predominantly small blue round cells (H and E stain, c. 40x, d. 100x magnification)

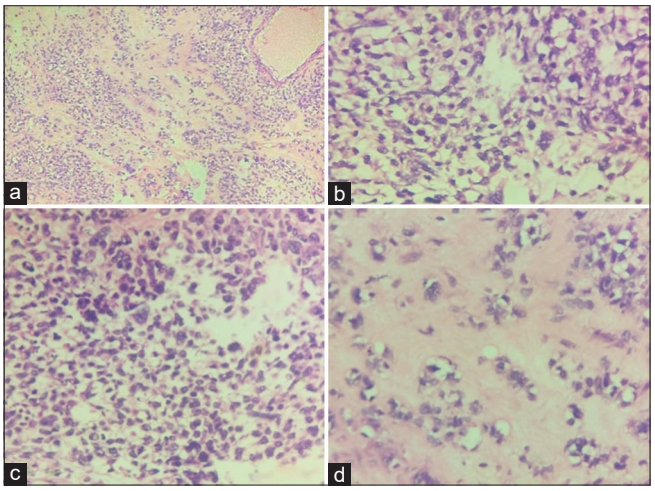

Figure 2: H and E-stained sections show pleomorphic round to focal spindle cells along with strap cells and rhabdomyoblasts (a. 100x, b. 200x, c. 200x magnification). Focal clear cell changes are also seen (d. 400x magnification)

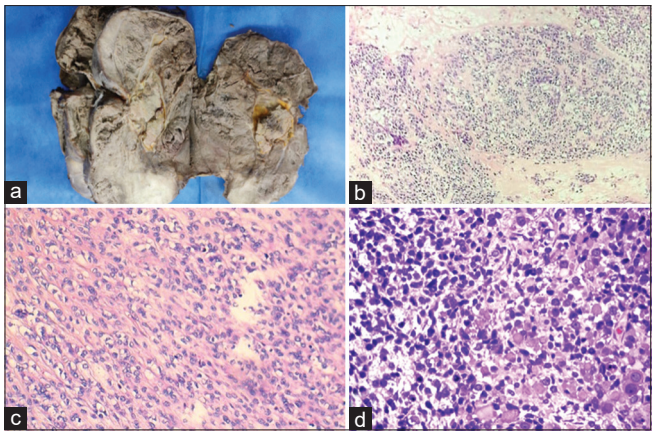

Figure 3: (a) Left orchidectomy specimen with a grayish firm tumor. H and E stain showing embryonic paratesticular RMS composed of focal spindle cells (b. 100×, c. 200× magnification) along with primitive small round blue cells admixed with larger cells showing rhabdomyoblastic differentiation (d. 200x magnification)

was 90% in the tumor cells. The pathological staging for the patient was pT4N3M1aS2, AJCC stage IIIB. Thereafter, again the patient underwent three cycles of chemotherapy along with radiotherapy. The patient is in remission now and on regular follow-up.

Discussion

The paratesticular region is a rare site for RMS which is commonly seen in the extremities. Patients with paratesticular RMS generally present with two peaks, one at the age of 4 years and the other at the age of 18 years.[2]

It is uncommon to find paratesticular RMS in adults, whereas it is commonly seen in children and comprises 7 to 10% of the male genitourinary system neoplastic lesions.[3] No racial predilection has been noted.[2] Only a few adult cases of paratesticular RMS have been mentioned in the literature.[4,5]

The patient generally presents with a very hard, painless swelling in the inguinoscrotal region. The size and duration of the paratesticular RMS vary, and it infiltrates the overlying skin in some cases. It has been mentioned that the tumor arises from the mesenchymal elements encasing the testis, epididymis, and spermatic cord.[2]

In such cases, local examination of lymph nodes should be performed along with general clinical examination to look for the presence of metastasis. A few clinically important differential diagnoses include testicular torsion, scrotal abscess, epididymo-orchitis, and rarely testicular tuberculosis.[2]

Diagnostic modalities

Ultrasound along with color Doppler is of utmost importance in cases of paratesticular RMS which presents with non-specific clinical features and where localization of tumor is not possible by clinical examination.[6] Color Doppler helps to demonstrate the vascularity and to differentiate testicular from paratesticular region.[7] USG of scrotum has been mentioned to distinguish testis and scrotal mass with a sensitivity of more than 95%.[8]

To evaluate the location, size, and metastasis, CT and magnetic resonance imaging (MRI) are reliable modalities; however, they cannot be used for the confirmation of diagnosis. The various differentials of paratesticular RMS include liposarcoma, leiomyosarcoma, and fibrosarcoma. Histopathological examination is required for confirmation of all these tumors as they do not have specific radiological features.[9] Our case presented to the hospital with a right inguino-scrotal swelling having a rapid increase in size within 1 month. There was absence of elevation of serum tumor markers, such as CEA, AFP, b-HCG, and LDH.

For an early and precise diagnosis, the adolescents should be educated regarding the procedure and importance of regular self-examination. A thorough physical examination is compulsory for a patient presenting with painless inguinal and/or scrotal swelling. USG alone can lead to misdiagnosis of the lesion and its origin. Hence, USG should be done in conjunction with MRI for identification of the exact site of the lesion.

A pre-operative UNB should be practiced for obtaining a rapid histopathological diagnosis.[1] This can reduce the frequency of repeat radical surgeries done for completion, which have to be performed if the post-operative histopathological diagnosis is RMS. This was the scenario in our case where pre-operatively, malignancy was not a probable diagnosis and hence a simple orchiectomy was performed expecting the lesion to be a non-malignant one. Testicular and epididymal puncture is currently considered to be a safe procedure and carries no risk of tumor implantation or metastasis via a needle.[10]

Histopathology

The commonly identified histological subtypes of RMS are embryonal, botryoid embryonal, spindle cell embryonal, alveolar, and anaplastic as per international RMS classification.[11] Among all the subtypes, embryonal RMS (eRMS) is the most common subtype comprising 60% of all the RMS cases.[3]

The tumor cells in eRMS are fundamentally poorly differentiated cells along with rhabdomyoblasts having an abundant eosinophilic cytoplasm. Ki-67 expression is frequently assessed in a case of RMS. The diameter of the primary tumor along with Ki-67 expression directly correlates with the lymphadenopathy on CT scan and solid organ metastases in RMS.[12] This correlation was seen in our case study also. In our first case, the Ki-67 index was 30% and there was no evidence of lymphadenopathy or metastases, whereas in the second case having a Ki-67 index of 90%, there was presence of retroperitoneal lymphadenopathy as well as lung metastases. On cytogenetic testing, loss of heterozygosity on the short arm of chromosome 11 is specific

for eRMS. The accuracy of histopathological diagnosis of eRMS can be improved by chromosomal analysis along with electron microscopy.[11] However, due to their non-availability, these tests were not performed in our cases.

Treatment

The primary step of paramount importance in managing any case of RMS is to perform radical orchidectomy by an inguinal route with the first cord ligation. Hemiscrotectomy is rather favored if there is presence of local invasion or lymphadenopathy clinically.[13] A simultaneous inguinal lymphadenectomy is planned only after performing a CT scan or lymphography if it shows lymphadenopathy.

RMS is a chemosensitive tumor, so chemotherapy comprising vincristine, actinomycin D, and cyclophosphamide is offered to these patients. Radiotherapy can be used to support surgery and chemotherapy only in cases having residual disease and/or retroperitoneal lymph nodes.[2] Our first patient was managed with a radical high inguinal orchidectomy, followed by three sessions of chemotherapy, resulting in patient improvement and disease remission.

The prognosis and survival rate of paratesticular RMS are better than those of RMS at other sites, after radical tumor resection.[14] The 5-year survival rate of cases diagnosed at the age of less than 10 years is 97%, whereas for more than 10 years age group, it is 84%.[15]

The line of treatment for RMS which includes surgery, chemotherapy, and radiotherapy has many side effects on the reproductive and endocrine system of the patients. Most of the patients present at an early age, so it is very critical for the long-term survivors to recover the endocrine functions and maintain their fertility. Cryopreservation of the sperms is a recommended method before starting chemoradiotherapy for future artificial insemination or assisted reproduction techniques like *in vitro* fertilization. Regular follow-up visits should be planned for a long term in order to evaluate the hormone levels as well as psychological condition of the patients.[1]

Conclusion

The take-home key messages are that paratesticular RMS is an infrequent and aggressive tumor of childhood and adolescence of which localized lesions have a good prognosis, whereas metastatic tumors have a poor outcome. Early detection is required as it grows rapidly, and to develop a personalized comprehensive treatment plan is required. Pre-operative UNB is recommended for rapid diagnosis. A comprehensive treatment plan of action comprising surgery and chemotherapy gives a good outcome. Sperm cryopreservation prior to chemoradiotherapy and regular follow-up of endocrine and reproductive function post-treatment improves the quality of life.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Zhu Y, Zhu Z, Xiao Y, Zhu Z. Case report: Paratesticular rhabdomyosarcoma. Front Oncol 2021;11:629878. doi: 10.3389/fonc.2021.629878.
2. Bouchikhi AA, Mellas S, Tazi MF, Lahlaidi K, Kharbach Y, Benhayoune K, *et al.* Embryonic paratesticular rhabdomyosarcoma: A case report. J Med Case Rep 2013;7:93.
3. Dangle PP, Correa A, Tennyson L, Gayed B, Reyes-Múgica M, Ost M. Current management of paratesticular rhabdomyosarcoma. Urol Oncol 2016;34:84-92.
4. Harel M, Ferrer FA, Shapiro LH, Makari JH. Future directions in risk stratification and therapy for ad vanced pediatric genitourinary rhabdomyosarcoma. Urol Oncol 2016;34:103-15.
5. Matias M, Carvalho M, Xavier L, Teixeira JA. Paratesticular sarcomas: Two cases with different evolutions. BMJ Case Rep 2014;2014:1-5.
6. Mak CW, Chou CK, Su CC, Huan SK, Chang JM. Ultrasound diagnosis of paratesticular rhabdomyosarcoma. Br J Radiol 2004;77:250-2.
7. Secil M, Bertolotto M, Rocher L, Pekindil G, Stocca T, Richenberg J, *et al.* Imaging features of paratesticular masses. J Ultrasound Med 2017;36:1487-509.
8. Frates MC, Benson CB, DiSalvo DN, Brown DL, Laing FC, Doubilet PM. Solid extratesticular masses evaluated with sonography: Pathologic correlation. Radiology 1997;204:43-6.
9. Graiouid EM, Chakir Y, Gallouo M, Dakir M, Debbagh A, Aboutaieb R. Paratesticular rhabdomyosar coma: A case report. Pan Afr Med J 2019;33:55.
10. Drudi FM, Maghella F, Martino G, Messineo D, Ciccariello M, Cantisani V, *et al.* Detection of small testicular masses in monorchid patients using US, CPDUS, CEUS and US-guided biopsy. J Ultra sound 2015;19:25-8.
11. Visser M, Sijmons C, Bras J, Arceci RJ, Godfried M, Valentijn LJ, *et al.* Allelotype of pediatric rhabdomyosarcoma. Oncogene 1997;15:1309-14.
12. Soffer S, Amitai MM, Shimon O, Ohana O, Rozendorn N, Barshack I, *et al.* Rhabdomyosarcoma disease spread evaluation on CT scans: Association with primary tumor size and Ki-67 proliferation marker. Clinical Imaging 2019;56:41–6.

13. Kourda N, El Atat R, Derouiche A, Bettaib I, Baltagi S, Zermani R. Paratesticular pleomorphic rhabdomyosarcoma in an adult: Diagnosis and management. Cancer Radiother 2007;11:280-3.
14. Hammond WJ, Farber BA, Price AP, Wolden SL, Heaton TE, Wexler LH, *et al.* Paratesticular rhabdomyosarcoma: Importance of initial therapy. J Pediatr Surg 2017;52:304-8.
15. Kaefer M, Rink RC. Genitourinary rhabdomyosarcoma. Treatment options. Urol Clin North Am 2000;27:471-87.