



A rare case of pediatric orbital rhabdomyosarcoma in Nepal: a case report

Tina Shrestha, MD^a, Sumina Mainali, MBBS^{b,*}, Sandhya Poudel, MBBS^a, Narendra K.C, MBBS^b, Aliza Dulal, MBBS^b

Introduction and Importance: Orbital rhabdomyosarcoma (RMS) is a highly malignant, mesenchymal orbital tumor of childhood with a predilection in children less than 20 years of age. It presents as a space-occupying lesion in the orbit, most commonly over the superior nasal quadrant of the orbit. The patient usually presents with rapid onset unilateral proptosis and eyelid edema.

Case Presentation: In this article, a 14-year-old male presented with rapidly progressive swelling of the right orbit. On ocular examination, there was nonaxial inferolateral proptosis of the right eye. Computed tomography revealed a large soft tissue density tissue lesion in the right nasal cavity and meati measuring at least 3.2 × 2.7 × 5.4 cm in size with the erosion of the right orbit along with extension of the lesion in the extraconal compartment of the orbit. An MRI of the brain with contrast showed a heterogeneously enhancing altered signal intensity lesion. Debulking was planned, and a biopsy of the mass was sent that gave an impression of alveolar RMS. He also received radiotherapy and chemotherapy at one of the cancer hospitals in Nepal. Postsurgical follow-up showed gradual improvement in the visual acuity of the right eye. No evidence of metastasis and recurrence was found upon subsequent follow-up.

Conclusion: Thus, early diagnosis and prompt treatment is most for a favorable prognosis in the case of RMS. The main aim of this article was to briefly overview a rare case of RMS, its clinical presentation, diagnosis, treatment modalities, and its prognosis.

Keywords: case report, mesenchymal tissue, proptosis, rhabdomyosarcoma (RMS)

Introduction

Orbital rhabdomyosarcoma (RMS) is the most common soft tissue sarcoma of the head and neck in childhood and comprises 4% of all pediatric malignancies with 10% of all cases occurring in orbit^[1]. Primary orbital RMS is mainly a disease of young children with 90% occurring before the age of 16 years old with a mean age of onset of 5–7 years. The ratio of male to female is 5 : 34^[2]. Orbital RMS is extremely rare in our part of the world with very few cases being clinically evaluated every year, which makes this case exceptional. One of the prospective, observational study conducted in mid-west Nepal showed that among 1180 suspected children, eight children developed unilateral orbital RMS with the mean age

^aDepartment of Ophthalmology, Dhulikhel hospital and ^bKathmandu University School of Medical Sciences, Dhulikhel, Kavre

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding author. Address: Kathmandu University School of Medical Sciences, Dhulikhel, Kavre 44600. Tel.: 9843497998. E-mail address: mainalisumina1436@gmail.com (S. Mainali).

Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Annals of Medicine & Surgery (2023) 85:1247–1253

Received 15 November 2022; Accepted 18 March 2023

Published online 10 April 2023

<http://dx.doi.org/10.1097/MS9.0000000000000501>

HIGHLIGHTS

- Orbital rhabdomyosarcoma (RMS) is a highly malignant, mesenchymal orbital tumor of childhood in which the patient presents with rapid onset unilateral proptosis and eyelid edema.
- RMS is divided into three histological subtypes: pleomorphic, embryonal, and alveolar with the majority of RMS being embryonal type and the pleomorphic subtype occurring almost exclusively in adults (median age sixth decade).
- Computed tomography and MRI are important for pre-operative evaluation, staging, and follow-up of RMS. A biopsy is important in establishing the diagnosis and determining the prognosis.
- Treatment options include debulking in addition to chemotherapy, additional external beam radiation therapy, brachytherapy, and if all fails exenteration is the remaining option.
- Metastatic spread of orbital RMS is uncommon; however, if left untreated metastasizes to the lung, bone, and bone marrow mainly via hematogenous spread.

of presentation being 6–8 years. RMS is divided into three histological subtypes: pleomorphic, embryonal, and alveolar with the majority of RMS being embryonal type and the pleomorphic subtype occurring almost exclusively in adults (median age sixth decade). Out of different variants, 75% was embryonal, the commonest variant followed by alveolar type,



Figure 1. A 14 years old male with protrusion of right eye.

which was 25%. Proptosis was the commonest presenting feature and was present in 100% of cases^[3]. Primary orbital RMS involves the orbit, eyelid, conjunctiva, and rarely uveal tract. Typical presentation is rapid onset unilateral proptosis, eyelid edema, and ptosis^[2]. A detailed history of pain, visual loss, signs of sinusitis, and any rapidly progressive alteration of lid, conjunctiva or caruncle should be taken to exclude orbital cellulitis, lymphangioma, hemangioma, Langerhans cell histiocytosis, and dermoid cyst. Computed tomography (CT) and MRI are important for preoperative evaluation, staging, and follow-up of RMS. A biopsy is important in establishing the diagnosis and determining the prognosis. Recurrence or metastatic spread usually occurs within the first 3 years after treatment, and the most common site of metastasis is the lung^[4]. Treatment options include debulking in addition to chemotherapy, additional external beam radiation therapy, brachytherapy, and if all fails exenteration is the remaining option. A 5-year survival rate for children who have low risk ranges from 70 to greater than 90%. Early diagnosis and appropriate treatment are the most important factors, which result in a better prognosis. However, extension of the tumor outside the orbit is associated with the worst prognosis particularly if there is skull base erosion^[5]. Overall survival was about 25–30% (with historically recommended treatment), and with the introduction of surgery combined with adjuvant

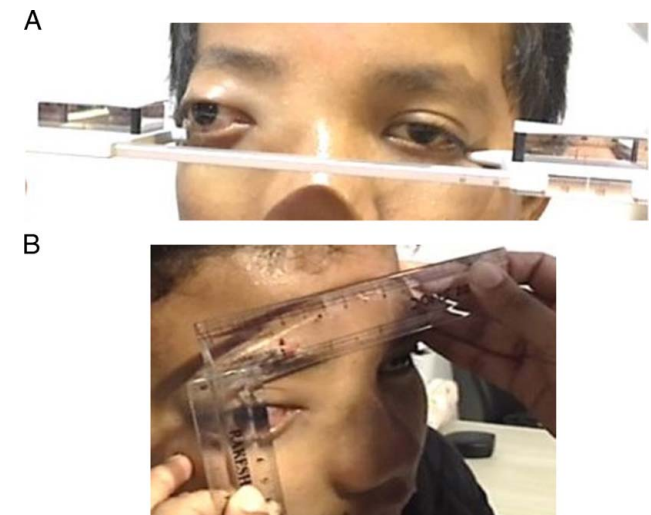


Figure 3. (A), (B): Proptosis evaluation: HERTEL'S EXOPHTHALMOMETRY using 120 mm BAR.

chemotherapy as well as radiotherapy, overall survival improved to around 90%^[6]. This case report has been reported in line with the Surgical CAse Report (SCARE) 2020 Criteria^[7].

Case presentation

A 14-year-old male presented with a complaint of protrusion of the right eye for 3 months and watering from the right eye. According to the informant (the patient's father) the patient was relatively well 3 months back when he first noticed the protrusion of the right eye. It was insidious in onset, gradually progressive in nature, painless with no blurring of vision, no double vision. He gives no history of other ocular problems and no other systemic illness like diabetes mellitus, hypertension, and tuberculosis in the past. He was delivered via normal delivery at term with an uneventful antenatal and perinatal period. Developmental milestones were achieved as per his age. There is no history of any

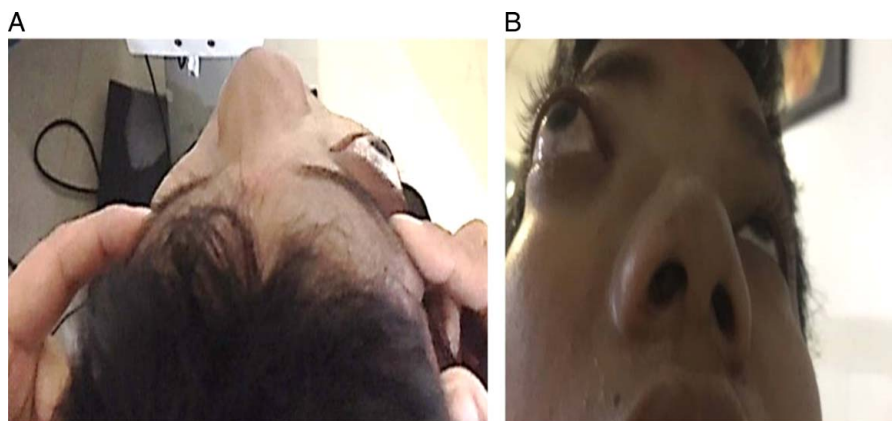


Figure 2. (A) Proptosis evaluation using NAFZIGER'S method.(B) Proptosis evaluation using WORM'S EYE VIEW method.

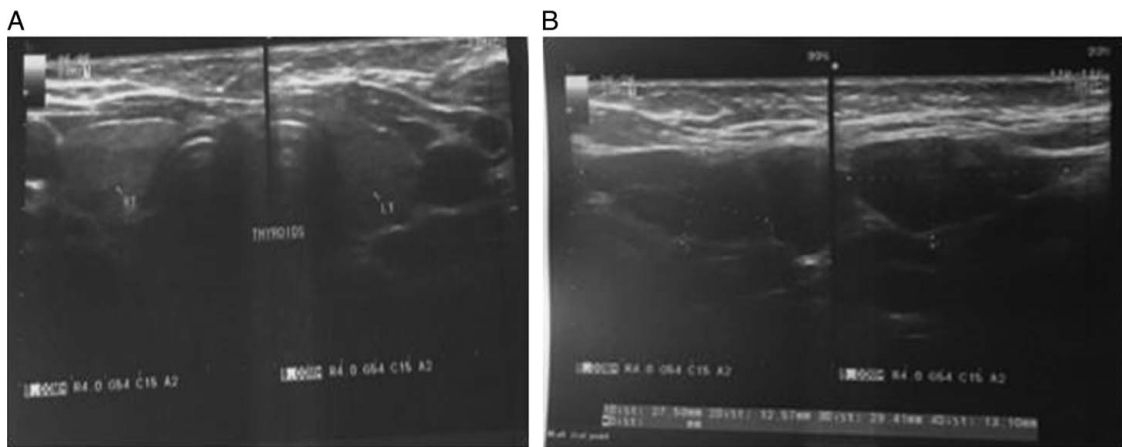


Figure 4. (A), (B) Ultrasonography of Neck showing multiple enlarged and hypoechoic lymph nodes at both sides of neck at multiple levels.

previous surgical interventions. There is no history of any drug intake on a regular basis, and there is no significant allergic history to drugs and any foreign bodies like dust or wool. Patient party gives no history of similar illness and no significant genetic and psychosocial history in other family members. General clinical examination revealed bilateral submandibular and jugulo-digastric lymphadenopathy. Facial asymmetry and an asymmetrical nasolabial fold was evident.

On ocular examination, there was nonaxial inferolateral proptosis of the right eye. It was rapidly progressive but was non tender and nonpulsatile. Conjunctival congestion was present. Proptosis was evaluated by Nafziger’s method and the worm’s eye view. There was decreased range of movement in the right eye. There was lagophthalmos of 5 mm and nonaxial proptosis of the right eye. Visual acuity of the right eye was 6/36 (unaided) and of the left eye was 6/6 (unaided). Hertel’s

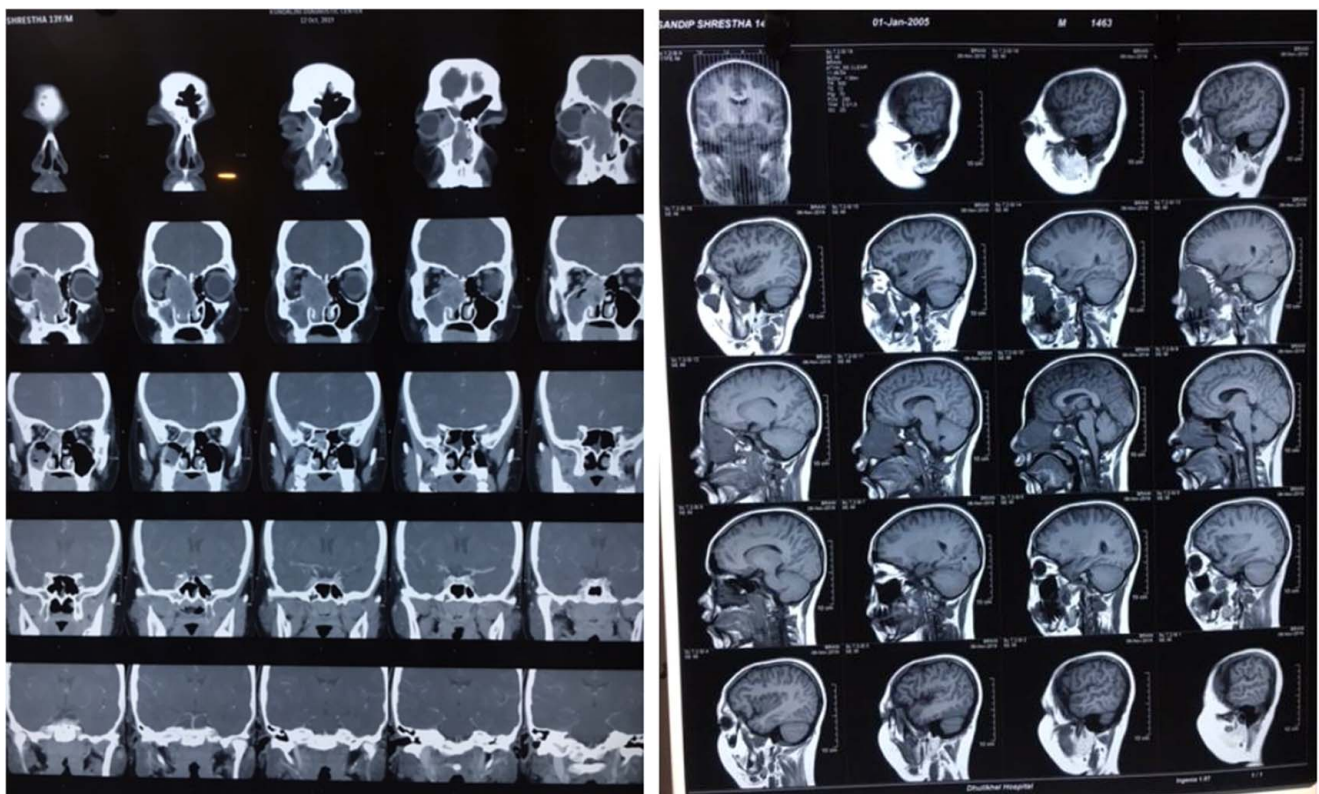


Figure 5. Computed tomography Scan of Paranasal Sinuses showing large soft tissue density tissue lesion noted in right nasal cavity and meatus measuring at least 3.2 × 2.7 × 5.4 cm, showing erosion of right nasolacrimal duct and medial wall of right orbit with extension of lesion in extraconal compartment of orbit. Right medial rectus muscle is compressed and stretched by the mass. Superiorly lesion is extending into ethmoidal and frontal sinuses with possible erosion of skull base in the region of olfactory groove.

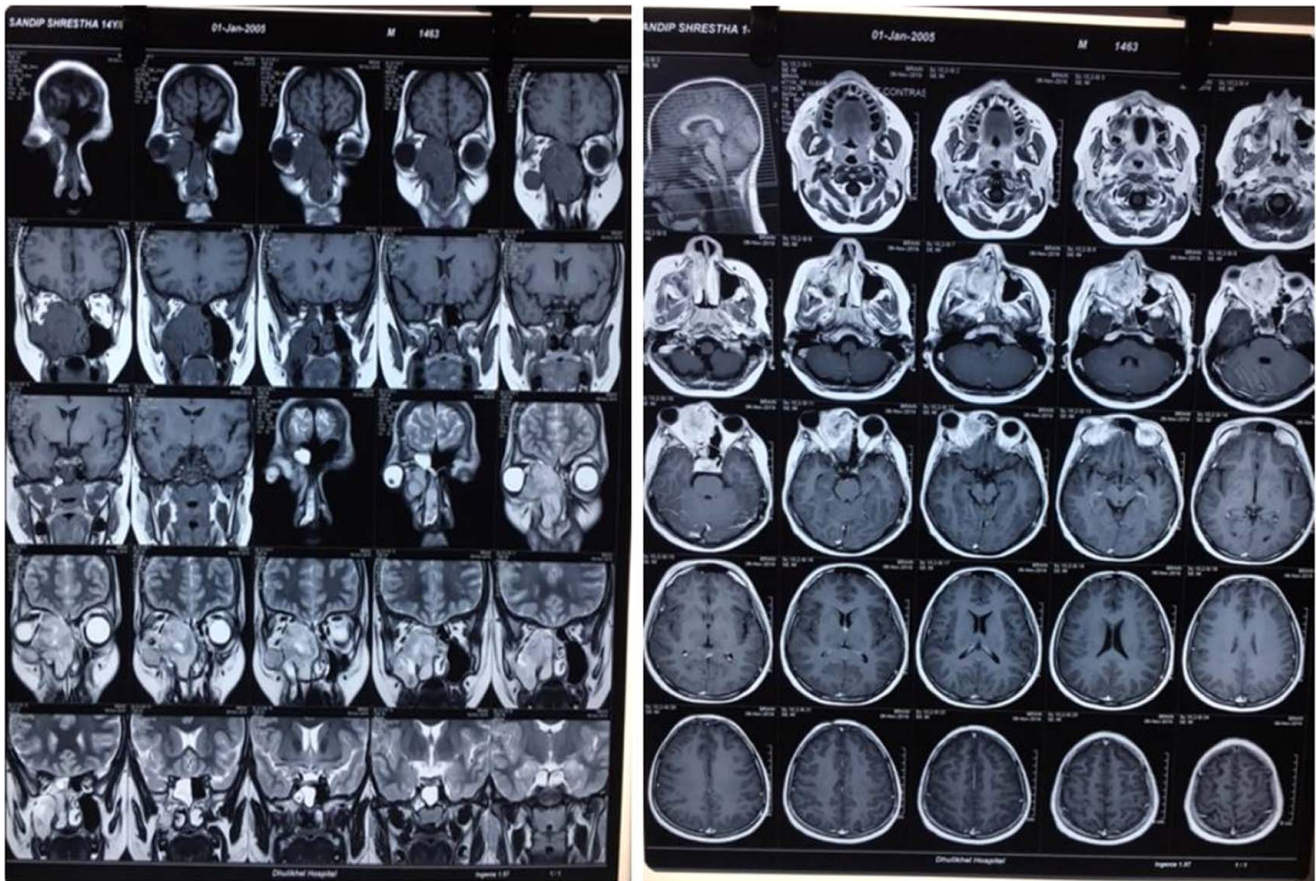


Figure 6. MRI Brain with contrast: showing heterogeneously enhancing altered signal intensity lesion (hypo intense on T2 and FLAIR) measuring ~57 × 48 mm at right nasal cavity extending into right maxillary sinus with breach of medial and lateral wall with maxillary soft tissue infiltration. Erosion of medial and inferior wall of right orbit with infiltration of medial rectus and inferior oblique muscles with mild proptosis of right globe.

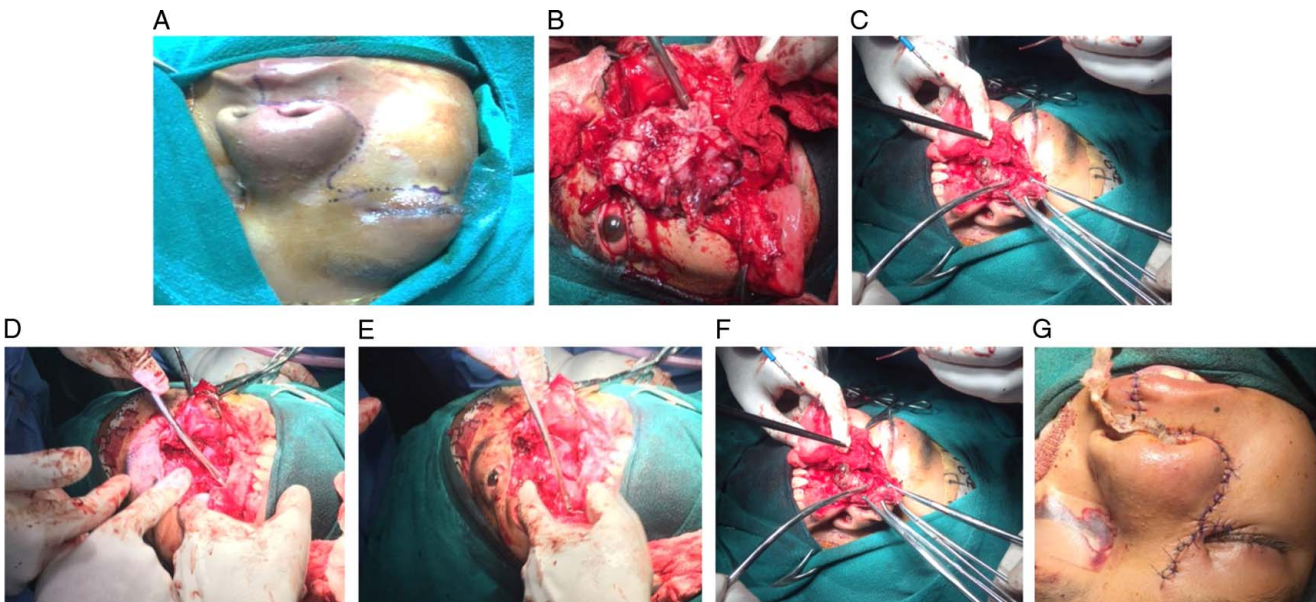


Figure 7. A Preoperative profile image showing mass in right orbit. Debulking surgery for right orbital rhabdomyosarcoma.

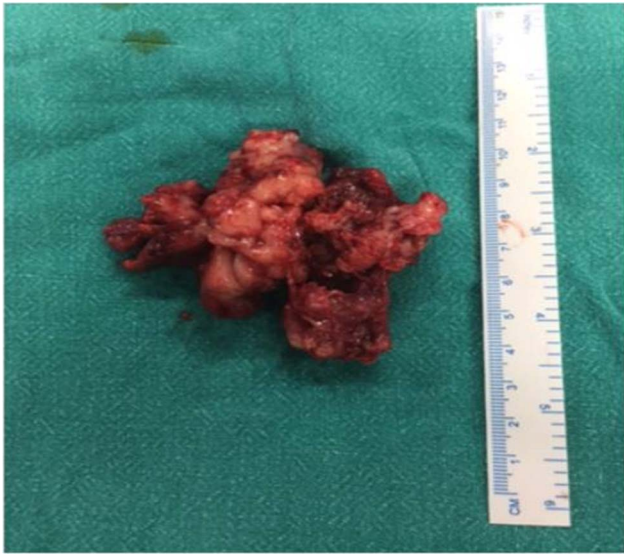


Figure 8. Enucleated specimen for histopathology.

exophthalmometry using a 120 mm bar showed an anterior projection of right eye by 29 mm and left eye by 20 mm exceeding the difference of 2 mm between the two eyes thus suggesting exophthalmos.

Investigations

Ultrasonography of the neck: showed multiple enlarged and hypoechoic lymph nodes on both sides of the neck at multiple levels (bilateral cervical lymphadenitis). The nodes showed preserved hilar fat and vascularity.

CT scan of the head and neck: showed a large soft tissue density tissue lesion in the right nasal cavity and meati measuring at least $3.2 \times 2.7 \times 5.4$ cm in size.

MRI brain with contrast: showed a heterogeneously enhancing altered signal intensity lesion (hypo intense on T2 and FLAIR) measuring $\sim 57 \times 48$ mm at the right nasal cavity and extending into the right maxillary sinus with breach of the medial and lateral wall with maxillary soft tissue infiltration.

A biopsy was taken from the right nasal cavity mass, and histopathological reports showed a typical cells arranged in nests, sheets, and cords present in the sub-epithelial region separated by a fibrovascular stroma. Focal areas showed tumor cells having fibrillary background. Focal areas of necrosis, fibrocartilaginous tissue, and the arrangement of tumor cells around blood vessels were also noted.

Provisional diagnosis

Right nonaxial proptosis is secondary to the right orbital mass.

Management

Following radiological and histopathological confirmation of the diagnosis, surgical debulking of the mass was planned to alleviate the symptoms due to the mass effect. Size of 6.5×5.5 cm irregular, multilobulated rough hard mass of brownish-reddish color was debulked and immunohistochemistry was sent. The patient was then monitored in the PICU for 2 days on a ventilator following surgery and he was under intravenous antibiotics (injection flucloxacillin), injection dexamethasone 8 mg, and analgesics. Daily dressing was done and suture removal was done on the eighth postoperative day. He was discharged with eye drop ofloxacin, ointment ciprofloxacin, tablet cefixime, tablet Levocetizine and was advised for follow-up with immunohistochemistry reports.

Outcome

On first follow-up

Immunohistochemistry of the mass showed diffuse sheets of primitive tumor cells having round to oval nuclei, granular

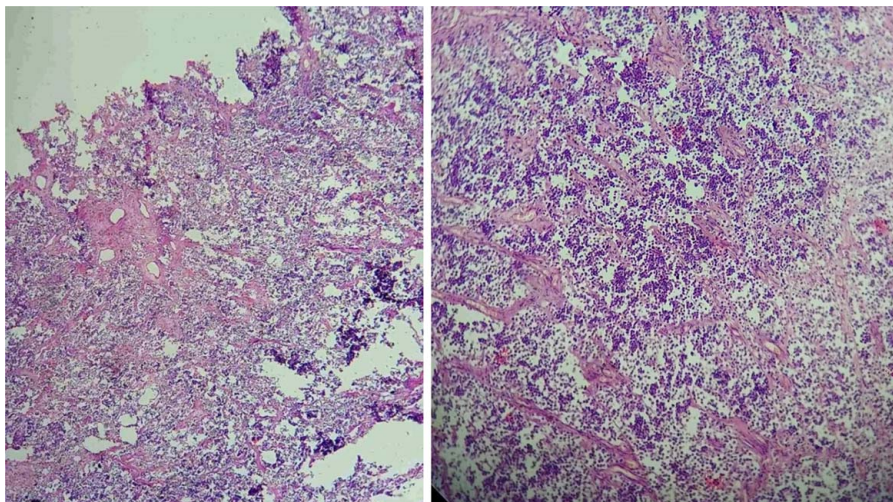


Figure 9. Section from the mass show tumor cells arranged in alveolar pattern and solid sheets. Cells are round to oval with scanty to moderate amount of eosinophilic cytoplasm. Nuclei are round to oval and are eccentrically placed. Nuclear chromatin is vesicular and have prominent nucleoli in these cells. Infiltration of tumor cells into the peripheral fat.



Figure 10. Post surgical outcome: he looks normal at the right eye with good vision.

chromatin, and inconspicuous nucleoli. Immunohistochemistry markers desmin, myogenin, and MyoD1 were positive in tumor cells hence giving an impression of alveolar RMS.

The visual acuity of right eye improved to 6/24. There was an improvement in the range of motion of the right eye. Facial asymmetry and all those above-mentioned symptoms resolved with treatment of RMS.

On second Follow-up:

The visual acuity of the right eye was 6/9 with further improvement of range of motion. Patient party was counseled for further treatment with chemotherapy and radiotherapy.

On further evaluating the case, the patient party also mentioned that the patient received adjuvant chemotherapy with newer agents, ifosfamide and etoposide in a cancer hospital, one of the national-level cancer hospitals in Nepal. Radiotherapy was also advised. So following chemotherapy 50 grays of radiation was also administered in 25 fractions.

Clinical discussion

We report a rare case of primary orbital RMS in childhood. RMS is primarily seen in young children, at a mean age of 7–8 years, though the tumor has been reported in adults and infants^[8]. However, the child was 14 years old in our case. RMS is a highly malignant soft tissue tumor of the skeletal muscle. RMS has also been reported as lid masses and as masses in other areas of orbit^[8]. Most of the data derived from retrospective case series state that the typical first presentation is unilateral proptosis, while other cases describe atypical presentation such as an eyelid nodule^[4]. Although superonasal orbit is the most common location, in our case the tumor was located in the medial and temporal wall of the right orbit with nonaxial, inferonasal proptosis. Horn and Enterline in mid-1900 first classified RMS histologically into four major categories: embryonal, alveolar, botryoid, and pleomorphic, which was later supported by other researchers^[5]. It is believed that the embryonal, alveolar, and botryoides variants have a mesenchymal origin and the pleomorphic variant has a mature skeletal muscle origin. The

pleomorphic type is the most differentiated type and carries the best prognosis followed by the embryonal and botryoides types^[8]. The worst prognosis has been shown by the alveolar type^[9]. Immunohistochemistry markers like desmin (90%), myogenin, MyoD1, MSA, and myoglobin confirm the diagnosis^[1]. Myogenin and MyoD1 are more specific in diagnosing embryonal RMS as they are transcriptional regulatory factors expressed early in skeletal muscle differentiation^[1]. All pediatric RMSs show nuclear expression of myogenin. Desmin, Myogenin, and MyoD1 were positive in our case. Following biopsy staging for orbital RMS is internationally uniformly done according to the IRS postsurgical staging system^[1]. Our patient was in Group III who had undergone chemotherapy, radiotherapy and salvage surgery as orbital debulking.

Metastatic spread of orbital RMS is uncommon; however, if left untreated RMS has a propensity to metastasize to the lung, bone, and bone marrow mainly via hematogenous spread (because orbital lymphatics are scarce^[1]). Orbital RMS shows a good prognosis due to its favorable anatomic location, favorable histology, and biology (80% embryonal)^[1]. Certain factors like younger age (< 10 years), female sex, embryonal histology, and a more localized disease positively influence the survival^[1].

Conclusion

Orbital RMS is one of the most life-threatening diseases, but it is also associated with a better clinical outcome. A 14-year-male presented with protrusion of the right eye for 3 months and watering from the right eye. A clinical examination was done and relevant investigations were sent. CT/MRI and biopsy findings were suggestive of a right orbital mass. Surgical debulking was planned and the patient underwent the procedure without any intraoperative and postoperative complications. Followed by debulking surgery he also received a combined treatment of chemotherapy and local radiotherapy. The patient and patient party were satisfied with the treatment outcome Figures 1–10.

Ethical approval

This is a case report; therefore, it did not require ethical approval from ethics committee.

Consent

Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in chief of this journal on request.

Sources of funding

The study did not receive any grant from public, commercial, or not-for-profit funding agencies.

Author contribution

All authors contributed in writing, reviewing, and editing the paper, revising it critically for important intellectual content.

Conflicts of interest disclosure

The authors report no conflicts of interest.

Research registration unique identifying number (UIN)

None.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Acknowledgment

None.

References

- [1] Jurdy L, Merks JHM, Pieters BR, *et al.* Orbital rhabdomyosarcomas: a review. *Saudi J Ophthalmol* [Internet] 2013;27:167.
- [2] Thien HH, Kim Hoa NT, Duy PC, *et al.* Pediatric primary orbital rhabdomyosarcoma. *J Pediatr Surg Case Reports* 2020;59:101475.
- [3] Bastola P, Bastola S, Khadka M, *et al.* Orbital rhabdomyosarcoma in the pediatric population: a prospective, observational study from mid-west Nepal. *Acad J Heal Sci Med Balear ISSN-e 2255-0560* 2022;37:108–12.
- [4] Ahmad TY, Al Hourri HN, Al Hourri AN, *et al.* Aggressive orbital rhabdomyosarcoma in adulthood: a case report in a public hospital in Damascus, Syria. *Avicenna J Med* [Internet] 2018;8:110.
- [5] Das JK, Tiwary BK, Paul SB, *et al.* Primary orbital rhabdomyosarcoma with skeletal muscle metastasis. *Oman J Ophthalmol* [Internet] 2010;3:91.
- [6] Nicula C, Nicula D, Blidaru M, *et al.* Orbital rhabdomyosarcoma with a good life prognosis after surgical treatment in a 14-year-old patient. *Cent Eur J Med* [Internet] 2014;9:394–9.
- [7] Agha RA, Franchi T, Sohrabi C, *et al.* The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines. *Int J Surg* 2020;84:226–30.
- [8] Kaliaperumal S, Tiroumal S, Rao V. Orbital rhabdomyosarcoma: a case series. *Indian J Cancer* [Internet] 2007; 44:104.
- [9] Karcioğlu ZA, Hadjistilianou D, Rozans M, *et al.* Orbital Rhabdomyosarcoma. 2017;11:328–33.