Massive Embryonal Rhabdomyosarcoma of the Hand in an Infant With Metastasis at Birth: Management Dilemma

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Abstract

Background: Rhabdomyosarcomas are malignant tumors arising from striated muscle but can be often confused with primitive neuroectodermal tumors and Ewing sarcoma. They are often classified based on age of presentation and histological features. Three major types of rhabdomyosarcomas are embryonal, alveolar, and pleomorphic with characteristic presentations. **Method:** Here, we present a case of embryonal rhabdomyosarcoma in the hand of a 5-month-old child with lymphatic metastasis, the age, site, and metastasis being unusual feature for this type of rhabdomyosarcoma. **Result:** The child succumbed to the complications soon after initiation of chemotherapy. **Conclusion:** Age, site, metastasis at birth and treatment related complications contribute to the poor outcome.

Keywords: embryonal, rhabdomyosarcoma, infant, hand, metastasis

Introduction

Rhabdomyosarcomas in children are rare and have an incidence of 4.5 per million population.¹² Rhabdomyosarcomas are uncommon in the hand, and those affecting the extremities have been associated with poor prognosis as they appear to have high risk of regional lymph node metastasis.^{2,7,13} Superficial tumors may mimic an abscess or hemangioma with characteristics of rubor, tenderness, and increase in local vascularity.

Microscopically, rhabdomyosarcoma has been classified as embryonal, alveolar, and pleomorphic types. Embryonal type is more in male with an incidence of 4 per million live births. It occurs between birth and 15 years of age, with a peak age of 0 to 4 years.¹² Embryonal type usually arises from head, neck, and genitourinary system. Alveolar rhabdomyosarcoma mostly arises from head, neck, and extremities and is most common histological variant seen in the hand. Incidence of alveolar rhabdomyosarcoma does not vary with gender and is mainly seen in children and adolescents.¹² Embryonal and alveolar types are among the more common malignant tumors in their respective age groups.

Pleomorphic type is seen more in infants. However, when alveolar and pleomorphic types occur in older age groups, they are seen in extremities and are more susceptible for metastasis. Prior studies have demonstrated that age is a prognostic factor in rhabdomyosarcoma, and a poorer outcome is reported for infants than for older children.^{3,11}

Although the majority of the cases of embryonal rhabdomyosarcoma are diagnosed in children younger than 6 years, it is uncommon in infants and also rare in the extremity, especially the hand.¹ Metastasis in this variant is also reported less than in the other 2 variants, and is extremely rare to be present at birth.^{4,17}

Case

A 3-month-old male child born of a second-degree consanguineous marriage presented to the pediatric outpatient department with swelling of the left hand since birth involving the entire hand distal to wrist crease. The swelling had progressively increased in size from birth and turned from soft to firm in consistency, which was initially painless but later became painful. His mother noticed tiny swelling over the neck, chest, back, and inguinal region 15 days after birth, which subsided on its own after few days. The child was initially started on steroids from a local hospital a month earlier. On examination, the mass was extending both into

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Figure 1. Clinical pictures of embryonal rhabdomyosarcoma of the left hand in an infant.

Figure 2. Radiographs of the hand with embryonal rhabdomyosarcoma.

dorsal and palmar aspect of the hand measuring about 10 × 10 cm, soft, compressible, nonpulsatile, nontransilluminant without any distal neurovascular deficit (Figure 1). There were 3 small swellings which were firm and mobile in the right inguinal, left scrotal, and hypochondrium region. Radiographs showed a soft tissue mass arising from both palmar and dorsal aspect of the left hand without any bony involvement (Figure 2). Ultrasound suggested a large echogenic mass in the palmar aspect of the left hand in the subcutaneous and intramuscular planes encasing the tendons with few arterial feeders and venous lakes probably suggestive of a hemangioma. The pediatrician started the patient on Inderal (propranolol) (10 mg) and Prednisolone (5 mg) for 2 weeks, and asked to see the patient again in 2 weeks. On follow-up, the parents noticed reduction in the size of the swelling during the time the patient was on the medication, based on which the pediatrician continued the patient on same medication for another 2 weeks.

On subsequent follow-up, the parents complained of an increase in size of the swelling and appearance of new swelling in right neck, upper back, and left axillary region.

The patient was then referred to us for the swelling involving the entire hand including the fingers. Computed tomography (CT) angiogram suggested visible feeding vessels to the swelling which were nonenhancing on injection of dye and hence a provisional diagnosis of hemangioma or a neurogenic lesion was considered. The child underwent biopsy of the swelling in the hand and swellings in the neck and scapular region which was reported as congenital rhabdomyosarcoma with metastasis to the lymph nodes (Figure 3). On immunohistochemistry staining, it was CD99 and Desmin positive and leukocyte common antigen negative, suggestive of embryonal variant of congenital rhabdomyosarcoma. Bone marrow trephine biopsy and aspirate showed no evidence of any infiltration, and thoracic CT suggested multiple enlarged and heterogeneously enhancing lymph nodes in right axillary region with no evidence of pulmonary metastasis. Bone scan suggested increased radiotracer uptake in head of left third metacarpal.

The child was started on chemotherapy with vincristine, adriamycin, cyclophosphamide (VAC) regimen. After the first cycle of chemotherapy, the patient suffered from febrile

Figure 3. a, Hematoxylin-eosin staining of the biopsy specimen (original magnification $\times 10$) showing small round spindle cells with abundant eosinophilic cytoplasm. b, High-power view (original magnification $\times 40$) of the same section showing dense condensations of rhabdomyoblasts with cross striations.

neutropenia with subconjunctival bleeds and oral ulcers along with low hemoglobin and platelets for which packed cell and platelets were transfused. The child's condition deteriorated, and he developed severe oral thrush, bronchopneumonia, and right upper limb focal seizures and died after severe respiratory distress and cardiopulmonary arrest because of his illness.

Discussion

Although the majority of cases of rhabdomyosarcoma are diagnosed in children younger than 6 years, it is uncommon in infants. There is a high incidence of complications in infants with rhabdomyosarcoma.⁴ In 12 cases reported by Potenza and Winslow,¹³ the age of the patients ranged from 5 months to 35 years. Only 1 patient was diagnosed of alveolar rhabdomyosarcoma at 5 months involving the thumb web. Embryonal type is seen rarely in the extremity, and those in the hand are extremely rare.^{1,17} Lesions in the upper extremity have a better prognosis compared with those in the lower limb,⁸ and rhabdomyosarcoma arising in the hand has a better prognosis as the lesion is detected earlier when it appears in the hand.⁶ Among 1843 patients with nonmetastatic rhabdomyosarcoma reported by Malempati et al,⁹ 76 patients were younger than 1 year at the time of diagnosis, and 12 of the 76 patients (16%) had extremity involvement.

Local excision is not adequate and hence not recommended for rhabdomyosarcomas.^{8,15,17} In the study by Linscheid et al,⁸ a very high rate of recurrence was noted in patients who had local excision of the tumor, with 134 recurrences reported in 59 patients who had local excision. The remaining patients who had radical surgery had lesser recurrence. Radical excision in the hand may involve amputation or disarticulation of the digit or hand. This is recommended even though there is profound functional loss and cosmetic

nonacceptance.¹⁴ Siegel et al¹⁵ and Xarchas et al¹⁷ have also reported superior outcome with lesser recurrence and metastasis with a radical resection for rhabdomyosarcomas in extremities. In the Xarchas et al¹⁷ report, out of the 2 cases, the child who had local excision with chemotherapy died whereas another patient who had undergone an ulnar hemiresection along with chemotherapy and radiotherapy was free of recurrence and metastasis at 4.5-year follow-up. Cohen et al² reported a child with Apert syndrome with congenital embryonal rhabdomyosarcoma in the hand. At birth, the child had a 1-cm soft bluish mass in the thenar eminence of the right palm which was thought of as a hemangioma. At 14 months, it enlarged, and intralesional steroids were injected but the tumor continued to grow. Soon a mass in the forearm and a node in the axilla appeared and biopsy revealed the diagnosis. All the masses were radically excised, and the child was followed with chemotherapy and radiotherapy. At publication time of 18 months, the child was disease free.

Our case is that of an infant who suffered from embryonal rhabdomyosarcoma of the hand since birth with metastasis at birth and was referred to us at the age of 3 months. He had cervical, axillary, and inguinal lymphadenopathy, and some nodes were present since time of birth, which is an unusual presentation. Three of the 76 patients in the study by Malempati et al had distant lymph node metastasis. Thirty-two patients experienced treatment failure, and 20 patients died; 18 of these patients died from progressive disease, and 2 died from treatment-related toxicity.

The dilemma arises when there is a delay in presentation when metastasis has already occurred or when there is metastasis detected at birth. The effectiveness of a radical procedure in such cases has not been proven. Moreover, in case of an infant, it becomes extremely difficult to counsel the parents for amputation or other radical procedures. We had advised amputation for our patient for which the parents

disagreed. The child unfortunately died because of febrile neutropenia which is considered as a treatment-related complication, thus highlighting the poor outcome of rhabdomyosarcoma in infants when compared with older patients. Age, site of origin, size of tumor, resectability, presence of and number of metastasis, lymph nodes, and histological types are all considered as prognostic factors in rhabdomyosarcoma.^{3,5,10,16} The initial delay and the complications arising out of chemotherapy in infants were all contributing factors for the poor prognosis in our case. The reluctance to use aggressive local control measures can also lead to higher rates of failure.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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