

## CASE REPORT

# Primary rhabdomyosarcoma of the ethmoid sinus with orbital extension and metastasis to the pancreatic body

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## Abstract

This case report highlights the need for clinicians to monitor patients with rhabdomyosarcoma for pancreatic metastasis to ensure that proper treatment is quickly provided, thereby improving outcomes.

## KEYWORDS

adult, ethmoid sinus, metastases, pancreas, rhabdomyosarcoma

## 1 | INTRODUCTION

Rhabdomyosarcoma (RMS) is a rare cancer in adults, and metastasis to the pancreas is uncommon. We have reported a case of adult ethmoid sinus RMS with orbital extension and metastasis to the pancreatic body. The patient received radiotherapy and chemotherapy, and the tumors were completely ablated by this regimen.

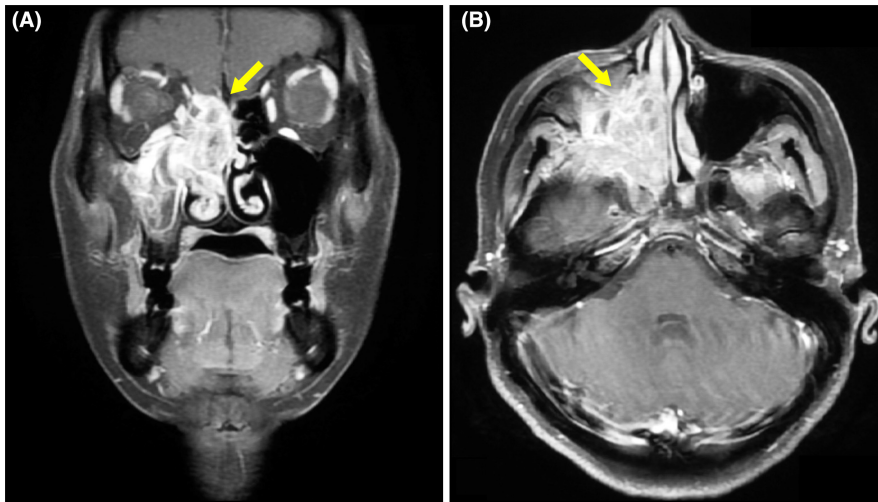
RMS is a malignant tumor of mesenchymal origin and is believed to arise from primitive skeletal muscle cells of various anatomical sites.<sup>1</sup> It is the most common soft tissue sarcoma in childhood and adolescence but rarely presents in adulthood.<sup>2</sup> Although RMS may occur at any age, 41% of all cases occur in adults, comprising 1% of adult cancers.<sup>2,3</sup> The primary tumor site of adult RMS has a wide anatomic distribution, with most tumors classified as visceral.<sup>3,4</sup> Tumors of

the head and neck only account for 19%-24% of adult RMS cases.<sup>3,4</sup> Adult RMS is an aggressive tumor, and more than half of patients have regional and distant metastases at diagnosis.<sup>3,4</sup> The common sites of metastasis include the lungs, bone, omentum, and lymph nodes.<sup>5</sup> Pancreatic metastases are rare in newly diagnosed patients.<sup>6,7</sup>

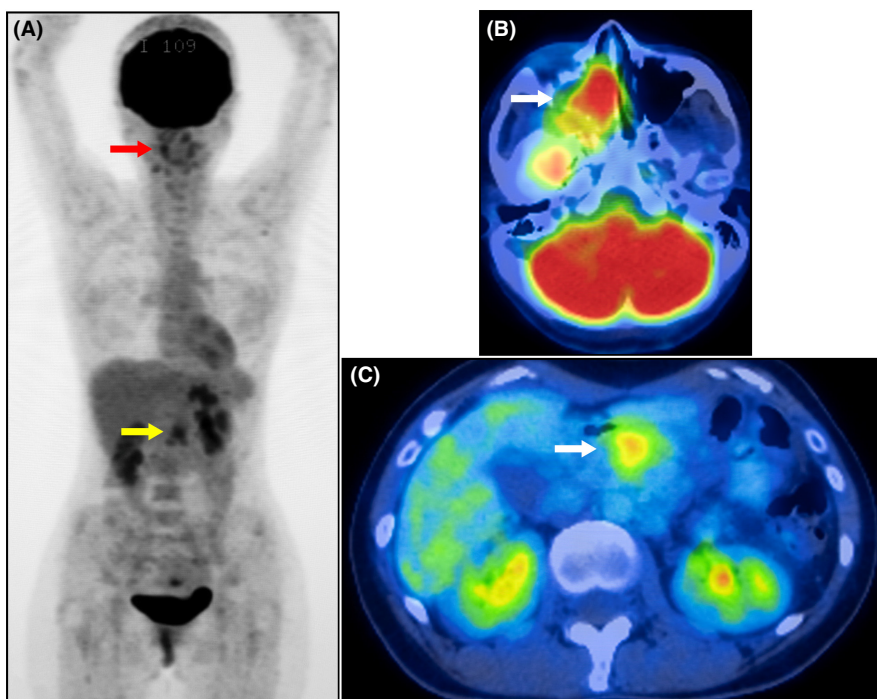
The prognosis of adult RMS is dismal, especially in patients with distant metastasis.<sup>3-5,8</sup> Although standard therapies have not been established, surgery remains the mainstay of treatment, and complete resection should be attempted whenever possible. For patients with residual or recurrent disease, chemotherapy, and/or radiotherapy may be reasonable options.<sup>4,5</sup> In this study, we have reported an adult case of RMS of the ethmoid sinus with orbital extension and metastasis to the pancreatic body in which a complete response was achieved following combination treatment with radiotherapy and chemotherapy.

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**FIGURE 1** Coronal (A) and axial (B) magnetic resonance imaging of the head revealing a large homogenous well-enhanced mass (42 × 21 mm) in the right ethmoid sinus (yellow arrow). The mass had extended to the right sphenoid sinus, nasal cavity, and orbit



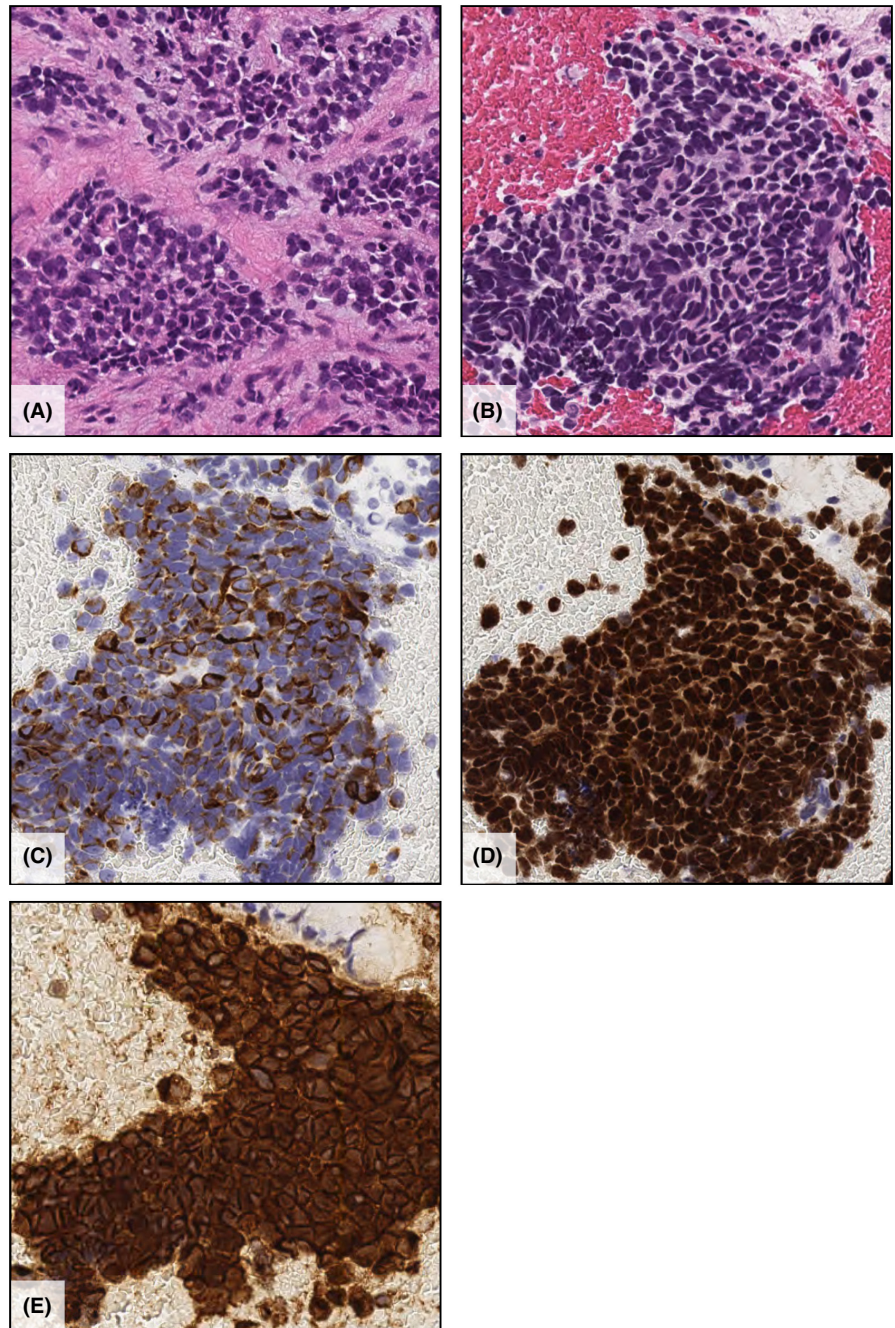
**FIGURE 2** Positron emission tomography-computed tomography. (A) The maximum intensity projection image of the whole body revealed increased tracer uptake in the right perinasal region (red arrow) and midabdomen (yellow arrow). Transaxial-fused images revealed hypermetabolic masses (white arrows) in the right ethmoid sinus (B) and pancreatic body (C)

## 2 | CASE REPORT

The patient was a 44-year-old Japanese woman (gravida 1 para 1) who presented at a local hospital with upper right gum pain and nose bleeding. Computed tomography (CT) revealed a 35 × 20 mm irregular mass in the right ethmoid sinus. Biopsy of the nasal mass was performed, revealing small round to oval malignant cells arranged in varying degrees of cellularity. She was subsequently referred to our clinic. Magnetic resonance imaging disclosed a large homogenous well-enhanced mass (42 × 21 mm) with surrounding bony erosion and remodeling (Figure 1). The mass had extended to the right sphenoid sinus, nasal cavity, and orbit. Although the corrected visual acuity was 1.0 in the

left eye, the right eye displayed complete vision loss. Ptosis and oculomotor nerve palsy were also observed in the right eye. Positron emission tomography (PET)-CT revealed an enhanced mass in the right ethmoid sinus and pancreatic body (Figure 2). Biopsy of the pancreatic tumor revealed a small round malignant cell tumor. Immunohistochemically, both nasal and pancreatic tumors were positive for desmin, MyoD1, and vimentin (Figure 3) but were negative for cytokeratin AE1/AE3, CK7, CK20, synaptophysin, chromogranin A, NSE, LCA, CD3, CD4, CD8, CD10, CD20, CD79a, S100, trypsin, MIC2, CAM5.2, calretinin, and Bcl-10. The Ki-67 labeling index was 80%. Therefore, the pathological diagnosis was embryonal RMS of the ethmoid sinus with orbital extension and metastasis to the pancreatic body.

**FIGURE 3** Microscopic examination of the right ethmoid sinus tumor (A) and pancreatic tumor (B). The small round malignant cells were arranged in nests and sheets and surrounded by fibrous stroma (hematoxylin and eosin staining,  $\times 400$ ). On immunohistochemical evaluation, the tumor cells were positive for desmin (C), MyoD1 (D), and vimentin (E)



The treatment strategy was radiotherapy (50 Gy) of the ethmoid sinus and systemic chemotherapy consisting of vincristine  $1.5 \text{ mg/m}^2$  on days 1, 8, and 15, actinomycin D  $0.045 \text{ mg/kg}$ , and cyclophosphamide  $1200 \text{ mg/m}^2$  (VAC) administered at 3-week intervals. After irradiation of the ethmoid sinus, 45 Gy of radiotherapy was delivered to the pancreatic body. After first cycle of VAC therapy, the patient developed febrile neutropenia. Then, the doses were decreased to vincristine  $1.2 \text{ mg/m}^2$ , actinomycin D  $0.036 \text{ mg/kg}$ , and cyclophosphamide  $1000 \text{ mg/m}^2$ . However, after a second cycle of VAC therapy, she developed grade 4 leukocytopenia. Thereafter, the doses were further reduced to vincristine  $0.9 \text{ mg/m}^2$ , actinomycin D

$0.027 \text{ mg/kg}$ , and cyclophosphamide  $720 \text{ mg/m}^2$ . The patient completed a total of 14 cycles of VAC therapy. CT revealed complete regression of the previous tumors. She has remained alive and healthy for 15 months since starting radiotherapy and VAC therapy.

### 3 | DISCUSSION

Malignant tumors of the paranasal sinuses comprise  $<1\%$  of all malignancies, and sarcomas of the paranasal sinuses represent approximately 7% of all head and neck sarcomas.<sup>9,10</sup> Forty-six percent of paranasal sinus sarcomas were the RMS

type in adults, and the maxillary sinus was the most frequent primary site (50%) of RMS among paranasal sinuses, followed by the ethmoid sinus (35%).<sup>11</sup> Considering patients with sarcoma of the ethmoid sinus, the most common tumor histology was RMS (68%).<sup>11</sup>

Although the 5-year overall survival (OS) rate of localized RMS exceeds 70% in children (<18), the prognosis of adult RMS is extremely poor.<sup>3-5,8</sup> Other important prognostic factors include tumor size, the presence of metastases, and histological subtypes.<sup>8</sup> Bompas et al reported 5-year OS rates for localized RMS and advanced RMS (with nodes and/or metastases) of 43% and 5% in adults, respectively.<sup>8</sup> Patients with metastatic disease have poorer prognoses, and they should be considered for various treatment approaches, highlighting the need for accurate staging. Full initial staging employs cross-sectional imaging of the primary tumor, chest, abdomen, and pelvis; bone scan; and pelvic bone marrow biopsies. Several studies have shown that PET-CT improved the initial staging accuracy in adult RMS, specifically the detection of distant metastatic spread.<sup>6,12,13</sup> In our patient, pancreatic body metastasis was detected by PET-CT.

The pancreas is considered a rare metastatic site in patients with newly diagnosed RMS.<sup>6,7</sup> In a retrospective analysis, four (5.6%) of 77 patients with alveolar RMS had pancreatic metastases at initial presentation, including one adult case, whereas four patients presented with pancreatic metastases at the time of disease recurrence, including one adult case.<sup>7</sup> In the two adult patients with RMS and pancreatic metastases, the primary tumor locations were the face (right orbit and periorbital region) in one patient and the left upper extremity (left shoulder region) in the other. Even though pancreatic metastasis is rare in adult RMS, evaluation of the pancreas might be needed in this disease.

The management of patients with RMS involves the surgery and/or radiotherapy for local control and chemotherapy of various intensity and duration depending on the risk group of assignment. Systemic therapy consisting of an alkylating agent (ie, cyclophosphamide or ifosfamide) combined with vincristine and actinomycin D administered every 3 weeks for 6-10 months is the standard backbone therapy for patients with intermediate- or high-risk RMS.<sup>14</sup> Therefore, we used VAC therapy as the first-line chemotherapy in the present case. During VAC therapy, our patient underwent radiotherapy of the primary lesion (ethmoid sinus) and pancreatic metastasis. Although our patient has survived for 15 months after the start of radiotherapy and VAC therapy, close follow-up is needed to detect recurrence.

## 4 | CONCLUSION

Adult RMS is extremely rare, and its prognosis is dismal, especially in patients with distant metastasis. PET-CT may be useful for accurately diagnosing distant metastases of RMS.

Pancreatic metastases are infrequent in adult patients with RMS but might need to be evaluated.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

## AUTHOR CONTRIBUTIONS

HI: contributed to concepts and manuscript editing. HA and KS: contributed to design. HA, KS, and NU: contributed to definition of intellectual content. HI, HA, KS, and NU: contributed to manuscript editing. TS: contributed to literature search and manuscript review.

## ETHICAL APPROVAL

This was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. Patients have given their written informed consent.

## PATIENT'S CONSENT

Yes.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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