Human Pathology (2018) 74, 122–128

ELSEVIER

Human PATHOLOGY

www.elsevier.com/locate/humpath

Original contribution

Uterine rhabdomyosarcoma in adults☆

Andre Pinto MD[a,*], Ryan M. Kahn MD[b], Andrew E. Rosenberg MD[a], Brian Slomovitz MD[c], Charles Matthew Quick MD[d], Michella K. Whisman MD[d], Marilyn Huang MD, MS[c]

[a]*Department of Pathology, University of Miami Miller School of Medicine, Miami, FL 33136*
[b]*Department of Obstetrics and Gynecology, New York-Presbyterian Hospital / Weill Cornell, New York, NY 10021*
[c]*Department of Gynecology Oncology, University of Miami Miller School of Medicine, Miami, FL 33136*
[d]*Department of Pathology, University of Arkansas for Medical Sciences, Little Rock, AR 72205*

Received 23 October 2017; revised 18 December 2017; accepted 2 January 2018

Keywords:
Rhabdomyosarcoma;
Uterus;
Sarcoma;
Gynecologic;
Malignancy

Summary Rhabdomyosarcoma (RMS) is an aggressive mesenchymal tumor most commonly diagnosed in the pediatric population, and when occurring in adults, tends to develop in the deep soft tissue of the limbs. Primary uterine RMS comprises an even more restricted subset, with little known or reported when compared to most other gynecologic sarcomas. Our goal with this study was to retrospectively evaluate cases from two academic institutions and describe the main histopathologic findings of this rare gynecologic malignancy. A total of 8 cases were identified, consisting of 4 pleomorphic rhabdomyosarcomas (PRMS), 2 alveolar rhabdomyosarcomas (ARMS), and 2 embryonal rhabdomyosarcomas (ERMS). They occurred in patients ranging from 22 to 70 years old, and the most common presenting symptom was vaginal bleeding. Most patients presented with advanced stage at diagnosis, including metastatic disease to lymph nodes and to distant sites. The masses were mostly (6/8) centered in the myometrium, while two cases arose in the cervix (2/8). Histologic characteristics of the tumors were dependent on the RMS subtype, although all cases demonstrated a similar immunohistochemical profile regardless of their subclassification. RMS of the uterus has a very poor prognosis, and data regarding treatment of this rare malignancy is limited, and usually extrapolated from non-uterine sites.

1. Introduction

Rhabdomyosarcoma (RMS) is an aggressive mesenchymal tumor whose phenotype recapitulates striated skeletal muscle. RMS is most commonly diagnosed in the pediatric population, occurring predominantly in patients younger than 10 years old, and tends to originate in the head, neck, limbs and urinary tract.

RMS is subclassified into embyronal, alveolar, pleomorphic and spindle cell/sclerosing variants. Uncommon in older patients, RMS accounts for less than 4% of all adult soft tissue sarcomas, and when occurring in this patient population most often develops in the deep soft tissue of the limbs [1,2]

RMS as a uterine tumor can occur as rhabdomyosarcomatous differentiation in the setting of a biphasic neoplasm (adenosarcoma [AS], carcinosarcoma) or as a "pure" tumor. Primary RMS of the uterus is exceedingly rare, and there is limited information about its clinicopathological features in the literature as compared to most other gynecologic malignancies.

To increase our understanding of this rare tumor, we describe the characteristics of eight primary uterine RMS

☆ The authors declare no conflicts of interest. No funding of any source was received for this work.

* Corresponding author at: University of Miami Miller School of Medicine, 1611 NW 12th Avenue, Holtz 2145, Miami, FL 33136.
E-mail address: Apinto1@med.miami.edu (A. Pinto).

https://doi.org/10.1016/j.humpath.2018.01.007
0046-8177/

Table 1 Immunohistochemistry details

Antibody	Clone	Vendor	Retrieval and time	Dilution
Desmin	ER-R-11	Leica	High pH for 20 min	Ready to use
Myogenin (Myf-4)	L026	Leica	High pH for 20 min	Ready to use
Myo-D1	EP212	Leica	High pH for 20 min	Ready to use
SMA	ASM-1	Leica	No retrieval	Ready to use
MSA	HHF35	Leica	Low pH for 10 min	Ready to use
CD10	56C6	Leica	High pH for 20 min	Ready to use

Abbreviations: SMA, smooth muscle actin; MSA, muscle-specific actin.

occurring in adult patients. Most cases were initially misdiagnosed or included in the differential diagnosis among other malignant tumors such as high-grade endometrial stromal sarcoma (HG-ESS), undifferentiated uterine sarcoma (UUS) and leiomyosarcoma (LMS).

2. Materials and methods

Institutional Review Board (IRB) approval was obtained. We retrospectively investigated the surgical pathology databases from the University of Miami (UM), Miami, FL

Table 2 Patient characteristics

Case	Age	Tumor size	Referring diagnosis	RMS type	Location	Other sites involved	Stage	Course of treatment	Follow-up status
1	40	12.0 cm	HG-ESS	ARMS	Uterus with cervical extension	Bone marrow	IVB	Adriamycin and ifosfamide for 6 cycles.	AWD (18 mo)
2	68	13.6 cm	CS with "SO"	PRMS	Uterus	Peritoneum, pelvic and para-aortic LNs, liver	IVB	Initially treated with carboplatin/ paclitaxel for 5 cycles. Subsequently began vincristine, doxorubicin, and cyclophosphamide.	DOD (10 mo)
3	65	Unavailable+	UUS	PRMS	Uterus	Lung	IVB	Initiated treatment with combination therapy of vincristine, doxorubicin and ifosfamide for 6 cycles. However, remained with persistent FDG activity in right hilar mass and initiated on pazopanib daily.	AWD (26 mo)
4	62	15.2 cm	N/A	PRMS	Uterus with cervical extension	Pelvic and para-aortic LNs, omentum	IVB	Declined chemotherapeutic intervention and elected for hospice care.	DOD (4 mo)
5	22	8.1 cm	N/A	ERMS	Cervix	N/A	Inoperable	Started chemotherapy with vincristine, actinomycin and cyclophosphamide with good response, but care was transferred to another facility.	AWD (4 mo)
6	70	13.0 cm	High-grade neoplasm with sarcomatous differentiation	PRMS	Uterus with cervical extension	Lung, liver	IVB	Vincristine, adriamycin and cytoxan for 6 cycles. Switched to vincristine, irinotecan, and temozolomide on 6th cycle due to stable size and increased nodal metabolism.	AWD (9 mo)
7	64	14.5 cm	Poorly differentiated malignant neoplasm	ARMS	Uterus	Intestines, pelvic LNs	IIIC	Declined chemotherapeutic intervention and elected for hospice care.	DOD (6 wk)
8	48	6.0 cm	ERMS	ERMS	Cervix	None	IB	N/A	N/A

Abbreviations: HG-ESS, high-grade endometrial stroma sarcoma; ARMS, alveolar rhabdomyosarcoma; ERMS, embryonal rhabdomyosarcoma; PRMS, pleomorphic rhabdomyosarcoma; LN, lymph node; AWD, alive with disease; DOD, died of disease; N/A, not applicable (diagnosed at the time of this report).
+Surgery performed abroad, operative records unavailable