IMPORTANCE  No previous studies to date have validated the American Joint Committee on Cancer (AJCC) 8th edition of the TNM classification for orbital sarcoma.

OBJECTIVES  To determine the prognostic performance of the most recent TNM classification for orbital sarcoma and to identify other prognostic factors for local recurrence, lymph node metastasis, distant metastasis, and death due to disease.

DESIGN, SETTING, AND PARTICIPANTS This single-center retrospective cohort study included 73 consecutive patients treated for orbital sarcoma from March 1, 2003, through June 30, 2018. Data were analyzed from November 1 to December 31, 2018.

MAIN OUTCOMES AND MEASURES  T and N categories at presentation and disease-related outcomes, including local recurrence, lymph node metastasis, distant metastasis (DM), and death due to disease (DD).

RESULTS  The 73 participants included 43 men (59%), and the median age was 21 (range, 0-77) years. The common histologic types were rhabdomyosarcoma (RMS) (35 [48%]), solitary fibrous tumor/hemangiopericytoma (10 [14%]), and Ewing sarcoma (8 [11%]). The most common TNM designations were T2 N0 M0 (26 [36%]) and T4 N0 M0 (24 [33%]). T category was associated with the risk of all disease-related outcomes, including local recurrence (hazard ratio [HR] for T2 vs T4, 0.22 [95% CI, 0.06-0.81]; HR for T3 vs T4, 0.59 [95% CI, 0.13-2.65]; P = .03), lymph node metastasis by the last follow-up (T1, 1 [14%]; T2, 0; T3, 0; T4, 12 [35%]; P = .001), DM (HR for T2 vs T4, 0.29 [95% CI, 0.08-1.07]; P = .04), and DD (HR of T3 vs T4, 0.16 [95% CI, 0.04-0.73]; HR of T4 vs T3, 0.30 [95% CI, 0.04-2.34]; P = .02). Higher risk of DM and higher risk of DD were associated with disease category of at least T3 (HR for DM, 3.24 [95% CI, 0.89-11.72]; P = .06); HR for DD, 6.32 [95% CI, 1.43-27.95]; P = .005), N1 disease (HR for DM, 13.33 [95% CI, 4.07-43.65]; P < .001); HR for DD, 7.07 [95% CI, 2.45-20.44]; P < .001)), tumor size larger than 3 cm (HR for DM, 2.72 [95% CI, 0.92-8.05]; P = .06); HR for DD, 5.79 [95% CI, 1.85-1814]; P < .001), and age of patient with RMS younger than 1 year or 10 years or older (HR for DM, 6.85 [95% CI, 0.83-56.53]; P = .04); HR for DD, 7.03 [95% CI, 0.85-57.83]; P = .04). Higher risk of local recurrence was associated with disease category of at least T3 (HR for< T3 vs =T3, 0.20 [95% CI, 0.06-0.71]; P < .01) and tumor size greater than 3 cm (HR for ≤3 cm vs >3 cm, 0.27 [95% CI, 0.09-0.77]; P = .009). Higher risk of lymph node metastasis was associated with disease category of at least T3 (odds ratio [OR], 13.33 [95% CI, 1.77-602.30]; P = .004), alveolar RMS (OR, 9.98 [95% CI, 2.13-51.55]; P = .001), and age of patient with RMS younger than 1 year or 10 years or older (OR, 9.20 [95% CI, 1.01-458.29] P = .03).

CONCLUSIONS AND RELEVANCE  In patients with orbital sarcoma, T and N categories at presentation (defined by the AJCC 8th edition classification) correlate with metastasis and survival. These findings appear to support consideration of strict surveillance testing for regional nodal and systemic metastases in patients with orbital sarcoma with disease category of at least T3 and/or N1 disease.
Sarcomas are a heterogeneous group of rare malignant neoplasms arising from mesenchymal tissues. Sarcomas account for 1% to 5% of malignant neoplasms in adults and 5% to 10% in children.1,2 Sarcomas occurring in the orbit account for 3% to 5% of orbital tumors in adults and 4% to 7% in children.3-5 The rarity of orbital sarcomas, combined with various histologic types with distinct biological behaviors, has made it difficult to study the clinical features and treatment outcomes of orbital sarcomas. Most published studies, except for studies of orbital rhabdomyosarcoma (RMS),6,7 are small, retrospective series, and results of these small individual studies are difficult to interpret. Thus, standardization of the staging and management of orbital sarcomas has been difficult, and recommendations have mostly been based on extrapolation from experience with sarcomas of the same histologic types in other anatomical sites.1-3,8

The American Joint Committee on Cancer (AJCC) TNM classification, which is based on primary tumor features and the presence of regional nodal and distant metastasis (DM), has been widely used. The 8th edition was published in 2017,9 and its use was implemented in January 2018. However, to our knowledge, the association between the AJCC TNM categories for orbital sarcoma and outcomes has not previously been reported.

The objective of this study was to determine the prognostic performance of the AJCC 8th edition TNM classification for orbital sarcoma. We evaluated whether the T and N categories at presentation correlate with local recurrence (LR), lymph node metastasis (LNM), distant metastasis (DM), and death due to disease (DD). We also sought to identify other prognostic factors for these outcomes.

Methods

This retrospective study was approved by the institutional review board at The University of Texas MD Anderson Cancer Center, and the requirement for informed consent was waived following the usual rules by our institutional review board. Given the retrospective nature of this project, which will not affect patient treatment, and owing to the large international patient population at our institution, it would not be possible to contact many of the patients for the purpose of obtaining consent. In addition, bias might be introduced into the study if we were able to include only those patients for whom consent was obtained. This work followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline and the tenets of the Declaration of Helsinki.10

The clinical records of all consecutive patients who were treated under the care of one of us (B.E.) at The University of Texas MD Anderson Cancer Center from March 1, 2003, through June 30, 2018, for histologically proven orbital sarcoma were reviewed for demographic information (age, sex, and race/ethnicity), history, clinicoradiological information needed for tumor classification (location, size, invasion of orbital structures and/or adjacent peri orbital structures, and presence of LNM and/or DM at presentation), histopathologic information (histologic type of sarcoma), treatment (surgery, irradiation, and chemotherapy), and disease-related outcomes (LR, LNM, DM, and DD). Tumor location was classified according to the American Joint Commission on Cancer, 8th edition, classification for orbital sarcoma with dichotomized age to 9 years and older patients,12,13 age of patients with RMS was better in patients aged 1 to 9 years than in younger or older patients,12,13 age of patients with RMS was dichotomized as 1 to 9 years vs younger than 1 year or 10 years or older.

Statistical Analysis

Data were analyzed from November 1 to December 31, 2018. Time to disease-related outcomes was measured from the date of presentation to our center with orbital sarcoma, and patients who did not experience any disease-related outcomes were censored at the date of last follow-up or death, whichever occurred first. Associations between putative prognostic factors and disease-related outcomes diagnosed during follow-up were studied using survival analysis. Survival curves were estimated using the Kaplan-Meier method, and differences in survival among groups were assessed using 2-sided log-rank tests, with P < .05 indicating significance. Univariate Cox proportional hazards regression models were used to study the association between risk factors and survival and to estimate effect sizes of risk factors. Associations between putative prognostic factors and disease-related outcomes by the last follow-up were assessed using the Fisher exact test. Statistical analyses were conducted using R, version 3.4.2 (R Project for Statistical Computing).

Key Points

Question What is the association of T and N categories at presentation according to the American Joint Commission on Cancer, 8th edition, classification for orbital sarcoma with disease-related outcomes?

Findings In this single-center cohort study including 73 patients with orbital sarcoma, T3 category or greater was associated with higher risk of all disease-related outcomes, including local recurrence, lymph node metastasis, distant metastasis, and death due to disease. N1 disease was associated with a higher risk of distant metastasis and death due to disease.

Meaning These findings appear to support consideration of strict surveillance testing for regional nodal and systemic metastases in patients with a disease category of T3 or greater or with N1 disease at presentation.
Results

Patient Demographics
We identified 113 patients with a diagnosis of orbital sarcoma treated by one of us (B.E.) during the study period. Seventy-three of these patients were included in the study; the others were seen for second opinions only or for other reasons did not have complete follow-up data. The median age of the 73 patients was 21 (range, 0-77) years; 43 were male (59%) and 30 were female (41%). Fifty-three patients were white, 15 were Hispanic, 4 were black, and 1 was Asian.

Clinical Presentation
Forty patients (55%) had tumors on the left orbit. Most tumors were extracranial (61 [84%]). The most common locations involved in the coronal and sagittal dimension were superomedial (19 [26%]) and anterior (32 [44%]) orbit, respectively (eTable 2 in the Supplement). The median tumor size was 2.8 (range, 1.0-8.0) cm. Tumor invasion of surrounding structures was seen in the orbital bony walls (33 [45%]), paranasal sinus (24 [33%]), and brain (18 [25%]). Fourteen patients (19%) had a history of orbital sarcomas treated elsewhere and had recurrent tumors when they first presented to our institution. The most common TNM designations at presentation were T2 N0 M0 (26 [36%]) and T4 N0 M0 (24 [33%]) (eTable 2 in the Supplement).

Histologic Types and Treatment
The most common histologic type was RMS (35 [48%]); the subtypes of RMS were embryonal (22 [63%]) and alveolar (13 [37%]). The median age of patients with RMS was 10 (range, 0-66) years. Fifteen of 35 patients with RMS (43%) had a lesion in the superomedial quadrant of the orbit. Other common histologic types were SFT-HPC (10 [14%]), Ewing sarcoma (8 [11%]), and liposarcoma (4 [5%]) (eTable 2 in the Supplement).

Most patients (60 [82%]) underwent multimodality therapy. The most common treatments were chemotherapy plus irradiation (31 [42%]), surgery with curative intent plus chemotherapy plus irradiation (14 [19%]), and surgery with curative intent plus irradiation (10 [14%]) (eTable 2 in the Supplement). Eleven patients (15%) had an orbital exenteration.

Outcomes
The median follow-up was 38.9 (95% CI, 33.5-56.7) months. During follow-up, 16 patients (22%) had LR, 7 (10%) had LNM, 14 (19%) had DM, and 16 (22%) had DD (eTables 3 and 4 in the Supplement). At last follow-up, 49 patients (67%) had no evidence of disease, 7 (10%) were alive with disease, 16 (22%) had died of disease, and 1 (1%) had died of unrelated causes.

Association of Putative Prognostic Factors With LR
During follow-up, 16 patients developed LR. The risk of LR was associated with T category (hazard ratio [HR] for T2 vs T4, 0.22 [95% CI, 0.06-0.81]; HR for T3 vs T4, 0.59 [95% CI, 0.13-2.65]; P = .03) (Figure 1A); T category of less than vs at least T3 (HR, 0.20 [95% CI, 0.06-0.71]; P = .006) (Figure 2A); and tumor size of no greater than vs greater than 3 cm (HR, 0.27 [95% CI, 0.09-0.77]; P = .009). The risk of LR was not associated with histologic type of sarcoma (HRs vs alveolar rhabdomyosarcoma, 1.23 [95% CI, 0.29-5.17] for embryonal; 0.59 [95% CI, 0.06-5.64] for Ewing sarcoma; 1.77 [95% CI, 0.36-8.80] for solitary fibrous tumor; 0.96 [95% CI, 0.21-4.31] for others; P = .87) or age of patients with RMS (HR for ages 1-9 years vs <1 or ≥10 years, 0.34 [95% CI, 0.07-1.70]; P = .17).

Association of Putative Prognostic Factors With DM
During follow-up, 14 patients developed DM. The risk of DM was associated with T category (HR for T2 vs T4, 0.29 [95% CI, 0.08-1.07]; P = .04) (Figure 1B); T category of at least vs less than T3 (HR, 3.24 [95% CI, 1.77-6.02]; P = .004); histologic type of sarcoma (proportion of N1 disease, 7 [54%] for alveolar RMS; 3 [14%] for embryonal RMS; 0 for Ewing sarcoma; 0 for SFT-HPC; 3 [15%] for other; P = .007); and age of patients with RMS (OR for age 1-9 years, 9.20 [95% CI, 1.01-45.29]; P = .03) (Table). Additional analysis revealed that a higher risk of LNM was associated with alveolar RMS compared with the other histologic types (OR, 9.98 [95% CI, 2.13-51.55]; P = .001) and compared with embryonal RMS (OR, 6.90 [95% CI, 1.14-55.19]; P = .02).

Association of Putative Prognostic Factors With LNM
During follow-up, 16 patients developed LNM. The risk of LNM by the last follow-up was associated with T category (proportion of LNM by the last follow-up: 1 [14%] for T1 vs 0 for T2 vs 0 for T3 vs 12 [35%] for T4 [P = .001]; T category of at least vs T4 (HR, 0.19 [95% CI, 0.05-0.73]; P = .005); tumor size of greater than vs no greater than 3 cm (HR, 5.79 [95% CI, 1.85-18.14]; P < .001); and age of patients with RMS younger than 1 year or 10 years or older vs 1 to 9 years (HR, 6.85 [95% CI, 0.83-56.53]; P = .04). The risk of DM was not associated with histologic type of sarcoma (P = .59).

Association of Putative Prognostic Factors With DD
During follow-up, 16 patients died of the disease. The risk of DD was associated with T category (HR for T2 vs T4, 0.16 [95% CI, 0.04-0.73]; HR for T3 vs T4, 0.30 [95% CI, 0.04-2.34]; P = .02) (Figure 1C); T category of at least vs less than T3 (HR, 6.32 [95% CI, 1.43-27.95]; P = .005) (Figure 2C); tumor size of greater than vs no greater than 3 cm (HR, 5.79 [95% CI, 1.85-18.14]; P < .001); N1 vs N0 category (HR, 7.07 [95% CI, 2.45-20.44]; P < .001) (Figure 3B); and age of patients with RMS younger than 1 year or 10 years or older aged

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1 to 9 years (HR, 7.03 [95% CI, 0.85-57.83]; \( P = .04 \)). Risk of DD for the entire cohort was not associated with histologic type of sarcoma (\( P = .57 \)).

For patients with RMS, the difference between patients with and without nodal disease at presentation with respect to disease-specific survival was not significant (HR, 3.69 [95% CI, 0.91-15.05]; \( P = .05 \)). Seven of the 21 patients with RMS (33%) younger than 1 year or 10 years or older at presentation vs 1 of the 14 patients (14%) aged 1 to 9 years at presentation died of the disease; the risk of DD was 86% lower for patients with RMS aged 1 to 9 years (HR, 0.14 [95% CI, 0.02-1.17]; \( P = .04 \)). Eleven of the 21 patients with...
RMS (52%) younger than 1 year or 10 years or older at presentation vs 2 of the 14 patients with RMS (14%) aged 1 to 9 years at presentation had alveolar RMS vs embryonal RMS (OR, 6.25 [95% CI, 1.00-71.33]; \( P = .03 \)).

**Association Between Tumor Size With Various Cutoffs and Disease Outcomes**

When we investigated the potential prognostic value of tumor size using different cutoff points for dichotomization, we found no difference in outcomes between orbital sarcomas no greater than 2 cm and greater than 2 cm (\( P > .05 \) for each comparison), but outcomes were different for orbital sarcomas no greater than 3 cm vs greater than 3 cm (HR for LR, 0.27 [95% CI, 0.09-0.77; \( P < .009 \)]; HR for DM 0.37 [95% CI, 0.12-1.09; \( P = .06 \)]; and HR for DD, 0.17 [95% CI, 0.06-0.54; \( P < .001 \)]. An additional analysis comparing tumors not involving the bony walls that were no greater than 3 cm (\( n = 32 \)) vs greater than 3 cm (\( n = 8 \)) showed no difference in outcomes (HR for LR, 0.55 [95% CI, 0.10-3.02; \( P = .48 \)]; HR for DM, 0.49 [95% CI, 0.04-5.49; \( P = .56 \)]; HR for DD, 0.38 [95% CI, 0.05-2.91; \( P = .34 \)], suggesting that for tumors 3 cm or greater, bony involvement rather than size alone may account for association with worse outcomes. Comparison of orbital sarcomas no greater than 4 cm and greater than 4 cm showed that tumors 4 cm or smaller were associated with lower risk of DM (HR, 0.30 [95% CI, 0.09-1.00]; \( P = .04 \)) and DD (HR, 0.24 [95% CI, 0.08-0.73; \( P < .01 \)), but not LR (HR, 0.53 [95% CI, 0.15-1.90]; \( P = .32 \)). When tumor size and age were treated as con-
Continuous variables in the statistical analysis, for every 1-cm increase in tumor size, the risk of LR would increase by 86% (P = .02), the risk of DM would increase by 79% (P = .006), and the risk of DD would increase by 134% (P < .001) (eTable 5 in the Supplement). For each 1-year increase in age of patients with RMS, the risk of distant metastases would increase by 3% (P = .02) and the risk of DD would increase by 3% (P = .03). Tumor size and age, as continuous variables, were not associated with the risk of LNM (t = −0.39 [95% CI, −1.20 to 0.83; P = .70 for tumor size; t = −0.55 [95% CI, −16.08 to 9.48; P = .59 for age]) (eTable 5 in the Supplement).

Discussion

The major finding in this study is that the T and N categories of the AJCC 8th edition classification appear to have prognostic value in patients with orbital sarcoma. We found that the T category was associated with risk of LR, LNM, DM, and DD. Specifically, disease of T3 category or greater at presentation seemed to be associated with higher risk for LR, DM, and DD. We also found that nodal disease at presentation was a strong predictive factor associated with higher risk for DM and DD.

Table. Association Between Disease and Patient Characteristics and Lymph Node Metastasis Status by the Last Follow-up

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>LNM, No. (%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T category at presentation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>6 (10)</td>
<td>1 (8)</td>
</tr>
<tr>
<td>T2</td>
<td>26 (43)</td>
<td>0</td>
</tr>
<tr>
<td>T3</td>
<td>6 (10)</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td>22 (37)</td>
<td>12 (92)</td>
</tr>
<tr>
<td><strong>Stratified by T3 category</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;T3</td>
<td>32 (53)</td>
<td>1 (8)</td>
</tr>
<tr>
<td>≥T3</td>
<td>28 (47)</td>
<td>12 (92)</td>
</tr>
<tr>
<td><strong>Histologic type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alveolar RMS</td>
<td>6 (10)</td>
<td>7 (54)</td>
</tr>
<tr>
<td>Embryonal RMS</td>
<td>19 (32)</td>
<td>3 (23)</td>
</tr>
<tr>
<td>Ewing sarcoma</td>
<td>8 (13)</td>
<td>0</td>
</tr>
<tr>
<td>SFT-HPC</td>
<td>10 (17)</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>17 (28)</td>
<td>3 (23)</td>
</tr>
<tr>
<td><strong>Age of patients with RMS, y</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 or ≥10</td>
<td>12 (48)</td>
<td>9 (90)</td>
</tr>
<tr>
<td>1-9</td>
<td>13 (52)</td>
<td>1 (10)</td>
</tr>
</tbody>
</table>

Abbreviations: LNM, lymph node metastasis; RMS, rhabdomyosarcoma; SFT-HPC, solitary fibrous tumor/hemangiopericytoma.

* Indicates patients who experienced LNM at presentation or during follow-up.

b Determined using American Joint Commission on Cancer 8th edition classification.
In addition, our findings suggest that tumor size greater than 3 cm correlated with higher risk for LR, DM, and DD. Finally, age of patients with RMS younger than 1 year or 10 years or older was associated with higher risk for LNM, DM, and DD, and, notably, the frequency of alveolar RMS was higher in the higher-risk age group.

Given the broad spectrum of histologic types of orbital sarcoma, it is remarkable that the AJCC TNM classification for orbital sarcoma, which does not account for histologic type, pathologic grade, or age, is associated with disease outcomes. Historically, AJCC T categories for orbital sarcoma have been defined by tumor size and invasion of bony walls of the orbit and orbital and/or periorbital structures.12-14 Our analysis verified that these criteria are reliably associated with outcomes after treatment in patients with orbital sarcoma. It is noteworthy that disease category of at least T3, which indicates invasion of orbital bone or adjacent periorbital structures, was associated with higher risk not only for LR but also for LNM, DM, and DD. Complete resection of orbital tumors with invasion of adjacent structures is often difficult to achieve and is associated with morbidity, and such tumors could be associated with a higher risk of LR due to residual macroscopic or microscopic disease. Furthermore, given the limited lymphatics in the orbital cavity,12 once sarcomas invade the orbital walls and gain access to structures outside the orbit,13 they may be more likely to spread by lymphatic or hematogenous routes and eventually cause DD. Importantly, even locoregional recurrence of orbital sarcomas may become lethal through invasion of the posterior orbit/skull base or brain structures. Although the ophthalmic literature lacks reports on prognostic factors for orbital sarcoma, tumor size and invasion of adjacent structures have been reported to be prognostic in patients with head and neck sarcoma.16-18

Given our findings regarding the importance of tumor size, a possible consideration for future modifications of the AJCC orbital sarcoma classification might be to change the cutoff point between T1 and T2 from 2 cm to 3 cm. When we investigated the potential prognostic value of tumor size using different cutoffs, we found no difference in outcomes between orbital sarcomas no greater than 2 cm and greater than 2 cm, but we found differences in outcomes between orbital sarcomas no greater than 3 cm and greater than 3 cm. However, when we limited the analysis to orbital sarcomas without bony invasion or involvement of adjacent structures, the prognostic significance of the 3-cm cutoff was lost. Some 3-cm tumors will likely invade the orbital bony walls, and that invasion may be more prognostically important than tumor size.

Most patients who had LNM at presentation (N1 disease) had RMS and T4 disease. Among the 11 patients with LNM at presentation, 8 had RMS (alveolar in 6 and embryonal in 2), and 10 had T4 disease. These findings were consistent with findings of previous studies of sarcomas in other anatomical sites, which showed that lymphatic spread of sarcoma is uncommon in adults but most commonly occurs with RMS.19,20 In the present study, LNM at presentation was the strongest adverse prognostic factor for distant metastases (HR, 13.33 [95% CI, 4.07-43.65]) and DD (HR, 7.07 [95% CI, 2.45-20.44]). The role of lymph node status in the staging of soft tissue sarcoma is controversial,21 but a previous study on head and neck sarcomas revealed that nodal disease at presentation was a prognostic factor for decreased overall survival.15 A larger sample size will be needed to verify whether LNM at presentation is an independent prognostic factor or a surrogate marker of T category and/or histologic subtype in patients with orbital sarcoma.

Rhabdomyosarcoma was the most common histologic type in our cohort (35 of 73 [48%]). Consistent with previous studies, a high proportion of the patients with RMS were children (median age, 10 years), and RMS exhibited a predilection for the superomedial quadrant of the orbit (15 of 35 [43%]).6,22 Alveolar RMS accounted for a higher proportion of the RMS cases in our cohort (13 of 35 [37%]) than in a previous large study (16%).7 Given that alveolar RMS has a worse prognosis than embryonal RMS (5-year survival rates, 75% and 95%, respectively),7 the higher proportion of patients with alveolar RMS in our cohort might have led to worse outcomes. We found that alveolar RMS was associated with a higher risk of LNM compared with other sarcomas (OR, 9.98 [95% CI, 2.13-51.55]; P = .001) and embryonal RMS (OR, 6.90 [95% CI, 1.14-55.19]; P = .02), and thus it seems reasonable to recommend careful examinations to check for LNM at presentation and during follow-up for patients with the alveolar subtype. In addition, we found that patients with RMS and LNM disease at presentation had a borderline higher risk of DD than those without LNM at presentation (P = .05). Thus, these findings support the use of histologic type and N category to guide follow-up decisions in patients with RMS. Previous studies on RMS in all anatomical sites (not just orbit) showed that patients aged 1 to 9 years had better survival12 and a lower recurrence rate13 than patients younger than 1 year or 10 years or older. Similarly, our analyses showed that being younger than 1 year or 10 years or older was associated with higher risks for LNM, DM, and DD in patients with orbital RMS.

Strengths and Limitations

Strengths of our study include the fact that this was one of the largest single-center series to date of patients with orbital sarcoma. In addition, all patients were evaluated and treated in a fairly standardized manner under the care of a single physician, and the prognostic value of the AJCC TNM classification for orbital sarcoma was systematically validated in our series.

This study has some limitations. First, because of the limited number of events during follow-up, the study did not have sufficient power to permit multivariable analyses. For example, given the anatomical features of the orbit, we were not able to examine whether tumor size, invasion of adjacent structures, and LNM might be covariables rather than independent variables. Although only limited conclusions can be drawn from univariate analysis, we believe that our findings have important implications for estimating outcomes and guiding future investigation because this is, to our knowledge, one of the largest series of orbital sarcomas in the literature. In addition, the analyses showed no prognostic effect of histologic type except that alveolar RMS was associated with higher risk of LNM at presentation, unlike in previous studies on sarcomas.15,23,24
Conclusions

The AJCC classification has included separate staging algorithms for orbital sarcoma since the second edition, published in 1983.14 However, to our knowledge, ours is the first study of treatment outcomes of orbital sarcoma according to AJCC T and N categories. We believe our findings support consideration of strict surveillance testing for regional nodal and systemic metastases in patients with orbital sarcoma with a disease category of at least T3 and/or nodal metastasis at presentation.

ARTICLE INFORMATION

Accepted for Publication: December 23, 2019.
Published Online: February 27, 2020.

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Drafting of the manuscript: Sa, Ning, Esmaeli.
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Obtained funding: Esmaeli.
Administrative, technical, or material support: Sa, Paulino, Esmaeli.
Supervision: Sa, Esmaeli.

Conflict of Interest Disclosures: Dr Tetzlaff reported receiving personal fees from Myriad Genetics, Inc, Novartis International, NanoString Technologies, Inc, and Seattle Genetics outside the submitted work. No other disclosures were reported.

Funding/Support: This study was supported by award P30CA016672 from the National Cancer Institute, which supports the MD Anderson Cancer Center Clinical Trials Support Resource.

Role of the Funder/Sponsor: The sponsor had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

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