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**Survival in Mesenchymal Chondrosarcoma: 205 Cases from the SEER Database**

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**Background:** Mesenchymal chondrosarcoma is a rare subtype of chondrosarcoma. It is believed to have a predilection for extraskeletal locations with the largest previous series reporting an incidence of 39% of tumors found in the soft tissues. It is also believe to carry a poor prognosis with a 10 year survival reported as low as 20%. What is not known are which factors are prognostic in the survival outcomes of patients with this disease, specifically with regard to disease location.

**Questions/Purposes:** 1) What is the 5 and 10 year overall (OS) and disease-specific survival (DSS) of patients with mesenchymal chondrosarcoma? 2) What is the effect of tumor location on survival including extraskeletal versus skeletal location and cranial/axial/appendicular location?

**Patients and Methods:** This investigation was completed utilizing the Surveillance, Epidemiology and End Results (SEER) Program Database administered through the National Cancer Institute. From 1973-2011 there were 207 cases of mesenchymal chondrosarcoma identified, two were excluded due to incomplete records. Data collected included patient age, sex, location of tumor (extraskeletal/skeletal, cranial, axial and appendicular), and survival status. Data were analyzed using Kaplan-Meier (KM) method for median, 5-year and 10-year OS and DSS. Multivariate analysis was performed utilizing Cox proportional hazards regression.

**Results:** 205 patients were available for analysis. There were 114 (56%) men in this cohort. Average age was 37 years. 123 tumors (60%) were encountered in an extraskeletal location. Information regarding metastatic disease at presentation was not present for 126 patients. The median overall survival for this patient cohort was 68 months. The 5- and 10- year OS was 51% (95%CI: 43-58%) and 43% (95% CI: 35-51%), respectively. Axial tumors were found to have a poor prognosis with a median OS of 30 months and 5- and 10-year OS of 37% (95%CI: 25-49%) and 31% (95% CI: 20-43%), respectively. The survival results based on extraskeletal compared to skeletal location and by cranial/axial/appendicular location are found in Table 1. Table 2 demonstrates the multivariate analysis which indicate that age ($p < 0.001$), male sex ($p = 0.01$) and axial location ($p = 0.03$) were found to negatively impact overall survival.

**Conclusions:** Our data indicated a high prevalence (60%) of mesenchymal chondrosarcoma is encountered extraskeletally, which surpasses the incidence that has been commonly accepted for this disease. The 10-year overall survival in our series of 43% indicates a poor prognosis, but not as dismal as prior reports. Age, male sex and axial location were found to be independent risk factors for mortality.

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| | Median Survival in months (95% CI) | 5-year Survival (95% CI) | 10-year survival (95% CI) |
|---|---|---|---|
| Appendicular | 64 (28-154) | 50% (36-63%) | 39% (26-52%) |
| Axial | 30 (20-59) | 37% (25-49%) | 31% (20-43%) |
| Cranial | 161 (122-inf) | 74 % (59-84%) | 67% (50-79%) |
| Extraskeletal (excl. cranial) | 47 (30-109) | 47% (36-58%) | 37% (26-48%) |
| Skeletal (excl. cranial) | 28 (19-59) | 33% (20-47%) | 28% (15-42%) |

Table 1. This table includes the median, 5-year and 10-year overall survival stratified by tumor location. Given the apparent difference clinical behavior for cranial tumors, those were excluded from the analysis by extraskeletal and skeletal locations as noted.

| Variable | Hazard Ratio | 95% CI | p-value |
|---|---|---|---|
| **Age at diagnosis** | 1.022 | 1.01-1.03 | <0.001 |
| **Extra Skeletal** | 0.74 | 0.48-1.13 | 0.16 |
| **Male** | 1.74 | 1.13-2.68 | 0.01 |
| **Location** | | | 0.002 |
| *Axial* | 1.68 | 1.06-2.66 | 0.03 |
| *Cranial* | 0.66 | 0.37-1.18 | 0.16 |

***Reference levels: Gender=Female; Site=Skeletal; Location=Appendicular**

Table 2. Multivariate analysis utilizing Cox proportional hazards regression indicating impact of age, extraskeletal location, sex and tumor location to overall survival.