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## Metastatic potential of low-grade chondrosarcoma of bone - results of a multi-institutional study

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**Background:** Little is known about the metastatic potential of low-grade chondrosarcoma. The objective of this study was to evaluate the rate of distant metastasis and attempt to identify possible risk factors.

**Methods:** The files of 211 patients with newly diagnosed, low-grade chondrosarcoma of bone treated between 1976 and 2010 were retrospectively analyzed. Mean follow-up was 99 months for survivors (range, 24-424 months). Non-parametric analyses were performed with the Mann-Whitney U test. Survival curves were calculated with the Kaplan-Meier method and compared with the log-rank test.

**Results:** Distant metastases developed in 15 patients after a mean of 56 months (range, 4-125 months). 7 of these patients have died of disease, 6 are alive with disease and 2 patients are in complete remission. Post-metastasis survival amounted to 63% after 2 years and 35% after 5 years. 12 of the 15 patients developed local recurrences prior to metastatic disease, 8 of which were grade II. Regarding risk factors, patients with metastases had a mean tumor size at diagnosis of 7.9cm, compared to 8.7cm for patients who did not develop metastases ( $p=0.947$ ). Patients with tumors of the thoracic wall had a significantly lower 10-year metastasis-free survival of 55%, compared to patients with tumors of the upper extremity (98%,  $p=0.003$ ), the lower extremity (91%,  $p=0.028$ ) and the pelvis (90%,  $p=0.036$ ). There were no significant differences in metastasis-free survival between patients treated with intralesional curettage compared to those treated with wide resection ( $p=0.711$ ). Patients who developed local recurrences had a significantly poorer 10-year metastasis-free survival, compared to patients who developed no local recurrences (64% vs. 96%,  $p<0.001$ ). Patients with low-grade local recurrences had a strong trend for a higher metastasis-free survival compared to patients with grade II recurrences (80% vs. 49% at 10 years,  $p=0.062$ ).

**Conclusion:** Tumor localization in the thoracic wall and development of local recurrences were associated with a higher metastasis rate in this study, while tumor size and surgical treatment modality were not. Given the rarity of grade I chondrosarcoma and its low metastasis rate, further analysis of the risk of metastasis in these patients can only be achieved through large multi-institutional studies.

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