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Results of Limb-Sparing Surgery of Soft Tissue Sarcoma of the Lower Extremity with Sciatic Nerve Involvement

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The surgical resection of lower limb soft tissue sarcomas with sciatic nerve involvement presents a significant surgical and oncological challenge. In the past, sciatic nerve involvement was an indication for limb amputation. However, recent studies have shown good functional outcomes and no significant difference in overall survival rates for limb-sparing surgery treated with a multimodal approach. Current treatment strategies are therefore more targeted towards limb preservation.
The aim of our study was to evaluate the oncological and functional outcomes of limb sparing surgery of soft tissue sarcomas with sciatic nerve involvement in a cohort of adult patients treated in a specialist center. We also proposed a classification system and treatment algorithm for soft tissue sarcomas of the lower extremity with sciatic nerve involvement.
Patients receiving limb-preserving resections for lower limb soft tissue sarcomas with sciatic nerve involvement treated at the Clinical Center Frankfurt Höchst between January 2010 and January 2017 were included. Demographic, clinical and oncological data of the included patients were collected on an ongoing basis in a computerized database and retrospectively analyzed. Nerve involvement of lower limb soft tissue sarcomas was classified preoperatively as follows: Type A for nerve encasement greater than 180°, type B for nerve contact less than 180° and type C for no nerve involvement (excluded from analysis).
A total of 364 patients with soft tissue sarcomas underwent surgical resection, of which 27 patients had soft tissue sarcomas of the lower extremity with sciatic nerve involvement. Eight type A tumors (29.6%) and 19 type B tumors (70.4%) were diagnosed. Patients with type A tumors underwent sciatic nerve resections whereas patients with type B tumors were treated with an epineural nerve dissection. Primary limb salvage was achieved in 100% of cases with negative margins confirmed in 25 out of 27 cases (92.6%). Patients were followed up for a maximum of 5 years with a median duration of 23 months. Disease progression was observed in 8 patients (29.6%) with a local recurrence rate of 11.1% and distant metastasis in 29.6% of patients. The overall survival rate was 74%. Tumor grade was the single parameter significantly associated with metastatic disease ($p = 0.01$) and overall survival. ($p = 0.02$). The type of nerve resection significantly influenced the functional outcome but had no significant impact on oncological outcome or overall survival.
To our knowledge, this is the first study to date to classify the extent of nerve involvement in soft tissue sarcomas and to suggest a treatment algorithm based on the classification. We have demonstrated that acceptable oncological and survival outcomes can be achieved for patients undergoing limb sparing surgery, with no significant difference between patients undergoing complete nerve resection or epineural dissection of the sciatic nerve. Precise classification of nerve involvement is therefore useful in selecting the appropriate degree of nerve resection without compromising oncological outcome or unnecessarily sacrificing leg function.