

Does intralesional excision plus adjuvant charged- particle radiation therapy matter on local disease control and survival in the management of primary spinal tumors not eligible for en bloc resection? Retrospective analysis of a cohort of 36 patients fr

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Introduction

The management of primary tumors of the spine has long been a challenge in oncological surgery. En bloc resection with wide or marginal margins is considered the gold standard for achieving local control and reducing recurrence rates, particularly for aggressive benign and malignant tumors. Recent advancements in adjuvant radiotherapy, particularly charged-particle therapies such as proton therapy and carbon ion radiotherapy, have begun to shift this paradigm.

Materials and Methods

The study is a retrospective analysis of data prospectively collected. It includes patients affected by primary tumors of the mobile spine who were treated by intralesional surgery at a tertiary center specialized for spinal diseases between March 2015 and February 2024.

After the intralesional surgery, all patients underwent charged- particle radiotherapy, Carbon ion radiation therapy (CIRT) or Proton Beam Therapy (PBT), at specialized external centers. Patients were followed up longitudinally through clinical visits and imaging studies. Local recurrences (LR) after surgery were recorded.

Results

A total of 36 patients were included in the study: 24 males and 12 females, with a mean age of 57.5 years at the time of surgery. The most frequent tumor type was chordoma (26 cases, 72.2%), and the most frequent localization was lumbar (44.4%). Most patients (27/36, 75%) had already undergone prior surgeries for the same lesion.

Patients underwent intralesional intracapsular excision in 11 cases (30.6%) or intralesional extracapsular excision (gross total resection) in 25 cases (69.4%) with CFR-PEEK posterior instrumentation for most patients (27, 75%).

All patients underwent charged-particle therapy after the intralesional surgery: 27 patients (75%) were treated by PBT and 9 patients (25%) were treated by CIRT.

The survival probability at 3 years of follow-up was 88.3% (95% CI: 78.2–99.8), decreasing to 61.4% (95% CI: 45.4–82.9) at 5 years. The occurrence of LR at any point during follow-up emerged as a significant predictor for mortality (HR = 3.70 [95% CI 1.48, 9.27]).

Eighteen patients (50%) had one or more post-operative local recurrences after the index surgery. Fifteen out of 18 patients (83.3%) with post-operative LR had also local recurrence before the index surgery. The pre-operative LR or the type of intralesional surgery had no significant impact on the occurrence of LR during the follow up period.

Conclusion

Intralesional surgery followed by charged-particle radiotherapy provides acceptable results in terms of local control and survival rates, even in cases of recurrent tumors.