Radiotherapy in the treatment of chordoma.

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Background. Chordomas are rare tumors. In the last 20 years innovative treatment approaches have been developed, but evidence generated by available studies is weak. Surgery is preffered as primary treatment but radical resection is often not possible. Radiotherapy (RT) is recommended as adjuvant treatment and is the treatment of choice for inoperable patients. Hypothesis. Evaluation of treatment results and identification of prognostic factors of patients with chordomas. Methods. Sixty seven patients (33 male, 34 female) aged 12 - 80 (median 50) were treated with RT due to chordoma. Most of them (80%) were diagnosed with classical type of tumor. Cranium was the most common disease site (76%) followed by sacrum (21%) and cervical/thoracic spine (3%). 91% patients were in good performance status (ECOG 0 or 1). Most of the patients underwent surgery (84%) before RT. 22 patients had recurrence after the surgery and 16 of them underwent another resection. RT was part of the treatment in 53 cases. 22 patients had been irradiated using hypofractionated stereotactic radiotherapy (SRT) or radiosurgery (SRS) combined in some cases with conventional irradiation, 7 patients received proton therapy and 24 were treated using other irradiation techniques. The total biological dose (alfa/beta=3) ranged from 17.6 to 81.6Gy (median 51Gy). 7 patients had been reirradiated to the median dose of 30 Gy. In the statistical analysis the Kaplan-Meier method, Cox regression model and log-rank tests were used. Follow-up was calculated from the date of the diagnosis to the date of death or last contact. Results. During follow-up (FU) of median time of 70 months 31 patients died. In univariate analysis factors associated with survival were: sex ($p=0.039$), location ($p=0.004$) , performance status ($p<0.000$), use of radiotherapy ($p=0.002$), use of radiosurgery or proton therapy (vs other) ($p=0.005$), irradiation to the total biological dose over 70 Gy ($p=0.049$) and treatment effect ($p=0.001$). Female were found to have better OS than men (5-year: 66% vs 44% and 10 year: 44% vs 11%), also patients with skull base chordoma tend to live longer than those with sacral location of chordoma (5-year: 64% vs 36%, 10-year 30% vs. 0%) Patients in better performanace status had better 5-year and 10-year OS. Use of radiotherapy, especially SRS or proton therapy with total dose over or equal 70 Gy was associated with improved OS. In multivariate analysis only use of RT was an independent factor influencing OS ($p=0.006$). During FU 29 patients had progression of the disease and median progression free survival was 46 months. In univariate analysis irradiation with stereotactic hypofracionated radiotherapy or proton therapy ($p=0.043$) to the total dose over or equal 70Gy ($p=0.032$) was found to affect local control (LC). Multivariate analysis showed that higher total dose was the only one independent factor associated with longer progression free survival ($p=0.043$). RT is essential in the treatment of patients with chordoma. SRT or proton RT improves OS and LC. Total dose ≥70 Gy results in better OS and LC.