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The role of stereotactic body radiotherapy in treating patients with the tumor of a single kidney

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Categories: Radiation Oncology, Urology
Keywords: stereotactic body radiotherapy, renal cell carcinoma, kidney tumor

How to cite this abstract
Vorobyov N (June 16, 2016) The role of stereotactic body radiotherapy in treating patients with the tumor of a single kidney. Cureus 8(6): a77

Abstract

Objectives: Traditionally, renal cell carcinoma is considered to be a radioresistant tumor. Standard radiation therapy when used in mode 2 Gy per fraction has minimal effect on the disease. At the same time, it was shown, that stereotactic radiosurgery for brain metastases in patients with renal cell carcinoma is highly effective. In this case, the local control is higher than 90%. In recent years, due to the development of new equipment, it became possible to deliver high-dose radiation not only to intracranial but also to extracranial tumors and, at the same time, to reduce radiation exposure to healthy tissue. The effectiveness of irradiation also managed to increase due to new modes of fractionation. In some cases SBRT can be considered as alternative to surgery. The purpose of the study is to evaluate efficacy and toxicity of SBRT in patients with a tumor of a single kidney.

Methods: The study included 5 patients with primary or metastatic renal cell carcinoma in a single kidney. Tumor volume varied from 25 to 170 cm3 (mean 105 cm3). Treatment was carried in a mode of hypofractionation (36-45 Gy in 3 fractions) over 1 week. In order to monitor displacements of the kidney during respiration, radiopaque markers were implanted in the kidney tissue 14 days before the start of treatment. Efficiency of SBRT was estimated on the basis of radiographic studies (CT, MRI) performed 1 month after irradiation and then 1 time in 3 months. In order to assess the toxicity serum creatinine level was monitored, kidney scintiscanning was performed.

Results: Local control (stabilization or reduction in tumor size on CT/MRI) was noted in all patients during the follow-up period of 20 months. In 3 of 5 patients, whose follow-up period was more than 18 months, renal scan revealed silent area, according to PTV. On the IV contrast enhanced CT there was no contrast uptake and signs of blood flow in the irradiated area. Fatigue was noted in one patient and persisted for 3 weeks after treatment. No Grade II, III or IV adverse events were observed. Increase of serum creatinine after SBRT recorded in 2 patients and was <25% of the original value. Clinically significant reduction in the filtration function of the kidney was not observed in any patient, hemodialysis was not performed.

Conclusions: The results show the effectiveness of SBRT in terms of local control with good tolerability and low incidence of side effects.

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Published 06/16/2016