

Summary

The CyberKnife is a device for frameless whole-body radiosurgery using image guided robotic technology and linear accelerator as a photon source. It was introduced in USA in 2001. First CyberKnife device in eastern and middle Europe was installed in Faculty hospital Ostrava in 2010. So we were given a chance to use the most recent technology in treating oncological patients.

Brain metastases are an important and frequently treated indication in modern radiosurgery. This non-invasive method offers good local control with minimum toxicity and repeatability of the treatment.

Biological aspect and dose delivery is equivalent to devices using framed stereotaxis and cobalt as radiation source (Gamma Knife). The difference is in technological performance. The ability of fractionated therapy with CyberKnife enables radiotherapy of larger tumours.

Patients treated with CyberKnife for metastatic brain disease are checked with repeated magnetic resonance imaging (MRI) to figure out the growth of treated tumours and/or appearance of new lesions.

In our prospective study we measure the volume of brain metastases on MRI with use of computer-assisted volumetry. We evaluate the predictive value of volumetric changes on MRI exams 6 weeks and 12 weeks post radiosurgery respectively.

The aim was to identify high-risk patients, who have higher probability of radiotherapy failure - in these patients shorter follow-up MRI intervals seem reasonable.

On the other hand identifying good radiotherapy responders (according to early significant post SRT tumour shrinkage) would enable prompt and vigorous systemic therapy of extracerebral metastases, if present.

The group of patients with CyberKnife treated brain metastases, that is unique in our conditions, is then statistically analyzed and results are compared to peer-reviewed articles of institutions using the same technology and reference data from Gamma Knife are matched.

We discuss the benefit of prognostic estimation based upon early post-radiation volumetric tumour changes.