Background

Hypothalamic-pituitary (HP) deficiencies are frequent in childhood brain tumor survivors (CBTS) after cranial radiation. It is not known whether MRI changes in time in the HP-region or in brain volume are predictive of HP dysfunction.

We performed this study to quantify changes in the HP-region on MRI in CBTS after exposure to craniospinal radiotherapy (CRT) and analyze its relationship with changes in HP-function.

Methods

Ninety childhood medulloblastoma survivors selected from a previous reported nationwide cohort1 and treated with CRT between January 2002 and December 2012, were included.

All MRI scans were retrospectively systematically evaluated regarding the anatomy of the HP-region, at time of diagnosis, post-neurosurgical intervention, post-radiation and during follow up at 2 time points until 5 years of FU.

The observers were blinded for outcome of HP function. Additional data on endocrine function and growth were collected.

Results

In CBTS exposed to CRT, Z-scores for pituitary height, sagittal width, PS/BA ratio and pituitary volume decline in time, potentially indicating an effect of radiation damage with significant differences between start of treatment and last moment of follow-up. The presence of pituitary disease did not have an overall effect on interaction with time. Pituitary disease only showed an interaction effect with time and group on a marginal trend level towards significance for PS/BA ratio.

Conclusions

Preliminary results show that cranial radiation in childhood has a negative effect on size of pituitary height, sagittal width, PS/BA ratio and pituitary volume. These effects could not be related to development of endocrine dysfunction as no significant difference was found between children with and without pituitary disease. This may possibly be explained by under diagnosis of pituitary dysfunction in the patients now classified as having adequate pituitary function. Further subgroup analyses will be performed.