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Role of radiotherapy in combined treatment of medulloblastoma

KEYWORDS: Medulloblastoma; Radiotherapy

Medulloblastoma is a primitive tumor of neuroectodermal origin of the skull posterior pit, which predominantly appears in childhood. It makes 20% of tumors of the central nervous system in childhood. It is most frequently diagnosed in children aged 5 and 6 years, and in 20% of cases it appears in infants up to age of 2 years. It occurs in the same percentage in adults. It was classified for the first time by Kusing in 1925 as the tumor of the central nervous system. Disease manifestation is typical for so-called tumor cerebral symptomatology: wider base of walking with balance losing, ataxia, sometimes headache and vomiting due to higher intracranial pressure, nystagmus, diplopia. The first step in diagnosis establishing and involvement of the disease is examination of the intracranial structure and the spinal channel with computerized tomography of endocranium with mielogram, or MR examination of the craniospinal axis. Medulloblastoma treatment always starts with surgery. If necessary, the first surgical treatment includes only the tumor decompression and placing of the shunt for liquor derivation. Then, in the second act, the tumor is removed macroscopically visible in toto, if possible, and if not, the tumor mass is reduced. The tumor surgical removal is incomplete from the microscope point of view, so the treatment should be compulsory continued with radiotherapy. Early works which followed only operated patients without postoperative radiotherapy, showed that in 5-year follow-up there were no survived patients. Local irradiation technique to the very tumor stem resulted in 5% survival. Having in mind that medulloblastoma cells have characteristic of dissemination through cerebrospinal liquor along arachnoidal space, Bloom et al. introduced postoperative irradiation therapy of the complete craniospinal access with extra dose to the region of the posterior skull pit. Such an approach improved results of 5-year survival up to about 55%. Chemotherapy, with surgery and radiotherapy, found its place in certain situations, when great rest is present, infiltration with brain stem, as well as in children under age of 2 years. Aim of the craniospinal radiotherapy is irradiation of the complete subarachnoidal space: cranial and the spinal one, for prevention of the malignant infiltration development. One of the most frequent irradiation methods is applied at our Institute as well. It is the irradiation of the cranium and proximal part of the cervical channel, most frequently up to C4, from two opposite parallel fields, with application of compensational filter and the spinal channel irradiation from direct field. Photon irradiation on the linear accelerators is also applied. Since complete intracranial subarachnoidal space should be irradiated with the cranial field, the volume should include subarachnoidal space around optic nerve, what practically means orbit top, and the field should also cover cribiform plate and temporal pit. The spinal field includes the spinal channel from upper edge C5 to S2 vertebra. Attempt of some centers to include electronic field to the cribiform plate region, as well as spine electronic irradiation, did not show either difference in the treatment results, or late consequences in relation to the patients irradiated only with photons. Medulloblastoma is relatively radiosensitive tumor. Radiotherapy is compulsory mode of the postoperative treatment. The biggest centers in the world, as well as our Institute, accepted optimal dose of TD 35-36Gy for irradiation of the craniospinal axis in 20 sequances, with boost dose to the skull posterior pit to TTD 55-56Gy. The filed of the posterior skull pit spreads from posterior clivoids and, regarding height, it is 2/3 height of the skull base up to the skull top. In cases of the disease dissemination along the spinal channel, metastatic locations must receive TTD 45-50Gy. Choice of method, dose and machines at our Institute with follow-up of the results of 5-year survival and of acceptable consequences, correspond to the results published in the referential oncology centers in the world.

REFERENCES