Aiming to avoid damage to neurocognitive areas of the brain during cranial radiation

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Radiation oncologists at Rush University Medical Center are intent on finding ways to avoid damage to the critically important hippocampus and limbic circuit of the brain when cranial radiation is required to treat existing or potential metastatic cancers.

The goal is to spare these areas, which are responsible for short-term memory, as well as emotions, motivation, and a range of executive functions, such as planning and decision-making.

Cranial radiation is used to destroy tumors that have spread to the brain, which happens in 20 to 25 percent of all cancer patients. It is also used prophylactically to prevent the development of overt intracranial metastases in patients diagnosed with small-cell lung carcinoma.

But there is a downside to the treatment. Because the hippocampus and the limbic area are irradiated along with the rest of the brain, the treatment often causes memory lapses, difficulty with executive planning, and poor fine motor control. The consequences can be devastating for patients, whose quality of life is deeply affected.

In a review of records for 107 patients with 700 lesions, the team of radiation oncologists at Rush found that metastases had occurred in the hippocampus in only 0.8 percent of the cases, and in the limbic circuit in fewer than 3 percent of cases.

That finding emboldened them to determine whether it might be possible

to deliver cranial radiation to the brain, but not to these particular areas - eliminating metastases or potential metastases with radiation but sparing the hippocampus and the limbic areas, where metastases were unlikely to occur.

In their feasibility study, the researchers were able to show that the hippocampus and limbic circuit can be largely spared using advanced equipment that targets the radiation to specific areas.

Their results are being presented in a poster session at the annual meeting of the American Society for Radiation Oncology, which is being held November 1-5 in Chicago.

"We have shown that it is possible to reduce the dose of radiation to this area, while treating the rest of the brain, where the cancer is located, at full dose," said Dr. Arnold Herskovic, principal investigator of the study.

The feasibility study was done using a TomoTherapy Hi-Art System, which enables the treatment of tumors with image-guided radiation therapy.

The researchers expect to start a clinical trial of the new procedure soon to determine whether in fact it can both prevent or treat brain metastases and minimize long-term neurocognitive consequences.

Source: Rush University Medical Center (news : web)