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Tomotherapy treatement of Brain metastasis with Simultaneous integrated boost

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Introduction

Brain metastases occur among 30% of patients sufuring from cancer. Their incidence is increasing.
The therapeutic approach is based on surgery, whole brain radiation therapy, focused radiation (radiosurgery) alone or combined.
Aggressive treatments such as surgery or radiation surgery must double life expectancy.
Simultanous Integrated Boost (SIB) technique allows for better dose control and avoids the time interval between total brain irradiation and radiosurgery.
Tomotherapy can deliver a large dose to the target volume while preserving organs at risk.

Observation

It was a 54-year-old patient managed for brain metastases of a bronchial adenocarcinoma. The patient's medical history reveal an active smoking of one pack a day for 33 years and a unexpected discovery of bronchial cancer made during a preoperative assessment of a right inguinal hernia.
Thoracic CT shows a tumoral process of right pulmonary hilum with adenopathy under carinary.
The abdominal ultrasound did not find any detectable abnormalities.
The patient underwent a right lower lobectomy coupled with an excision of a large adenopathy under carinary.
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The tumor was staged pT3N2M0.
Postoperative Chest-abdomen-pelvis CT shows a postero-basal right fibro-cicatricial reshaping with localized posterior pleural thickening with no specificity, and the posterior pleural recesses filled with fluid.
As well as a lateral adenopathy of the lower mediastinal cavity and hilar right of about 10 to 17 mm in diameter.
The patient started chemotherapy based on Navelbine / CDDP

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The cerebral MRI performed as part of the exploratory of a convulsive attack and a left hemiparesis found 3 intraparenchymal nodular formations, of which the largest measured 22 mm in diameter in cortical subcortical on the right. The second one mesured 15 mm in Para central on the right and the last one on the left cerebellar peduncle of 17 mm.
In the context of this clinical picture a conformal radiotherapy with intensity modulation and guided by the image "IMRT + IGRT" with 6MV photons of a Tomotherapy device was decided.
The prescribed dose is 30 Gy on the whole brain with 10 sessions of 3 Gy with an integrated boost "SIB" up to 45 Gy on the 3 cerebral nodular formations or a complement of 1.5 Gy on metastases for each session.
Tomographic imaging was performed before each session.
After 5 treatment sessions the patient resumes walking after the disappearance of left hemiparesis.
It is noted he has as an acute side effect headaches wich was treated with corticosteroids.
The rest of the sessions were performed without incident.
Chemotherapy was continued after the end of radiotherapy.
2 months after the end of the irradiation cerebral MRI of surveillance found a clear regression of the cerebral nodules' diameter measured between 52% and 63%.
The patient was asymptomatic.
5 months after the end of the irradiation cerebral MRI found a disappearance of the right frontal nodule, the right para-central nodule regressed and reach a decrease of 60% of its initial diameter.
The left cerebellar peduncle nodule remained stable after the first decrease in its diameter.

Conclusion

The Integrated Boost technique has acceptable toxicity and reduces the number of displacements for patients with brain metastases.

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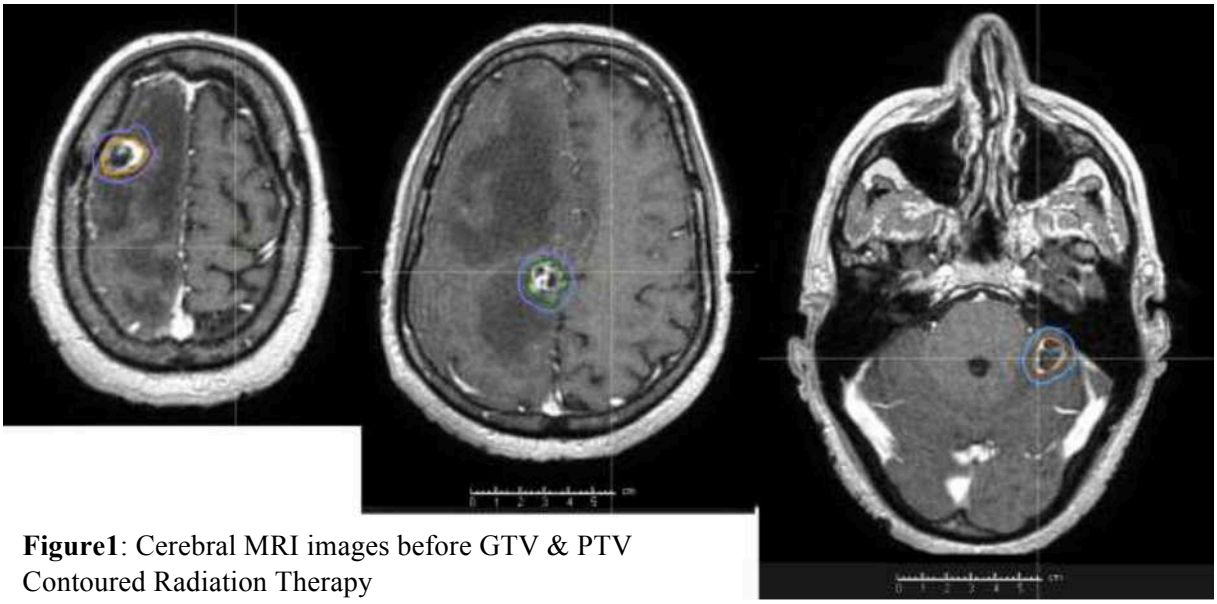

Figure1: Cerebral MRI images before GTV & PTV Contoured Radiation Therapy

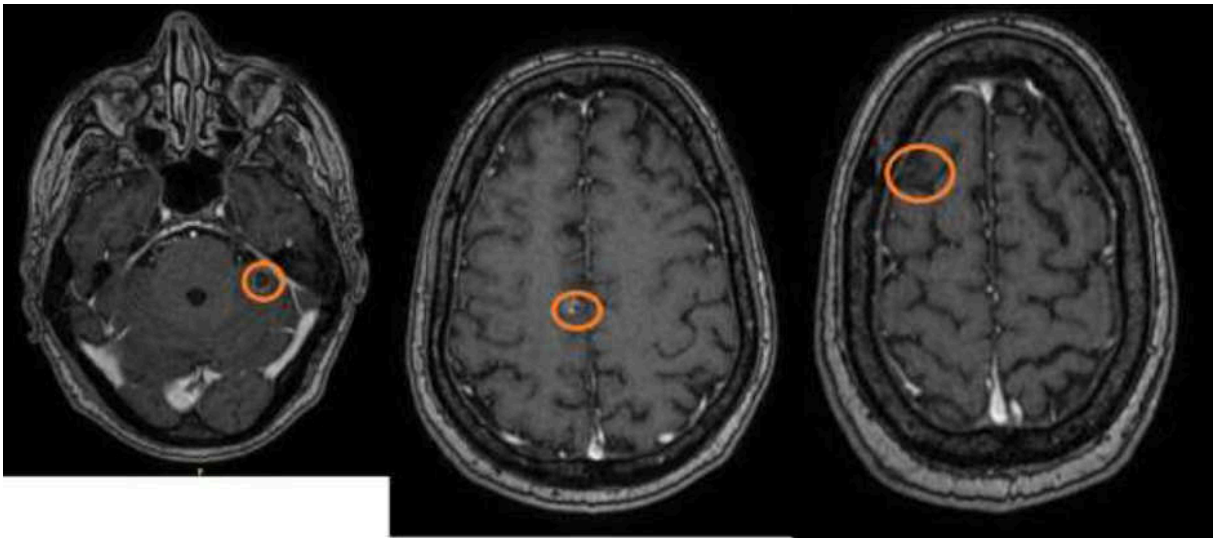

Figure 2: MRI brain 5 months after radiotherapy