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The use of 3d programs in the treatment of glioblastomas - 3d angio window. Technical note

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ABSTRACT

The purpose of this study is to define pre- and postoperative planning as a new usage area of 3D imaging programs in the follow-up and treatment of glioblastomas. The thin-section MRI images of the cases were used in this study. These images were analyzed with the 3D angio window of the Radiant Dicom Viewer © Program. In the 3D angio window, it was found that the glioblastoma tumour tissue was revealed in 3D, such as the vascular structures, when calvarium and brain tissue were suppressed. In this examination method, the bleeding in the postoperative surgical area is also suppressed, the contrasting residue tissue is fully visible, and can be monitored in 3D.

Keywords
brain haemorrhage,
glioblastoma,
3d imaging programs

INTRODUCTION

A good preoperative planning should be made to ensure maximum tumor resection with low surgical complications in glioblastomas. It is very important to make the tumor clear and to define its relationship with environmental structures for a good planning in radiological terms. Also, knowing the feeding of the tumor and its relations with vascular structures will facilitate surgery. Clearer evaluation of patients in terms of postoperative residue is also very important for treatment and follow-up (1). For this reason, efforts are continuing to develop new radiological imaging techniques and expand their use. For this purpose, 3D Imaging Programs are widely used in the medical world in this respect. The purpose of this study is to define pre- and postoperative planning as a new usage area of 3D imaging programs in the follow-up and treatment of glioblastomas.

METHODS

For this purpose, 10 cases who were suspected of glioblastoma and were confirmed with diagnosis after surgery were examined. Also, the images of 10 cases of intracerebral hematoma with contrasting MRI images were included from the archives in the study as the control group to find out if the bleeding was suppressed. The thin-section MRI images of the cases were used in this study. These images were

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analyzed with 3D Angio Window of the Radiant Dicom Viewer © (64-bit) Program (Figure 1).

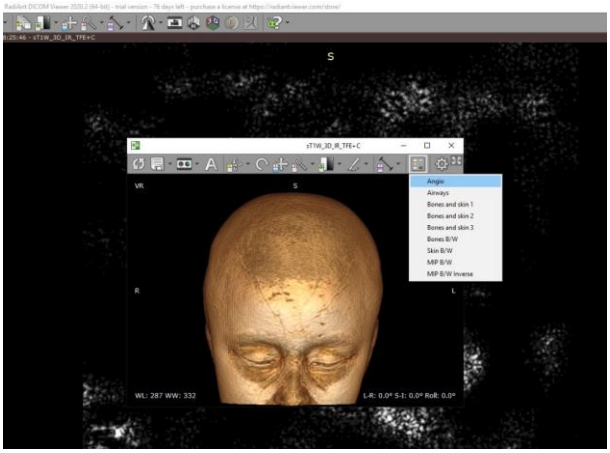

Figure 1. Radiant Dicom Viewer ©- Angio Window Screenshot

Discussion

There are two basic data in the development of our hypothesis. First of all, calvarium and brain tissue are suppressed in this window of the program, and vascular structures are revealed because of its contrast content. This allows to examine the vascular network in 3D. The second one is that the radiologically environmental-ring contrasting is typical for Glioblastoma Multiform. This contrasting area also shows the active tumor area where the feeding occurs, and the main target is the complete resection of this area in surgery. This ring-like contrasting of the tumor external wall was our main reference point. In Radiant Dicom Viewer 3D Angio Window, it was found that the glioblastoma tumor tissue was revealed in 3D, such as the vascular structures, when calvarium and brain tissue were suppressed. Also, this situation constitutes an opportunity to examine the relation and feeding of vascular structures as well as to fully reveal tumor size in 3D (Figures 2-3). It is important to reveal whether there are postoperative residues in the follow-up and treatment of glioblastomas. Sometimes it becomes difficult to evaluate this because of postoperative bleeding areas in control radiological images. It may not be easy to reveal whether it is bleeding or residual tissue, and if it is residual tissue, to determine the exact size of it. In this examination method, the bleeding in the postoperative surgical area is also suppressed, the contrasting residue tissue is fully visible, and can be monitored in 3D (Figure 3). These images will contribute to the creation of a roadmap for the follow-up and treatment of glioblastoma multiforme patients after their surgery. Also, the bleeding will be suppressed with this examination method in atypical bleedings, and it will be easier to understand the underlying pathology, if any (bleeding into the tumor, vascular malformations) (Figure 4-5).

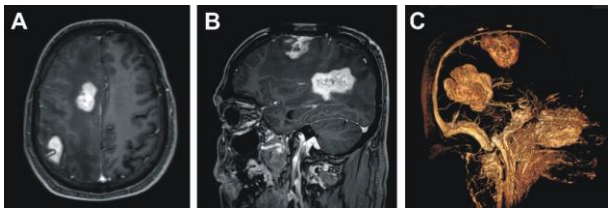

Figure 2. Multiple glioblastoma case; Tumors and vascular structures are observed in a- Axial contrasted MRI, b- Contrasted sagittal MRI, c- 3D Angio Window Image.

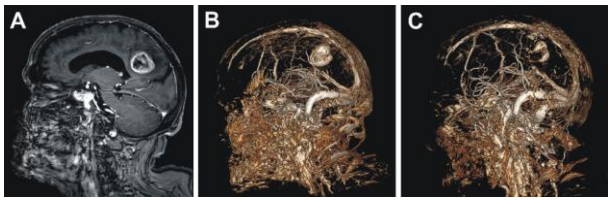

Figure 3. Glioblastoma case; a- Sagittal contrasted MRI, b- Relation with tumors and vascular structures is seen in 3D Angio Window Image, c- The presence of tissue in the postoperative residue in 3D angio window image.

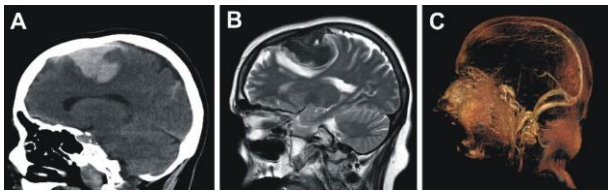

Figure 4. Case of atypical bleeding; a- Sagittal CT, b- Sagittal T2-weighted MRI,
c- Complete suppression of the bleeding is seen as there is no contrasting in 3D angio window.

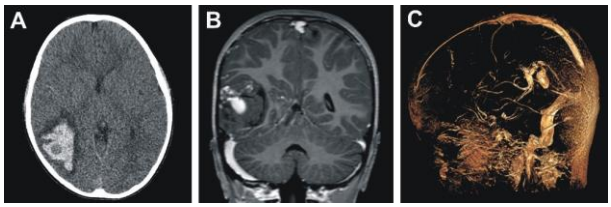

Figure 5. Atypical bleeding case; a- Axial CT, b- Coronal-contrasted MRI, c- It is seen in 3D angio window that bleeding is suppressed, and the presence of contrasted vascular anomaly is preserved.

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