

# Imaging diagnosis

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## Case 433

### 3. Hepatocellular carcinoma with portal tumor thrombi

#### 【Progress】

He made treatment choice to receive administration of anticancer drugs. Thereafter, he might undergo radiation treatment.

#### 【Discussion】

Patients with hepatocellular carcinoma with portal tumor thrombus in main portal vein or the first branch portal vein that indicates one of the situations of the most advanced hepatocellular carcinoma, are extremely poor prognostic. Their survival terms without any treatment are within 3 months. Now, check point inhibitors are getting used, expecting longer survivals than ever.

In the beginning of 21 century, our radiation treatment team in Wakayama Medical University radiation oncology team began to treat hepatocellular carcinoma (HCC) with portal tumor thrombus in main portal vein or the first branch portal vein using three-dimension (3D) radiation method utilizing hypo-functioning liver area.

Once, we experienced a more than 10 years survivor with a solitary but relatively large HCC at the right lobe marginal area which enabled 60Gy irradiation with conventional 2-way radiation beam. But HCCs with tumor thrombi in main and/or first branch situate at the center of liver hilum. These areas are surrounded with stomach and duodenum that are sensitive to radiation. It indicates difficulty elevating radiation doses to control HCCs with tumor thrombi in main and/or first branch even using 3D radiation therapy. Conventional 3D radiation therapy is the method of multibeam concentrating to the target of HCCs. Each beam is the same dose. Liver itself is relatively sensitive to radiation. The tolerant radiation doses of liver and digestive organ including duodenum, are already known and the curative radiation doses to HCC are also acknowledged. However, radiation planning with each beam of equivalent doses could not be made so as both to elevate curative doses to target and to lessen doses to risk organs for avoiding adverse effects. Our team radiation oncologist, Dr. Shirai came up with an idea to use radioisotope to investigate the liver area of non-functional or functional. When using RI for liver function, we are surprised at realizing that tumor-bearing areas, corresponded to irrigation liver area of occlusive portal vein, are hypo-functioning, while portal flow irrigation area are functioning. Then, radiation planning enabled curative doses without adverse effects on risk organs. Namely, in radiation planning, main beam to target plus hypo-functioning liver area is used, and supplementary beams whose radiation doses are not exceedingly to induce damages to risk organs are added. The doses of main beam and supplementary beam attain curative doses to target HCC with tumor thrombi. Local control rate was 80%, survival rate, Overall survival rate at one year and three year, was 40% and 30%, respectively.

In our case, either 3D radiation treatment or chemotherapy using check point inhibitors is scheduled.

## **【Summary】**

We presented an eighty-year-old male with hepatocellular carcinoma accompanied with portal tumor thrombi in the right portal vein and main portal vein after radiofrequency ablation for HCC nodule at segment 5 three months before. It is borne in mind that three-dimensional radiotherapy for main tumor plus portal tumor thrombus using radiation planning utilizing hypofunctional area is effective for tumor response and survivals.

## **【References】**

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2. Shintaro Shirai, M.D. · Morio Sato, et al. Single Photon Emission Computed Tomography–Based Three-Dimensional Conformal Radiotherapy for Hepatocellular Carcinoma With Portal Vein Tumor Thrombus. *International Journal of Radiation Oncology\*Biophysics* 2008; 73(3):824-31

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