

Complete Pathological Response Noted in Explanted Liver After Y90-SIR-Spheres Therapy for Hepatocellular Carcinoma

Abstract

In the treatment of hepatocellular carcinoma, achieving complete pathological response (CPR) in explanted liver specimens following any locoregional treatments is associated with reduced recurrence rates and better posttransplant survival compared to the incomplete response. Here, we present the imaging findings of a patient who achieved CPR in the explanted liver following Y-90 SIR-Spheres® therapy.

Keywords: Carcinoma, complete, explant, hepatocellular, liver, response, SIR-Spheres®, Y90

A 62-year-old male with a history of chronic liver disease (Child-Pugh score A) with 4.1 cm arterially enhancing lesion in the segment VI/VII of the liver [Figure 1a and b, bold black arrows] suggestive of hepatocellular carcinoma (HCC) was referred for selective internal radiation therapy (SIRT) using Y-90 SIR-Spheres® as a bridge to liver transplantation. Pre-SIRT planning angiography showed normal celiac axis anatomy and 4% hepatopulmonary shunt and tumor-to-normal liver uptake ratio (TNR) of 6 on Tc-99m macroaggregated (MAA) scintigraphy [Figure 1c and d, thin black arrows]. The therapeutic dose administered calculated using partition model, delivering a liver limiting dose (50 Gy), was 1.7 GBq, with an estimated tumor adsorbed dose (TAD) of about 350 Gy. After 10 days of angiography, SIRT was executed by administering Y90 SIR-spheres through selective cannulation of the distal right hepatic artery. Posttherapy, Y90 positron emission tomography/computed tomography (CT) showed selective concentration of Y-90 SIR-Spheres® in the tumor bed with high TNR [Figure 1e and f, white arrows], concordant with the MAA scan. The patient subsequently underwent successful deceased donor liver transplantation 1-month post-SIRT. Explant liver pathology study revealed no evidence of any viable tumor cells (absence of any mitotic activity) and extensive necrosis in

the irradiated liver bed [Figure 2a and b, black arrows]. The patient continued to be asymptomatic and disease-free at 9 months follow-up (at the time of writing this report).

Of all the locoregional therapies (LRT) available as a bridge therapy for liver transplantation, SIRT using Y90 has been reported to have a maximum incidence of complete pathological response (CPR) in the explanted liver with least liver toxicities.^[1] Studies have shown that pathological downstaging of primary tumor or achieving CPR in explant liver pathology with LRT for HCC is a strong predictor of recurrence-free survival.^[2-4] Response to Y-90 SIR-Spheres® is a function of TAD, which critically depends on the method of therapeutic dose estimation used. The partition model should be preferred for over body surface/empirical methods for estimating the optimal Y90 therapeutic dose whenever feasible.^[5] As per Chansanti *et al.*, reported cutoff values for TAD (based on 99mTc-MAA single-photon emission CT/CT) was >190 Gy for responders (93% specificity) and that for nonresponders about <72 Gy (100% specificity).^[6] For achieving the best long-term outcomes for bridge therapy for liver transplantation, proper patient selection and maximizing the TAD aiming for complete imaging/pathological response are imperative.

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Received: 06-02-2020

Revised: 17-02-2020

Accepted: 19-02-2020

Published: 01-07-2020

Access this article online

Website: www.ijnm.in

DOI: 10.4103/ijnm.IJNM_23_20

Quick Response Code:



How to cite this article: Chandra P, Nath S, Jain D. Complete pathological response noted in explanted liver after Y90-SIR-Spheres therapy for hepatocellular carcinoma. *Indian J Nucl Med* 2020;35:267-8.

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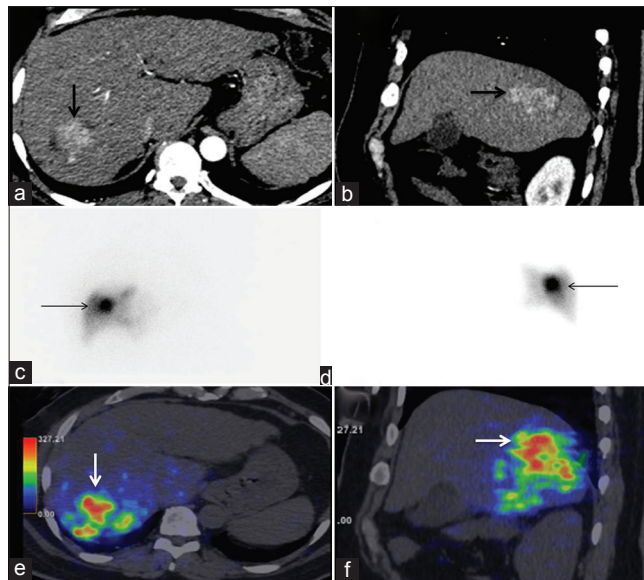


Figure 1: (a and b) Solitary arterially enhancing lesion in the right lobe involving segments VI/VII (bold black arrows). (c and d) Anterior-posterior Tc-99m macroaggregated scintigraphy showing focal increased perfusion in the right lobe (thin black arrows) with good tumor-to-normal liver uptake ratio and the absence of any significant hepatopulmonary shunting. (e and f) Post-therapy Y-90 SIR-Spheres positron emission tomography – computed tomography images showing selective intense uptake of the radio-pharmaceutical into the tumor bed (white arrows) polymerase chain reaction assay

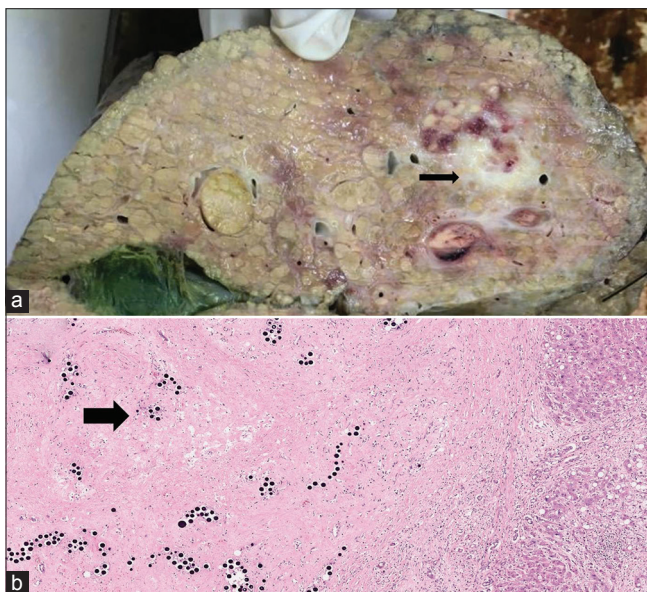


Figure 2: (a) Gross cut specimen of the explanted liver showing parenchymal necrosis in the tumor bed (thin black arrow) with background liver showing the cirrhotic change. (b) Tumor bed with *in situ* microspheres (bold black arrow) extensive tumor necrosis and no mitotic activity-suggestive of complete pathological response (H and E, x400)

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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