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Durable Response in Recurrent HCC After Y90 Treatment with TriNav®

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OVERVIEW

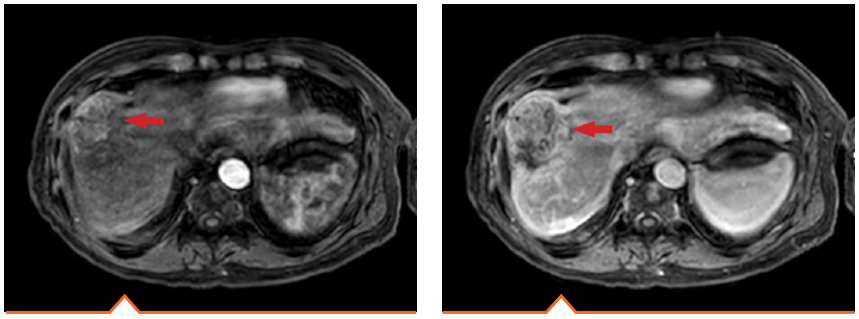
A 70-year-old man with history of Hep C cirrhosis had prior external beam radiation and Y90 treatment, and presents with large, recurrent HCC in Segment 8. The mapping study was performed via a traditional microcatheter and the glass Y90 treatment was delivered using a TriNav® Infusion System. Comparing the post-MAA and post Y90 SPECT/CT from this case demonstrates how TriNav achieved improved delivery of Y90 to the tumor and less non-target activity in surrounding parenchyma. Follow-up MRI imaging at 6-months post-treatment showed no evidence of residual disease. This case shows how TriNav can simultaneously enhance particle penetration and augment the tumor to normal distribution so that an effective treatment dose can be delivered to a previously treated, large tumor in a patient with underlying liver disease.

PATIENT HISTORY

A 70-year-old man with history of Hep C cirrhosis presented with a 10 cm HCC tumor in the right lobe of the liver. Initially the patient underwent external beam radiation (450 Gy) followed by glass Y90 treatment in 2021. Follow-up MRI in June 2023 showed a 6.9 cm nodular enhancing residual HCC in Segment 8 **(Figures 1a, 1b)**. The patient was not a candidate for surgical resection; however, he is on a liver transplant list, so preservation of liver function and a complete response to liver directed therapy was imperative.

TREATMENT

The mapping procedure was performed using a traditional microcatheter and Tc-99m MAA was injected via a Segment 8 branch. An angiogram was performed via the SMA (reconstitution of the hepatic artery via pancreaticoduodenal arcade), and showed that the origin of celiac artery was occluded **(Figure 2)**. Procedural angiograms with the traditional microcatheter in Segment 8 branch were also performed **(Figure 3)**.



Figures 1a, 1b. MRI showing 6.9 cm residual HCC tumor in Segment 8.

Cone beam CT images in the arterial and venous phase show poor tumor contrast enhancement **(red circle, Figures 4a, 4b)**. Post-MAA SPECT-CT demonstrates minimal radiotracer activity within the target tumor (red circle) and intense activity in the surrounding parenchyma **(Figure 5)**. The treatment procedure was performed using a TriNav, which tracked easily through the pancreaticoduodenal arcade into the hepatic artery and then into the right hepatic artery and Segment 8 branch. **Figures 6a, 6b, 7** show the procedural angiograms and cone beam CTs with the tip of the TriNav located at the same position as the traditional microcatheter during the mapping procedure, and preferential flow to the targeted tumor. 180Gy was delivered and the post-Y90 SPECT-CT shows preferential delivery to the targeted tumor **(Figure 8)**. Contrast enhanced MRI done at 2- and 6-months post-Y90 treatment in both the arterial and the venous phase demonstrates no evidence of residual disease. **(Figures 9a, 9b)**.

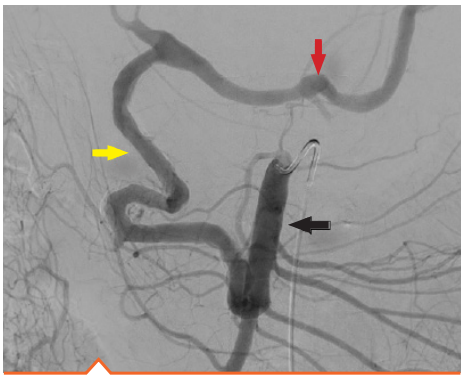


Figure 2. Mapping angiography from the superior mesenteric artery (black arrow) demonstrating retrograde flow to the hepatic artery via the pancreaticoduodenal arcade (yellow arrow) due to celiac artery occlusion (red arrow).

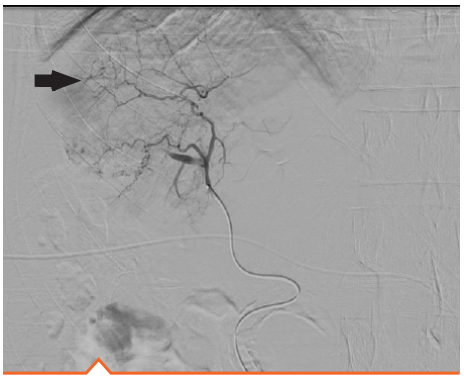


Figure 3. Mapping angiography via traditional microcatheter showing target tumor [black arrow].

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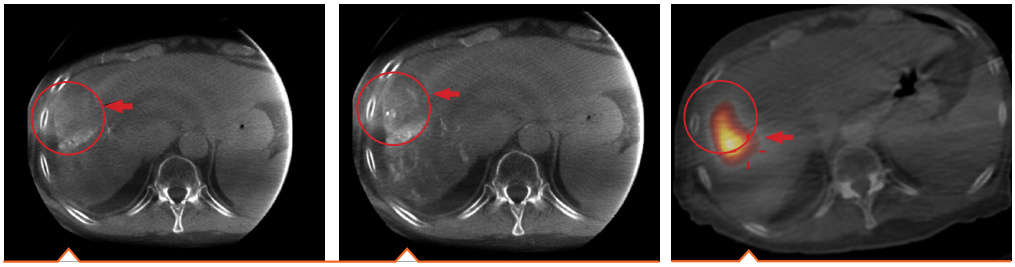
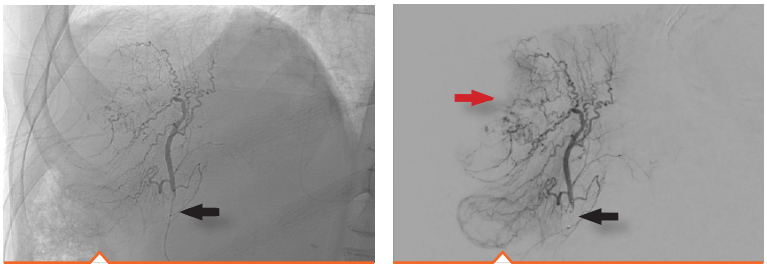
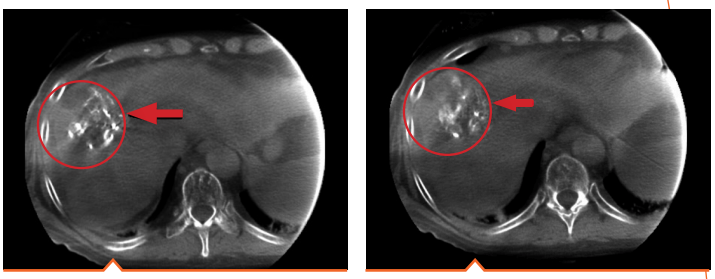


Figures 4a, 4b. CBCT showing poor MAA uptake to target tumor [red circle] following mapping via traditional microcatheter.

Figure 5. Post-MAA SPECT-CT demonstrates minimal radiotracer activity within the target tumor [red circle] and intense activity in the surrounding parenchyma following mapping via traditional microcatheter.



Figures 6a, 6b. Procedural angiography via TriNav [black arrow] showing preferential flow to the target tumor [red arrow].



Figures 7a, 7b. CBCT showing improved tumor contrast enhancement with the TriNav [red circle] following treatment using TriNav.

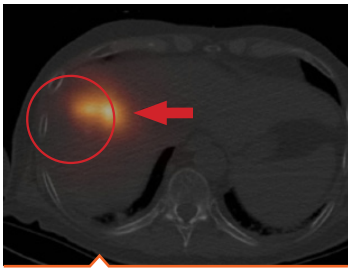
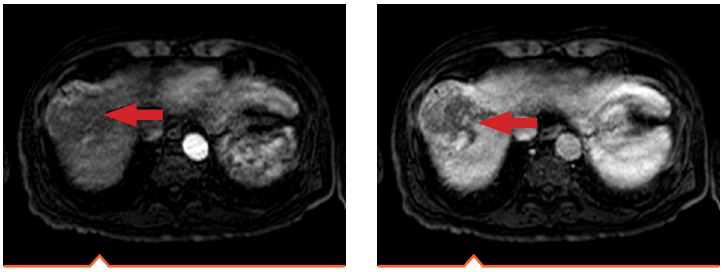


Figure 8. Post-Y90 SPECT-CT shows preferential delivery to the targeted tumor [red circle].



Figures 9a, 9b. Two-month follow-up contrast enhanced MRI showing no evidence of residual disease.

DISCUSSION

Larger tumors (>5 cm) generally have poorer responses to local therapy.[1] These worse outcomes may be related to the fact that tumor pressures increase with the size of the tumor. Additionally, patients with incomplete response from prior embolization may have additional barriers that also require increased delivery pressures to achieve adequate tumor penetration.[2] TriNav modulates delivery pressure to overcome these treatment barriers, resulting in better tumor penetration. TriNav can benefit patients with compromised liver function because its Pressure-Enabled Drug Delivery approach reduces non-target particle distribution, meaning less radiation in the background liver, which reduces the risks of liver injury.[3]

CONCLUSION

This case highlights the ease of tracking the TriNav through tortuous anatomy and the ability of the TriNav to improve particle penetration and promote preferential distribution to the tumor and less non-target delivery. This case demonstrates the benefits of TriNav and its PEDD (Pressure-Enabled Drug Delivery) approach in a previously treated, large tumor in a patient with underlying liver disease.

ABOUT THE AUTHOR

Dr. Shekher Maddineni is an Attending Interventional Radiologist at Westchester Medical Center and Associate Professor of Radiology & Surgery at New York Medical College. He received his training in Vascular and Interventional Radiology at Montefiore Medical Center, Albert Einstein School of Medicine and holds American Board of Radiology Certification in Diagnostic Radiology and Certification of Added Qualification in Vascular and Interventional Radiology. Dr. Maddineni's interests include UFE, Y90, TACE Ablation, Prostate Artery Embolization, Genicular Artery Embolization and Dialysis Access.

REFERENCES: **1.** Jeong, S. O. et al. Predictive Factors for Complete Response and Recurrence after Transarterial Chemoembolization in Hepatocellular Carcinoma. *Gut Liver* 11, 409–416 (2017). **2.** Titano, J. J. et al. End-hole Versus Microvalve Infusion Catheters in Patients Undergoing Drug-Eluting Microspheres-TACE for Solitary Hepatocellular Carcinoma Tumors: A Retrospective Analysis. *Cardiovasc. Intervent. Radiol.* 42, 560–568 (2019). **3.** Pasciak, A. S., McElmurray, J. H., Bourgeois, A. C., Heidel, R. E. & Bradley, Y. C. The impact of an antireflux catheter on target volume particulate distribution in liver-directed embolotherapy: a pilot study. *J. Vasc. Interv. Radiol.* JVIR 26, 660–669 (2015).