

Improved Tumor Uptake when Using TriNav[®] Infusion System in Y-90 Mapping Procedure as Compared to Standard Microcatheter

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OVERVIEW

A patient with a history of metastatic breast cancer (mBC) to the liver was treated with Y-90 radioembolization. During the Y-90 mapping procedure hepatic angiography was performed using both a TriNav Infusion System and a standard microcatheter. Angiographic images and cone beam CT illustrated increased and more targeted uptake of contrast into the tumor by the TriNav relative to what was observed with the standard microcatheter. Tc-MAA was subsequently delivered into the left hepatic artery via the TriNav, and intense uptake of the radiotracer was shown on SPECT CT. This case demonstrated the positive effect of TriNav's Pressure-Enabled Drug Delivery™ (PEDD™) approach in Y-90 mapping procedures.

PATIENT HISTORY

A 65-year-old female was diagnosed with estrogen receptor positive, HER2/neu negative mBC in September 2020 and was initially treated with docetaxel and capecitabine. There were no other sites of disease. In March 2021 she was started on palbociclib and letrozole. A 4.3 x 4.2cm mass within segment 4 of the left hepatic lobe (*Figure 1*) was found, and the patient was presented at a multidisciplinary tumor board. The consensus was to proceed with Y-90 radioembolization due to isolated hepatic progression.

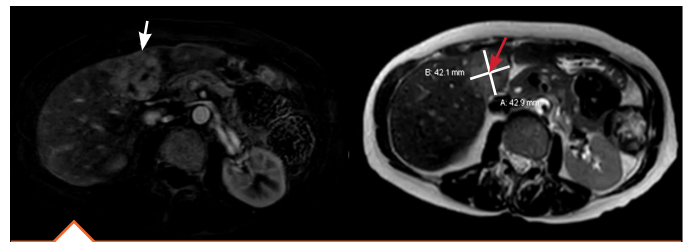


Figure 1: Contrast enhanced MRI demonstrates a 4.3 x 4.2 cm mass within segment 4 of the left hepatic lobe. The mass demonstrates contrast enhancement with focal areas of central necrosis.

TREATMENT

Left hepatic angiography and cone beam CT were performed with a 0.027-inch inner diameter standard microcatheter and a 0.021-inch inner diameter TriNav at the same injection rate (*Figure 2a, 2b*). As shown on the images, there is increased and more uniform uptake of contrast in the tumor when TriNav is used compared to the standard microcatheter. Also noted on cone beam CT was decreased contrast in non-target normal liver tissue with TriNav relative to what was observed with the standard microcatheter.

Tc-MAA was subsequently delivered into the left hepatic artery via the TriNav, and the subsequent SPECT CT scan shows intense uptake of Tc-MAA in the segment 4 tumor (*Figure 3*).

Figures 2a and 2b: Left hepatic angiogram and cone beam CT via both standard microcatheter and TriNav. Images demonstrate greater and more uniform contrast uptake within the tumor with TriNav.

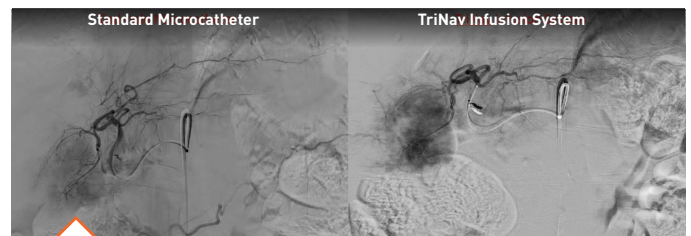


Figure 2a

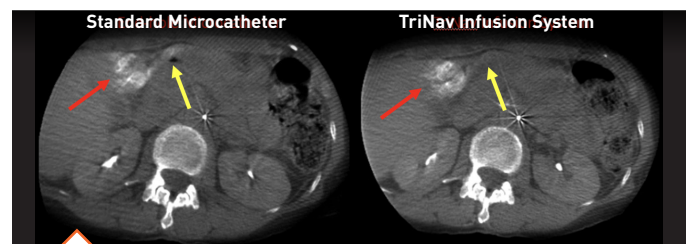


Figure 2b: Red arrow demonstrates the tumor, which has more uniform contrast uptake with the TriNav versus the standard microcatheter. Yellow arrow demonstrates normal left hepatic parenchyma which shows less contrast uptake with TriNav compared to the standard microcatheter.

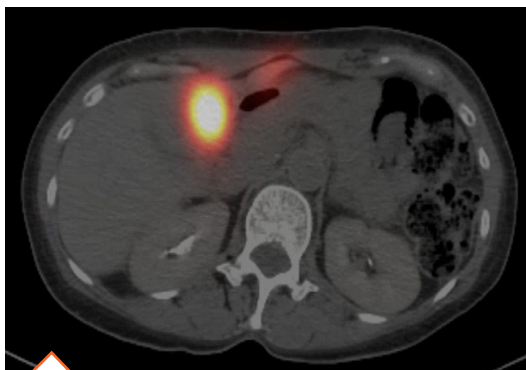


Figure 3: SPECT-CT following mapping procedure shows intense uptake of Tc-MAA in segment 4 tumor.

DISCUSSION

In my experience, using TriNav during both mapping and radioembolization allows for greater consistency in perfusion and improved uptake of Y-90 in the tumor.

High intratumoral pressure (ITP) is a known barrier to adequate deposition of therapeutic agents into solid liver tumors. Tumor growth leads to increased ITP which causes blood vessels in the area to collapse,¹ limiting drug delivery into the tumor tissue.² The PEDD approach works in sync with the heart³ to enhance delivery pressure beyond what the cardiovascular system can generate on its own, and has been shown to physiologically and atraumatically increase local vascular pressure at the target location close to the tumor.⁴ This Y-90 mapping case demonstrated the deeper tumoral perfusion that can be achieved using TriNav.

Improved delivery of Y-90 has been reported to correlate with higher likelihood of radiographic response and favorable clinical outcome.⁵ Furthermore, there is potential for less activity deposition in non-target normal liver parenchyma which ultimately allows for a safer procedure with less risk for hepatotoxicity.

The PEDD approach has also been shown to improve delivery of other therapeutics to liver tumors, including chemo-embolic and cell therapies.^{6,7}

CONCLUSION

This case demonstrated that using TriNav during the Y-90 mapping procedure allows for improved consistency in perfusion and greater tumor uptake.

In addition, the improved delivery observed in this case showed TriNav's potential to reduce off-target effects and increase the likelihood of response in Y-90 radioembolization procedures.

ABOUT THE AUTHOR

Dr. Gandhi is an Interventional Radiologist at Miami Cardiac & Vascular Institute and Miami Cancer Institute and Clinical Professor at the University of South Florida School of Medicine and the Herbert Wertheim College of Medicine at Florida International University. He co-authored the textbook, *Interventional Oncology*. Dr. Gandhi also serves as program Director for the International Symposium on Endovascular Therapy (ISET) and Symposium on Clinical Interventional Oncology (CIO).

Dr. Gandhi is a member of the TriSalus™ Interventional Radiology Scientific Advisory Board.

REFERENCES

1. Stylianopoulos, Triantafyllos, John D. Martin, Matija Snuderl, Fotios Mpekris, Saloni R. Jain, and Rakesh K. Jain. 2013. "Coevolution of Solid Stress and Interstitial Fluid Pressure in Tumors During Progression: Implications for Vascular Collapse." *Cancer Research* 73 (13): 3833–41. <https://doi.org/10.1158/0008-5472.CAN-12-4521>.
2. Jain, Rakesh K. 1994. "Barriers to Drug Delivery in Solid Tumors." *Scientific American*, 8.
3. Data on file [Animal Study Video]. TriSalus™ Life Sciences, 2019.
4. Data on file [CEA 001 trial]. TriSalus™ Life Sciences, 2019.
5. Padia, Siddharth A., et al. 2014. "Superselective yttrium-90 radioembolization for hepatocellular carcinoma yields high response rates with minimal toxicity." *Journal of Vascular and Interventional Radiology* 25:1067-1073. <http://dx.doi.org/10.1016/j.jvir.2014.03.030>
6. Katz et al. "HITM-SURE: Phase Ib CAR-T hepatic artery infusion trial for stage IV adenocarcinoma using Pressure-Enabled Drug Delivery technology." SITC (2018) Poster Presentation.
7. Titano, Joseph J., Aaron M. Fischman, Arnab Cherian, Madeline Tully, Lance L. Stein, Louis Jacobs, Raymond A. Rubin, et al. 2019. "End-Hole Versus Microvalve Infusion Catheters in Patients Undergoing Drug-Eluting Microspheres-TACE for Solitary Hepatocellular Carcinoma Tumors: A Retrospective Analysis." *CardioVascular and Interventional Radiology* 42 (4): 560–68. <https://doi.org/10.1007/s00270-018-2150-6>.