Feasibility of using a radiopaque embolic for transarterial chemoembolization followed by microwave ablation for hepatocellular carcinoma

Christina Marshall, BA, Alex Sher, BS, Vivian Bishay, MD, Mona Ranade, MD, Scott Nowakowski, MD,
Rahul Patel, MD Edward Kim, MD, Robert Lookstein, MD, Aaron Fischman, MD

Icahn School of Medicine at Mount Sinai

OBJECTIVES

The purpose of this study is to assess the viability of a radiopaque drug-eluting bead (RO-DEB) for transarterial chemoembolization (TACE) followed by microwave ablation (MWA) for unresectable hepatocellular carcinoma (HCC).

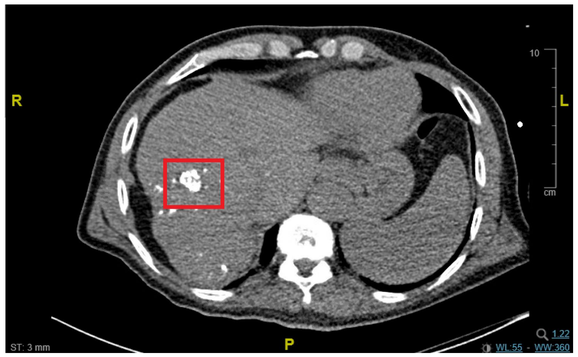
INTRODUCTION

Hepatocellular carcinoma is a primary cancer of the liver that affects hundreds of thousands of people a year with increasing incidence rates in many parts of the world including North America, Latin America, and central Europe [1]. While other common cancers showed declining rates of death from 2013 to 2017, liver cancer mortality increased by 0.6% [1]. Cirrhosis and chronic viral infection are notable risk factors for HCC. 50% of HCC cases are attributable to HCV and HBV accounts for another 20% [1]. Current treatment algorithms depend on tumor resectability and level of metastasis. Generally, patients with unresectable tumors who are not eligible for liver transplant receive local ablation which comes in many forms including: radiofrequency ablation, percutaneous ethanol injection, laser and microwave thermal ablation, and irreversible electroporation [2]. A 2017 study found that TACE combined with liver ablation provided the best patient survival (33.3 months) when compared to other methods such as TACE alone (18.1 months) and TACE plus external radiation (30.1 months) [3]. Current research points to assessing the benefits of different embolics for transarterial methods. Studies have shown that drug-eluting radiopaque beads have comparatively low systemic exposure, higher tumor concentrations, and lower short term tumor viability [4][5]. This presentation particularly focuses on implications of using the LC LUMI radiopaque bead from Boston Scientific.

METHODS

A retrospective review was performed of 160 patients with HCC treated with RO-DEB (LUMI,Boston Scientific) (loaded with 50 mg of Doxorubicin) from 02/2016 to 09/2019. Patients who received TACE followed by MWA (Certus 140, Neuwave) on the same treatment-naive lesion(s) were included (n=15). Patients were excluded if they did not have HCC, were not treated with TACE/MWA, or were not treatment naive before TACE and ablation (n=145). Patient demographics (including ECOG, BCLC stage,Child-Pugh scores) and clinical and procedural details were recorded. Outcomes analyzed included tumor response using mRECIST criteria on post-procedure MRI , target progression (defined as residual or recurrent tumor within 1cm of target lesion), 90-day postoperative mortality, and overall survival.

Procedure related adverse events (AEs) and laboratory toxicities were assessed between TACE and MWA and up to 6 months after MWA using CTCAE criteria. End of study was defined as the last communication, retreatment of the same lesion, transplant, or death.



Abdominal CT w/o contrast 9 months after TACE shows bead visualization at segment 8 target lesion

RESULTS

Demographics:

12 male (80%), median age 64 (range 49-80), BCLC 0/A/B – 1/10/4, Child-Pugh score A/B – 11/4. Average target lesion diameter was 1.8 cm (SD 0.8). Distribution of RO-DEB size (micron) were 40-90 (26.7%), 70-150 (20%), 100-300 (53.3%).

Outcomes:

Median follow-up was 253 days (36-1378 days). Median time between TACE and MWA was 14 days (range 1-271). RO-DEB were visualized to be within the target lesion and used for targeting on non-contrast CT during MWA for 9 (60%) lesions.mRECIST target response rates at a median of 41 days (range 27-151) are seen below in Figure 1. Target lesion progression occurred in one (6.7%) lesion with recurrence at 283 days and was treated with external radiation. The other 93.3% of patients showed a complete response.

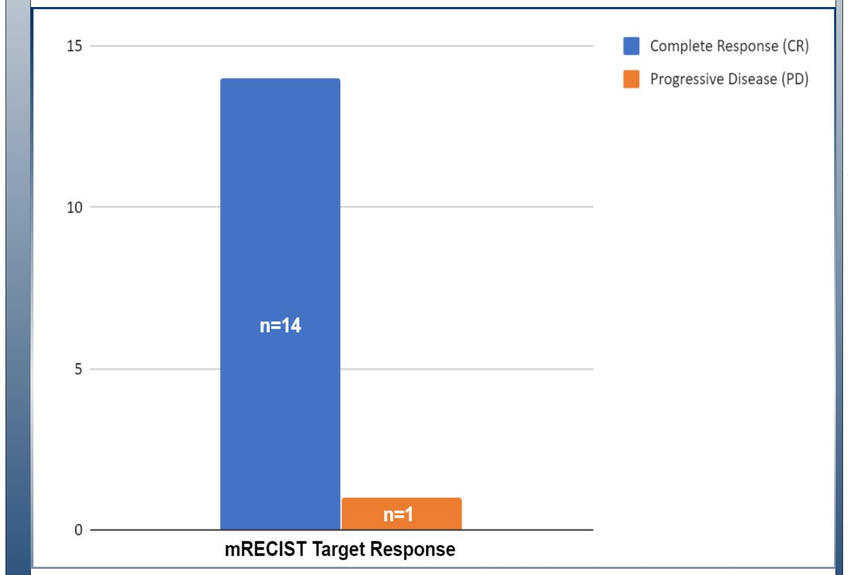


Figure 1

RESULTS CONT'D

AEs included: grade 1 arm hematoma (n=1), grade 3 hepatic decompensation in the form of ascites and edema and Grade 2 elevation in total bilirubin (n=1). Median overall survival was 254 days and 90-day mortality was 0%.

CONCLUSIONS

TACE with RO-DEB followed by MWA was highly efficacious and safe in this small cohort. RO-DEB appear to remain visible on CT for months suggesting a benefit for lesion targeting during MWA.

REFERENCES

[1] Williams, J., & Nieuwsma, J. (2016). Screening for depression in adults. In J. A. Melin (Ed.), UpToDate. Retrieved February 1, 2017, fromhttps://www.uptodate.com/contents/screening-for-depression-in-adults

[2] Williams, J., & Nieuwsma, J. (2016). Screening for depression in adults. In J. A. Melin (Ed.), UpToDate. Retrieved February 1, 2017, from https://www.uptodate.com/contents/screening-for-depression-in-adults

[3] Katsanos, K., Kitrou, P., Spiliopoulos, S., Maroulis, I., Petsas, T., & Karnabatidis, D. (2017). Comparative effectiveness of different transarterial embolization therapies alone or in combination with local ablative or adjuvant systemic treatments for unresectable hepatocellular carcinoma: A network meta-analysis of randomized controlled trials. PloS one, 12(9), e0184597. https://doi.org/10.1371/journal.pone.0184597

[4] Denys, A., Czuczman, P., Grey, D., Bascal, Z., Whomsley, R., Kilpatrick, H., & Lewis, A. L. (2017). Vandetanib-eluting Radiopaque Beads: In vivo Pharmacokinetics, Safety and Toxicity Evaluation following Swine Liver Embolization. Theranostics, 7(8), 2164–2176. https://doi.org/10.7150/thno.19652

[5] Duran, R., Namur, J., Pascale, F., Czuczman, P., Bascal, Z., Kilpatrick, H., Whomsley, R., Ryan, S., Lewis, A. L., & Denys, A. (2019). Vandetanib-eluting Radiopaque Beads: Pharmacokinetics, Safety, and Efficacy in a Rabbit Model of Liver Cancer. Radiology, 293(3), 695–703. https://doi.org/10.1148/radiol.2019190305