The Ohio State University / College of Medicine / Department of Radiology

Transarterial Therapy in Non-Hepatocellular Carcinoma Liver Tumors: Expanding Indications and Evidence Base

Nikhil Sekar, BA[1], Jenish S. Venancius, MPH[1], Alexander D. Rudich, BS[1], Elliott L. Fite, MS[1], Mina S. Makary, MD[2*]

[1]The Ohio State University College of Medicine; Columbus, OH 43210
[2]Department of Radiology, The Ohio State University Medical Center, Columbus, OH 43210

INTRODUCTION

Locoregional therapies have been previously established for Hepatocellular Carcinoma (HCC). Recently, their use has grown for treatment of non-HCC liver tumors such as intrahepatic cholangiocarcinoma (iCCA), colorectal liver metastases (CRLM), and neuroendocrine tumor liver metastasis (NELM). This review evaluated the use of locoregional therapies in non-HCC liver tumors, highlighting recent advances and ongoing gaps in knowledge.

The therapies reviewed were transarterial chemoembolization (TACE), drug-eluting bead TACE (DEB-TACE), bland embolization (TAE), and transarterial radioembolization (TARE) (Figure 1).

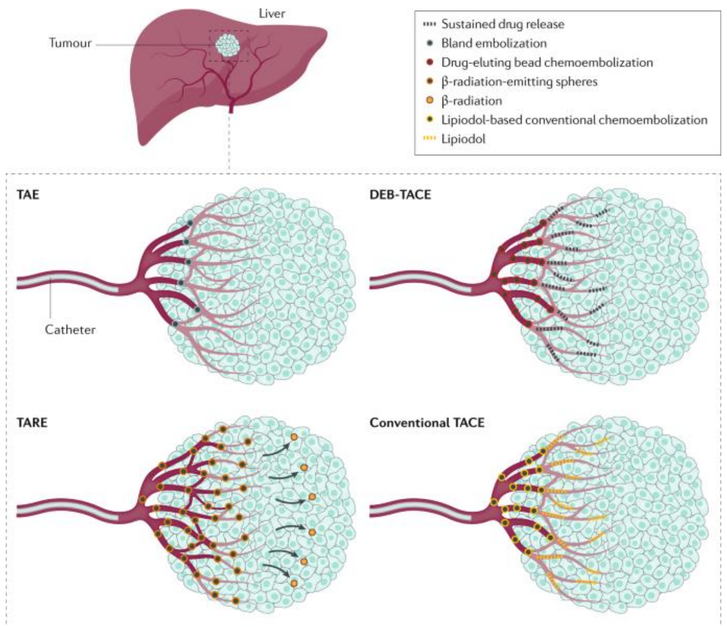

Figure 1, Locoregional Therapies used for Liver Tumors, adapted from Llovet et. al

METHODS

A literature review was conducted including randomized controlled trials, meta-analyses, and systematic reviews, and clinical guidelines that evaluate therapies for iCCA, CRLM, and NELM. Outcomes such as Overall Survival (OS), Objective Response Rate (ORR), Disease Control Rate (DCR) were analyzed in these studies.

RESULTS

ICCA

Two key studies are summarized below. A meta-analyses by Mosconi et. al found similar outcomes for unresectable ICCA when using TACE or TARE.[12] A systemic review by He et al. compared the efficacy of TACE vs DEB-TACE, with slightly improved outcomes in the DEB-TACE group.[7]

Outcome	**TACE**	**TARE**
Median OS	14.2 months	13.5 months
ORR	20.6%	19.3%
Frequency of Clinical Adverse Events	58.5%	43.0%

Table 1, TACE vs TARE[12]

Outcome	**TACE** (95% CI)	**DEB-TACE** (95% CI)
ORR	29.4% (11.6–50.8%)	72.8% (55.6–87.3%)
DCR	51.2% (30.6–71.7%)	88.7% (78.8–96.2%)

Table 2, TACE vs DEB-TACE[7]

CRLM

A meta-analysis by Zhao et al. demonstrated that among intra-arterial therapies for unresectable CRLM, DEB-TACE combined with systemic chemotherapy (SCT) was associated with improved outcomes over other modalities.[9]

Treatment Group	Median OS (months)	ORR (%)
DEE-TACE + SCT	**26.5**	**56.7**
HAI + SCT	13.2	62.6
Conventional TACE + SCT	18.4	20
Conventional TACE alone	16	23–36
DEE-TACE alone	15.2	36
HAI alone	13.2	~40
TARE (radioembolization) + SCT	14.0–14.4	34
TARE (radioembolization) alone	12	23–34
SCT alone	14.4–18.4	21–22

Table 3, Outcomes for Treatment Modalities in CRLM[9]

NELM

Retrospective studies demonstrate a high rates of symptom control and disease response with all the above modalities for unresectable NELM, with different modalities preferred for different tumor characteristics rather than a one-size-fits-all approach. [5, 8, 11, 13]

CONCLUSIONS

Locoregional therapies are increasingly utilized for non-HCC liver tumors, with expanding indications supported by guideline recommendations and retrospective data. The American Association for the Study of Liver Diseases endorses TACE, DEB-TACE, TAE, and TARE as viable treatment options[1], recommending individualized decision-making to tailor treatment plans to patient and tumor characteristics. Further research is required to clarify optimal patient selection, comparative efficacy, and integration with systemic therapies.

REFERENCES

1. Bowlus CL, Arrivé L, Bergquist A, et al. AASLD Practice Guidance on Primary Sclerosing Cholangitis and Cholangiocarcinoma. Hepatology. 2023;77(2):659-702. doi:10.1002/hep.32771.
2. Habib A, Desai K, Hickey R, et al. Transarterial Approaches to Primary and Secondary Hepatic Malignancies. Nat Rev Clin Oncol. 2015;12(8):481-489. doi:10.1038/nrclinonc.2015.78. PMID: 25985939.
3. Raphael MJ, Karanicolas PJ. Regional Therapy for Colorectal Cancer Liver Metastases: Which Modality and When? J Clin Oncol. 2022;40(24):2806-2817. doi:10.1200/JCO.21.02505. PMID: 35649228.
4. Elvevi A, Laffusa A, Elisei F, et al. Any Role for Transarterial Radioembolization in Unresectable Intrahepatic Cholangiocarcinoma in the Era of Advanced Systemic Therapies? World J Hepatol. 2023;15(12):1284-1293. doi:10.4254/wjh.v15.i12.1284. PMID: 38223418.
5. Egger ME, Armstrong E, Martin RC, et al. Transarterial Chemoembolization vs Radioembolization for Neuroendocrine Liver Metastases: A Multi-Institutional Analysis. J Am Coll Surg. 2020;230(4):363-370. doi:10.1016/j.jamcollsurg.2019.12.026. PMID: 32032719.
6. Cocozza MA, Dajti E, Braccischi L, et al. Survival After Transarterial Radioembolization in Patients With Unresectable Intrahepatic Cholangiocarcinoma: An Updated Meta-Analysis and Meta-Regression. Cardiovasc Intervent Radiol. 2024;47(10):1313-1324. doi:10.1007/s00270-024-03825-7. PMID: 39187651.
7. He M, Jiang N, Yin X, Xu A, Mu K. Conventional and drug-eluting beads transarterial chemoembolization in patients with unresectable intrahepatic cholangiocarcinoma: a systematic review and pooled analysis. *J Cancer Res Clin Oncol*. 2023;149(1):531-540. doi:10.1007/s00432-022-04485-1
8. de Mestier L, Zappa M, Hentic O, Vilgrain V, Ruszniewski P. Liver Transarterial Embolizations in Metastatic Neuroendocrine Tumors. Rev Endocr Metab Disord. 2017;18(4):459-471. doi:10.1007/s11154-017-9431-2. PMID: 28975561.
9. Zhao JJ, Tan E, Sultana R, et al. Intra-Arterial Therapy for Unresectable Colorectal Liver Metastases: A Meta-Analysis. J Vasc Interv Radiol. 2021;32(11):1536-1545.e38. doi:10.1016/j.jvir.2021.05.032. PMID: 34166803.
10. Kwan J, Pua U. Review of Intra-Arterial Therapies for Colorectal Cancer Liver Metastasis. Cancers (Basel). 2021;13(6):1371. doi:10.3390/cancers13061371. PMID: 33803606.
11. Frilling A, Clift AK. Therapeutic Strategies for Neuroendocrine Liver Metastases. Cancer. 2015;121(8):1172-1186. doi:10.1002/cncr.28760. PMID: 25274401.
12. Mosconi C, Solaini L, Vara G, et al. Transarterial Chemoembolization and Radioembolization for Unresectable Intrahepatic Cholangiocarcinoma-a Systemic Review and Meta-Analysis. Cardiovasc Intervent Radiol. 2021;44(5):728-738. doi:10.1007/s00270-021-02800-w. PMID: 33709272.
13. Barat M, Cottereau AS, Kedra A, et al. The Role of Interventional Radiology for the Treatment of Hepatic Metastases From Neuroendocrine Tumor: An Updated Review. J Clin Med. 2020;9(7):2302. doi:10.3390/jcm9072302. PMID: 32698459.
14. Llovet, J.M., De Baere, T., Kulik, L. *et al.* Locoregional therapies in the era of molecular and immune treatments for hepatocellular carcinoma. *Nat Rev Gastroenterol Hepatol* **18**, 293–313 (2021). https://doi.org/10.1038/s41575-020-00395-0