

Interventional Oncology in the Management of Metastatic Colorectal Cancer

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Summary

Chapter 2. Liver-directed and systemic therapies for colorectal cancer liver metastases

This literature review provided an overview on epidemiology, predisposing factors, pathology, diagnosis, approved/ recommended liver-directed and systemic therapies for metastatic CRC as well as it defined the role of interventional oncology in treatment of CRC liver metastases. The review also discussed standard of care as well as emerging interventional oncology procedures to treat metastatic CRC, new treatment modalities on the pipeline and key driving mutations which are important for better patient selection.

Chapter 3. Factors associated with local tumor control and complications after thermal ablation for colorectal cancer liver metastases: a 15-years retrospective cohort study

In our research we identified the factors associated with biliary complications - the most common type of major complications following liver thermal ablation in our study. We noted the strong association between post-ablation biliary complications with prior HAI therapy as well as with additional biliary complication predictors, such as pre-existing biliary dilatation, bevacizumab administration and minimum ablation margin size, which to the best of our knowledge, have not been described before. Our study provided recommendation to withhold bevacizumab within one month to thermal ablation, similarly to the precautions to the surgery [1].

Also, our study was one of the few studies documenting the importance of minimum ablation margin for a long-term tumor control by thermal ablation [2-9]. This study also supported the findings of our prior research group study that was limited on RFA, identifying minimal ablation margin size, increased tumor size and no history of prior hepatectomy as independent predictors of better LTPFS on multivariate analysis. We noted, that the best oncological outcomes were achieved for the patients treated with >10 mm minimal ablation margins with no case of LTP recorded. In our study we analyzed the risks of creating a >10 mm minimal ablation margin for two patient populations: patients with HAI history and HAI-naïve.

Chapter 4. Factors Affecting Oncologic Outcomes of ⁹⁰Y Radioembolization of Heavily Pre-Treated Patients with Colon Cancer Liver Metastases

The developed nomogram included six easy-to-obtain pre-treatment parameters (sum of largest diameters of two largest liver lesions in intended to-treat-regio, number of extrahepatic disease sites, CEA level, alanine aminotransferase, tumor differentiation and albumin levels) and provided good prediction of patient survival post-radioembolization. Baseline metabolic FDG-uptake parameter (SUV_{max}) was the single significant predictor of liver progression-free survival on multivariate analysis.

Chapter 5. ⁹⁰Y Resin Microspheres Radioembolization for Colon Cancer Liver Metastases Using Full-Strength Contrast Material

Administration of ⁹⁰Y resin microspheres using undiluted contrast medium in both “B” and “D” infusion lines was demonstrated to be safe and effective, resulting in lower fluoroscopy radiation dose and shorter infusion time, without evidence of myelosuppression or increased stasis incidence.

Chapter 6. Radiation Segmentectomy for Hepatic Metastases with ⁹⁰Y Glass-Based Microspheres: Technical Considerations, Correlations to Dosimetry and Preliminary Results

In this small retrospective study we described our initial experience with radiation segmentectomy in selected patients with limited metastatic liver disease that was not amenable to resection or percutaneous ablation. The study assessed the feasibility of treating up to three liver metastases using ⁹⁰Y radiation segmentectomy with local curative intent similar to ablative external radiation therapy or curative percutaneous ablation [10, 11]. We demonstrated, that radiation segmentectomy of ≤3 hepatic segments can safely provide good local tumor control in selected patients with limited metastatic liver disease and treatment options.

Chapter 7. Image-Guided Thermal Ablation for the Treatment of Pulmonary Malignancies

This literature review provided an overview on a variety of image-guided thermal ablation techniques for patients with oligometastatic lung disease and non-small cell lung carcinoma.

Chapter 8. Microwave Ablation in the Management of Colorectal Cancer Pulmonary Metastases

In this study we indicated, that the efficacy of MW ablation compared favorably to prior results of thermal ablation in terms of local tumor control, local progression-free and overall survivals [12-15].

Factors associated with local tumor progression-free survival and cancer-specific survival were identified and described. Firstly, we found strong association between tumor size and local tumor progression (LTP) and strong inverse association of LTP with minimal ablation margin, with all LTPs occurring in tumors ≥ 1 cm, ablated with minimal margin of < 5 mm. This observation supports the value of the minimal ablation margin as independent predictor of LTP as reported previously [2, 4, 16-18]. Also, this finding supports the fact, that tumor size remains a limiting factor for the widespread use of ablation regardless of energy used [19-22]. Pleural-based tumors had more than seven times the risk for LTP when compared to non-pleural-based metastases. Also, we found that increased CEA level and increased number of pre-MW ablation chemotherapy

lines negatively impacted cancer-specific survival. Further validation of study results is certainly needed in larger studies with longer follow-up to better define the role of MW ablation in the management of CRC metastatic disease.

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