

The Use of Brachytherapy in the Treatment of Liver Metastases: A Systematic Review

Authors : Mateusz Bilski, Jakub Klas, Emilia Kowalczyk, Sylwia Koziej, Katarzyna Kulszo, Ludmiła Grzybowska- Szatkowska

Abstract : Background: Liver metastases are a common complication of primary solid tumors and significantly reduce patient survival. In the era of increasing diagnosis of oligometastatic disease and oligoprogression, methods of local treatment of metastases, i.e. MDT, are becoming more important. Implementation of such treatment can be considered for liver metastases, which are a common complication of primary solid tumors and significantly reduce patient survival. To date, the mainstay of treatment for oligometastatic disease has been surgical resection, but not all patients qualify for the procedure. As an alternative to surgical resection, radiotherapy techniques have become available, including stereotactic body radiation therapy (SBRT) or high-dose interstitial brachytherapy (iBT). iBT is an invasive method that emits very high doses of radiation from the inside of the tumor to the outside. This technique provides better tumor coverage than SBRT while having little impact on surrounding healthy tissue and eliminates some concerns involving respiratory motion. Methods: We conducted a systematic re-view of the scientific literature on the use of brachytherapy in the treatment of liver metastases from 2018 - 2023 using PubMed and ResearchGate browsers according to PRISMA rules. Results: From 111 articles, 18 publications containing information on 729 patients with liver metastases were selected. iBT has been shown to provide high rates of tumor control. Among 14 patients with 54 unresectable RCC liver metastases, after iBT LTC was 92.6% during a median follow-up of 10.2 months, PFS was 3.4 months. In analysis of 167 patients after treatment with a single fractional dose of 15-25 Gy with brachytherapy at 6- and 12-month follow-up, LRFS rates of 88.4-88.7% and 70.7 - 71.5%, PFS of 78.1 and 53.8%, and OS of 92.3 - 96.7% and 76.3% - 79.6%, respectively, were achieved. No serious complications were observed in all patients. Distant intrahepatic progression occurred later in patients with unresectable liver metastases after brachytherapy (PFS: 19.80 months) than in HCC patients (PFS: 13.50 months). A significant difference in LRFS between CRC patients (84.1% vs. 50.6%) and other histologies (92.4% vs. 92.4%) was noted, suggesting a higher treatment dose is necessary for CRC patients. The average target dose for metastatic colorectal cancer was 40 - 60 Gy (compared to 100 - 250 Gy for HCC). To better assess sensitivity to therapy and predict side effects, it has been suggested that humoral mediators be evaluated. It was also shown that baseline levels of TNF- α , MCP-1 and VEGF, as well as NGF and CX3CL correlated with both tumor volume and radiation-induced liver damage, one of the most serious complications of iBT, indicating their potential role as biomarkers of therapy outcome. Conclusions: The use of brachytherapy methods in the treatment of liver metastases of various cancers appears to be an interesting and relatively safe therapeutic method alternative to surgery. An important challenge remains the selection of an appropriate brachytherapy method and radiation dose for the corresponding initial tumor type from which the metastasis originated.

Keywords : liver metastases, brachytherapy, CT-HDRBT, iBT

Conference Title : ICGOGCT 2023 : International Conference on Gastrointestinal Oncology and Gastrointestinal Cancer Treatments

Conference Location : Venice, Italy

Conference Dates : August 10-11, 2023