Same-day adaptive palliative radiotherapy without prior CT simulation: Early outcomes in the FAST-METS study

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Radiother Oncol. 2023 May;182:109538.

doi: 10.1016/j.radonc.2023.109538.

Abstract

BACKGROUND AND PURPOSE

Standard palliative radiotherapy workflows involve waiting times or multiple clinic visits. We developed and implemented a rapid palliative workflow using diagnostic imaging (dCT) for pre-planning, with subsequent on-couch target and plan adaptation based on a synthetic computed tomography (CT) obtained from cone-beam CT imaging (CBCT).

MATERIALS AND METHODS

Patients with painful bone metastases and recent diagnostic imaging were eligible for inclusion in this prospective, ethics-approved study. The workflow consisted of 1) telephone consultation with a radiation oncologist (RO); 2) pre-planning on the dCT using planning templates and mostly intensity-modulated radiotherapy; 3) RO consultation on the day of treatment; 4) CBCT scan with on-couch adaptation of the target and treatment plan; 5) delivery of either scheduled or adapted treatment plan. Primary outcomes were dosimetric data and treatment times; secondary outcome was patient satisfaction.

RESULTS

47 patients were enrolled between December 2021 and October 2022. In all treatments, adapted treatment plans were chosen due to significant improvements in target coverage (PTV/CTV V95%, p-value < 0.005) compared to the original treatment plan calculated on daily anatomy. Most patients were satisfied with the workflow. The average treatment time, including consultation and on-couch adaptive treatment, was 85 minutes. On-couch adaptation took on average 30 min. but was longer in cases where the automated deformable image registration failed to correctly propagate the targets.

CONCLUSION

A fast treatment workflow for patients referred for painful bone metastases was implemented successfully using online adaptive radiotherapy, without a dedicated CT simulation. Patients were generally satisfied with the palliative radiotherapy workflow.

KEYWORDS

Adaptive radiotherapy; Clinical implementation; Ethos; Metastases; Palliative radiotherapy; Simulation CT free workflow.