



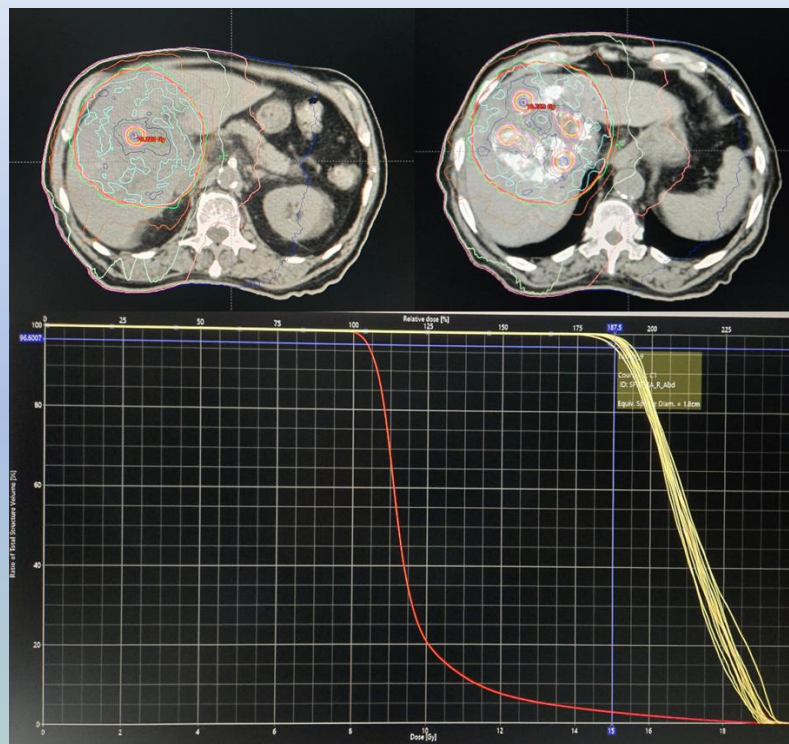
Objectives

Spatial fractionated radiation therapy (SFRT) has been gaining acceptance as palliative radiotherapy (RT) for liver tumours and may offer dosimetric and therapeutic advantage of tumour control and symptom relief, compared to traditional 2-dimensional or 3-dimensional RT. We have conducted a prospective pilot study on SFRT in patients with metastatic liver tumours, and evaluated the magnitude of symptom relief and toxicity after SFRT.

Methodology

Patients with inoperable advanced or metastatic primary hepatocellular carcinoma (HCC) or secondary liver malignancies presented with abdominal pain or distension or other associated symptoms and have previously failed at least 1 line of systemic anticancer treatment were invited. After baseline investigations with computed tomography with or without magnetic resonance imaging for target volume delineation, they underwent either stereotactic centralized ablative radiation therapy (SCART) or lattice SFRT with either 15Gy/8Gy/1 fraction or 60Gy/30Gy/5 fractions encompassing the central portion of the gross target volume (GTV) within a 1.5cm inner margin of GTV for SCART or the lattices.

Patient-reported Brief Pain Inventory (BPI) was prospectively collected at baseline before SFRT, then at 1 month and 3 months after SFRT.



An 83-year-old patient suffered from a previously untreated large HCC treated with lattice SFRT including 12 vertices delivering a single dose of 15Gy, with larger GTV encompassing the whole tumour with an internal target volume based on 4D-CT images and a 3mm-margin to generate the planning target volumes. His pain completely disappeared 1 month after SFRT.

Dose-volume histogram of his SFRT showed satisfactory PTV coverage (red line) with 8Gy and a high dose (15Gy) delivered to the pre-defined lattices.

Results

Eight patients were recruited including 4 males and 4 females. Four had hepatocellular carcinoma, 2 had uveal and nasal melanoma with liver metastases, 1 had sarcoma of the liver and 1 had ileal adenocarcinoma with liver metastases. Six and two patients received lattice SFRT and SCART, respectively. For those treated with lattice SFRT, the median number of vertices was 15 (range 9– 30), each separated from the others by a median of 2.2cm (range 1.5–3.0cm). The median pretreatment Brief Pain Inventory score (BPI) was 6 (ranging from 4–10).

After a median follow-up of 3.2 months (range 2.0–6.5), the median BPI score improved to 3 (range 0–4) and 2 (range 0–2) at 1 month and 3 months after SFRT (both p=0.03). One HCC patient was pain-free at 2 months after lattice SFRT. One had partial response, 6 had stable disease, and the remaining 1 had progressive disease. No acute liver impairment or other treatment-related adverse events were observed, up to 6 months after SFRT.

Conclusions

SFRT can offer effective and swift symptom relief with minimal toxicities compared to traditional radiotherapy techniques for inoperable advanced liver malignancies.