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Imaging guided liver fiducial marker placement for stereotactic body radiotherapy in hepatic malignancy: safety and efficacy based on a single-centre experience

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Introduction

Stereotactic body radiotherapy (SBRT) allows precise radiation dose to tumor while sparing adjacent important normal organs. The movement of intra-abdominal organs due to breathing had limited to SBRT usage. The fiducial markers insertion close to the hepatic tumors facilitates tumor-tracking SBRT to improve accuracy of hepatic tumor localization.

Objectives

The usage of fiducial markers to guide accurate liver tumor localization during stereotactic body radiotherapy is in upward trend. We aimed to describe our initial experience with gold liver fiducial marker and to evaluate the technique, efficacy and safety of imaging guided liver fiducial marker placement at our institution.

Methodology

Retrospective review of patients underwent imaging guided liver fiducial marker placement (2013–2017). Gold markers (VISICOIL) were placed into the liver close to the tumors. Post-procedure imaging was available to confirm marker positioning. Technical and Clinical success rate and complications were recorded. All cases performed under local anesthesia.

Result

Results

In total, 22 patients (M:F=15:7) with mean age 68.2 years (range 47-85) underwent liver fiducial marker placement. 19 patients (86.4%) underwent USG guidance for marker insertion and 3 patients (13.6%) had MDCT guidance. All post-procedure USG (19) and MDCT (3) were available to confirm marker positioning. Technical success rate (defined as successful fiducial marker placement) is 22/22 (100%). 22 cases consisted of 15 hepatocellular carcinoma (68.2%), 3 metastases from primary colonic tumor (13.6%), 1 lung carcinoma (4.5%), 1 prostate carcinoma (4.5%), 1 nasopharyngeal carcinoma (4.5%) and 1 uterine cancer (4.5%). The average size of target tumor was 3.15cm (range 0.7-15.3cm). The target tumor site in segment 1/2/3/4/6/7/8/2&3/4&8/5&6/5&8/7&8 were 1/2/3/1/6/5/3/1/3/3/1/1 respectively. In 15 patients, only one marker was deployed close to the target hepatic tumor. Six patients had 2 markers deployed due to multiple hepatic lesions while 1 patient had 3 markers inserted for multiple large lesions. 20 patients received subsequent SBRT. One patient refused SBRT in subsequent follow-up. One patient had further clinical deterioration due to rapid disease progression and excluded from SBRT. Clinical success rate (defined as completion of SBRT) is 20/22 (90.1%). No patients required additional fiducial markers localization during the period of SBRT. 20 patients had subsequent follow-up imaging MDCT(14) and PET/CT(6) shows no evidence of marker migration. One patient refused follow-up imaging and opted for supportive care. One patient had just completed SBRT and pending for next imaging follow up. No major complications, such as bleeding or marker malposition occurred. 3 patients (13.6%) was discharge on the same day of procedure and 19 patients (86.4%) were discharged on next day.

Conclusion

Imaging guided liver fiducial marker placement is a safe and effective procedure, which facilitates accurate hepatic tumors localization for SBRT in the treatment of liver malignancy.