

Purpose:To measure the setup errors with infrared marker-based positioning system (IM-BPS) and electronic portal imaging device (EPID) for patients with esophageal carcinoma and lung cancer and investigate the accuracy and practicality of IM-BPS.

Methods:From January 2007 to January 2008, 40 patients with esophageal carcinoma and 27 patients with lung cancer received three-dimensional conformal radiotherapy or intensity-modulated radiotherapy, setup errors during the treatment were measured with IM-BPS and EPID, and the data of setup errors were compared with paired t-test and agreement with χ^2 -test.

Results:It takes 10-12mins to complete the validating for each patient by EPID system, while IM-BPS system only needs 2-5mins. The mean setup errors along x-axis, y-axis, z-axis for patients with esophageal carcinoma measured by IM-BPS and EPID were 3.49mm, 3.19mm, 3.31mm and 4.03mm, 3.41mm, 3.43mm, respectively. For the patients with lung cancer, the setup errors were 4.23mm, 3.51mm, 3.39mm and 4.85mm, 3.53mm, 3.74mm, respectively. The difference of setup errors measured by the two systems was within 1mm for 65% esophageal carcinoma patients ($\chi^2=51.09$; $P=0.000$), the difference of setup errors measured by the two systems was within 1mm for 55% lung cancer patients ($\chi^2=53.35$; $P=0.000$). The rotation errors along sagittal plane, coronal plane and transverse plane for patients with esophageal carcinoma and lung cancer measured by IM-BPS were 0.31°, -0.90°, 0.34° and 0.05°, -1.12°, 0.22°, respectively.

Conclusions:The measurement results of setup errors for patients with esophageal carcinoma and lung cancer show that IM-BPS is mostly better than EPID. Though validating for patients can be measured accurately and be well quality controlled, IM-BPS is used easily because of macroscopic, homely, spare time and real-time monitoring.