

左乳腺癌保乳术后不同放疗方式的剂量学比较

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Title: A comparison of dose parameters for left breast cancer after breast-conserving surgery using three different radiotherapy techniques

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摘要: 目的: 评价左乳腺癌保乳术后三种放疗方式(3DCRT, IMRT, VMAT)的剂量学特点。方法: 选取本院2015年5月至2016年2月期间20例早期左乳腺癌保乳术后放疗患者, 所有靶区及危及器官均由同一高级放疗医师勾画, 包括临床靶区(CTV)、计划靶区(PTV)及危及器官(OAR), 并由同一高级放疗物理师分别设计3DCRT、IMRT、VMAT三种治疗计划, 处方剂量为50 Gy。比较三种计划的计划靶区(PTV)的靶区均匀性指数(HI)及适形度指数(CI), 最大剂量(Dmax)、平均剂量(Dmean)、最小剂量(Dmin); 肺、心脏的V5, V10, V20, V30, V40, Dmax, Dmean及Dmin等。结果: 3DCRT、IMRT、VMAT三种放疗计划适形度指数(CI)分别为 0.75 ± 0.08 、 0.84 ± 0.04 和 0.89 ± 0.04 ($P < 0.05$), 均匀性指数(HI)分别为 0.11 ± 0.12 、 0.11 ± 0.08 和 0.10 ± 0.09 。VMAT与IMRT计划降低了危及器官高剂量区体积, 但相应增加了低剂量区体积, 尤其VMAT计划的肺、患侧肺V5、V10明显增加($P < 0.05$)。结论: IMRT计划不仅提高了靶区的适形度, 而且降低了心脏和肺的低剂量受照体积及平均剂量。因此, IMRT计划更适用于左乳腺癌保乳术后的放射治疗。

Abstract: Objective: To evaluate the dosimetric characteristics of three radiation methods (3DCRT, IMRT, VMAT) after the operation of the left breast cancer. Methods: From May 2015 to February 2016, 20 patients with early left breast cancer after breast-conserving radiotherapy in our hospital were selected. All target areas and organs at risk were delineated by the same senior radiotherapy physician, including clinical target volume (CTV), planning target volume (PTV) and organs at risk (OAR), and designing 3DCRT, IMRT, VMAT treatment plans by the same senior radiotherapy physicists. Prescription dose was 50 Gy. Maximum dose (Dmax), mean dose (Dmean), minimum dose (Dmin), target uniformity index (HI) and conformal index (CI) of PTV in three types of plan were compared. V5, V10, V20, V30, V40, Dmax, Dmean and Dmin of lung and heart were compared. Results: The conformal index (CI) of 3DCRT, IMRT, VMAT was 0.75 ± 0.08 , 0.84 ± 0.04 and 0.89 ± 0.04 respectively ($P < 0.05$). The uniformity index (HI) was 0.11 ± 0.12 , 0.11 ± 0.08 and 0.10 ± 0.09 , respectively. VMAT and IMRT decreased the volume of the high-dose area of organs at risk, but increased the volume of low-dose area, especially the heart and ipsilateral lung, V5 and V10 increased significantly in VMAT plan ($P < 0.05$). Conclusion: The IMRT plan not only improves the conformability of the target area, but also reduces the low-dose exposure volume and the average dose of the heart and lung. Therefore, the IMRT program is more suitable for post-operative radiotherapy of left breast cancer.

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