

# 腹膜加球囊配合OPS技术在肝癌放疗中的临床应用

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**Title:** Clinical application of thermoplastic membrane plus balloon combined with OPS technique in radiotherapy of liver cancer

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**关键词:** 简易腹部加压; 红外定位系统; 摆位误差; 肝癌

**Keywords:** simple abdominal pressure; optical positioning system; patient setup error; liver cancer

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**摘要:** 目的: 设计简易腹部加压技术 (simple abdominal pressure, SAP) 配合红外定位系统 (optical positioning system, OPS), 研究其在肝癌放射治疗中对摆位误差的影响及其在胸腹部肿瘤精确放疗中的临床应用价值。方法: 本研究根据肝癌患者摆位技术的不同分为2个对比组, 每组选取15例患者, 分别是采用自由呼吸常规定位的对照组和SAP配合OPS技术控制患者呼吸幅度定位的实验组。首先观察模拟机下两组患者的肿瘤运动度, 然后勾画靶区设计计划, 治疗前均行千伏级锥形束CT(cone beam computed tomography, CBCT)验证, 分别分析定位时肿瘤运动度和治疗时摆位在X (左右方向)、Y (头脚方向)、Z (面背方向)的线性误差。结果: 实验组与对照组在模拟机下X、Y、Z方向的肿瘤运动度分别为 (2.461 5±0.660 2、3.923 1±1.187 5) mm、(5.692 3±1.548 4、19.076 9±4.499 3) mm、(3.230 8±1.165 8、8.692 3±2.982 9) mm, 各方向对应的P值分别为P=0.001、P<0.001、P<0.001; 实验组与对照组在X、Y、Z方向上的线性摆位误差分别为 (2.175 3±0.464 8、4.940 0±0.573 3) mm、(1.435 3±0.304 9、6.408 0±0.555 0) mm、(2.288 7±0.591 4、4.967 3±0.353 9) mm, 各方向对应的P值均小于0.001。结论: 与常规定位摆位相比, 设计的SAP配合OPS技术可明显减小肝癌患者放疗中的肿瘤呼吸运动度和提高治疗时的摆位精度, 对于提高肝癌以及胸腹部肿瘤的治疗精度具有临床应用价值。

**Abstract:** Objective: Simple abdominal pressure (SAP) combined with optical positioning system was designed to study the effect of placement on liver cancer radiotherapy and its clinical application value in precise radiotherapy of thoracic and abdominal tumors. Methods: This study was divided into two comparison groups according to the placement technique of liver cancer patients. Each group selected 15 patients, which was the control group with free breathing routine positioning and the experimental group of SAP combined with OPS technique to control the respiratory amplitude localization. Firstly, the tumor motility of the two groups of patients under the simulator was observed, and then the design plan of the target area was delineated. Before the treatment, the cone beam computed tomography (CBCT) was performed to verify the tumor motility and treatment. The linearity error was analysed at the time of X (left and right direction), Y (head and foot direction), and Z (face and back direction). Results: The tumor motility of the experimental group and the control group in the X, Y, and Z directions under the simulator were (2.461 5±0.660 2, 3.923 1±1.187 5) mm, (5.692 3±1.548 4, 19.076 9±4.499 3) mm, (3.230 8±1.165 8, 8.692 3±2.982 9) mm, and the corresponding P values in each direction were P=0.001, P<0.001, P<0.001. The linear positioning errors of the experimental group and the control group in the X, Y, and Z directions were respectively (2.175 3±0.464 8, 4.940 0±0.573 3) mm, (1.435 3±0.304 9, 6.408 0±0.555 0) mm, (2.288 7±0.591 4, 4.967 3±0.353 9) mm, and the corresponding P values in all directions are less than 0.001. Conclusion: Compared with the conventional positioning technology, the designed SAP combined with OPS technology can significantly reduce

the tumor respiratory motility in the treatment of liver cancer patients and improve the positioning accuracy during treatment. And the treatment accuracy of chest and abdomen tumors has clinical application value.

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