

论著

64层螺旋CT低剂量双相扫描肺密度在COPD患者肺功能评价中的应用研究

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摘要: 目的:探讨64层螺旋CT(spiral CT, SCT)低剂量双相扫描肺密度测定在慢性阻塞性肺部疾病(chronic obstructive pulmonary disease, COPD)患者肺功能评价中的应用价值。方法:选择经临床肺功能检查确诊的COPD患者36例(COPD组)和30例无任何心肺疾患且胸部CT检查正常的健康体检者(正常对照组)。两组研究对象均采用德国Siemens SOMATOM Sensation 64层SCT机进行深吸气末、深呼气末的全肺低剂量(50 mAs)扫描。按扫描层数将全肺分为上、中、下3个肺区。利用Pulmo软件,分别测量和计算出COPD组与正常对照组深吸气末、深呼气末上、中、下肺区及全肺的各密度指标:深吸气末密度(Din)、深呼气末密度(Dex)、密度差(Dex-Din)、密度比(Dex/Din)、密度变化百分比(Din-Dex)/Din。所有COPD患者均在SCT检查前后3 d内完成肺功能检测(pulmonary function tests, PFT),指标为第1秒用力肺活量的实测值与预计值的比值(FEV1%)及第1秒用力肺活量与用力肺活量的比值(FEV1/FVC)。比较COPD组与正常对照组之间SCT各密度指标,利用Pearson相关分析来检验各密度指标与肺功能指标FEV1%和FEV1/FVC的相关性。结果:COPD组与正常对照组比较,Din在上、中、下及全肺区的差异有统计学意义($P<0.05$);Dex, Dex-Din, Dex/Din, (Din-Dex)/Din在各肺区及全肺区的差异亦有统计学意义($P<0.01$)。Dex, Dex-Din, Dex/Din, (Din-Dex)/Din均分别与FEV1%, FEV1/FVC有良好的相关性($P<0.01$)。结论:64层SCT低剂量双相扫描能便捷、准确地获得评价COPD肺功能的密度指标,与FEV1%和FEV1/FVC两项肺功能指标相关性良好,可用于评估COPD患者的肺功能状况,有较高的临床应用价值。

关键词: 螺旋CT 慢性阻塞性肺部疾病 Pulmo软件 肺功能检查

Sixty-four slice spiral CT low-dose chest two-phase scanning for lung density measurement in assessing the pulmonary function in patients with chronic obstructive pulmonary disease

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Abstract: Objective: To explore the value of 64 slice spiral CT (SCT) low-dose chest scanning at full inspiration and full expiration for lung density measurement in assessing the pulmonary function in patients with chronic obstructive pulmonary disease (COPD).
Methods: Totally 36 COPD patients (the COPD group) underwent pulmonary function tests (PFT) and were essentially verified COPD; 30 healthy people (the control group) were selected whose 64 slice SCT chest scanning was normal. The 2 groups underwent chest 64 slice SCT low-dose scanning at full inspiration and full expiration. After the scanning, the lung was measured by CT Pulmo software. The lung was divided into 3 regions by scanning layers. We measured and calculated the density indexes of each region (including the upper, middle, lower field, and the total lung) of the 2 groups. All density indexes were lung density at full inspiration and full expiration (Din, Dex), density difference (Dex-Din), density ratio (Dex/Din), density variation percentage (Din-Dex)/Din. All patients underwent PFT and 64 slice SCT within 3 days, whose pulmonary function was tested by Master Lab (Jaeger, Germany). The indexes were the percentage of actual value and expected value of forced expiratory volume at the first second (FEV1%) and the ratio of first second forced expiratory volume to forced vital capacity (FEV1/FVC). Then we compared with the CT indexes between the COPD group and the control group. The relevant indicators of lung densities were analyzed in comparison with the indicators of FEV1% and FEV1/FVC by Pearson correlation analysis.
Results: The density indexes of each region and total lung, and the Din in the control group and the COPD group were compared. The difference between them was statistically significant ($P<0.05$). The difference among other indexes was also statistically significant ($P<0.01$). Excellent correlation was found between Dex, Dex-Din, Dex/Din and (Din-Dex)/Din indexes with FEV1% and FEV1/FVC ($r=0.566, 0.686, 0.568, 0.580, -0.565, -0.598, 0.565$ and $0.598; P<0.01$)
Conclusion: Sixty-four slice SCT low-dose two-phase scanning density indexes are closely related to the indicators (FEV1% and FEV1/FVC) of clinical lung function tests, which can be used to evaluate the lung function in COPD patients conveniently and accurately.

Keywords: spiral CT chronic obstructive pulmonary disease Pulmo software pulmonary function tests

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