模型基础的迭代重建算法优化腹部静脉成像质量

Model-based iterative reconstruction in optimizing image quality of abdomen CT venography

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中文摘要：

　　目的：探讨应用模型基础的迭代重建(MBIR)算法优化腹部CT静脉成像(CTV)图像质量的价值。方法：应用自动管电流调节技术对27例可疑腹部病变患者行腹部CT扫描,分别采用滤波反投影技术(FBP组)、50%自适应统计迭代重建(ASiR组)和MBIR(MBIR组)3种算法对原始数据进行重建;测量背部肌肉、背部脂肪、肝实质、胰腺实质、脾实质的噪声及CT值,计算门静脉、脉、脾静脉及下腔静脉的CNR;采用5分制对图像质量进行评分。采用方差分析和秩和检验对数据进行统计学分析。结果：3组图像CT值的差异无统计学意义(P均>0.05)。MBIR组图像噪声于ASiR组(P<0.001),而二者均低于FBP组(P均<0.05);与FBP组图像相比,ASiR组和MBIR组图像噪声分别降低28.61%和53.53%,CNR分别增加40.92%和158.85%。MBIR组、ASiR组和FBP组观评分分别为(4.64±0.31)分、(3.74±0.54)分及(3.22±0.60)分,差异有统计学意义(P=0.008)。结论：MBIR重建算法可以明显提高腹部CTV图像质量,并具有降低腹部CTV辐射剂量的潜能

英文摘要：

Objective: To explore the value of model-based iterative reconstruction (MBIR) in optimizing image quality of abdomen CT venography (CTV). **Methods:** Totally 27 consecutive patients were chosen and underwent plain and contrast-enhanced abdomen CT with automated tube current modulation. The images were reconstructed with filtered back projection (FBP group), adaptive statistical iterative reconstruction (ASiR group) 50% and MBIR (MBIR group), respectively. Image noises and CT values of muscle, fat tissue, liver, kidney and spleen, as well as CNR for portal veins, inferior cava, pancreatic veins and splenic veins were measured. The image quality was evaluated using 5-point scale. Those results among the 3 different reconstructions were compared by *one-way ANOVA a Wilcoxon signed-rank* tests. **Results:** CT value in three groups had no significant difference ($P>0.05$). The image noise in MBIR group was lower than that in ASiR group ($P<0.001$), and both of them lower than that in FBP group (both $P<0.05$). Compared with FBP group, the average SD reduction rate of ASiR group and MBIR group was 28.61% and 53.53%, the increase rate of CNR was 40.92 158.85%, respectively. The average subjective score of MBIR group, ASiR group and FBP group was 4.64 ± 0.31, 3.74 ± 0.54 and 3.22 ± 0.60, respectively ($P=0.008$). **Conclusion:** MBIR can impro the overall image quality and has potential in decreasing radiation dose of abdomen CTV.

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