· 论著 ·

常规超声联合超声造影对胸膜下肺结核、细菌性肺炎的检查影像特征分析*

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【摘要】**目的** 分析常规超声联合超声造影对胸膜下肺结核、细菌性肺炎的检查影像特征。**方法** 选择于本院确诊的胸膜下肺结核或细菌性肺炎患者115例，其中确诊为胸膜下肺结核的患者有78例，将其作为肺结核组；而确诊为细菌性肺炎的患者有37例，将其作为肺炎组。所有患者均行常规超声、超声造影检查，分析采用常规超声、超声造影检查的影像学表现。**结果** 肺结核组78例患者中52例呈楔形，占比66.67%；21例呈类圆形，占比26.92%；5例为不规则形，占比6.41%。肺炎组37例患者中23例为楔形，占比62.16%；14例为类圆形，占比37.84%，将两组患者形态进行对比，无明显统计学差异($P>0.05$)；肺结核组中出现碎片征的患者有24例，占比30.77%，在肺炎组中有30例，占比81.08%，肺炎组患者中碎片征的占比相较于肺结核组升高($P<0.05$)；边缘较为规整，后方出现彗星尾征的高回声为瀑布征，肺结核组患者中瀑布征的占比为62.82%，相较于肺炎组患者中的占比16.22%上升($P<0.05$)；肺炎组患者中有34例患者的病灶为离心型增强模式，占比91.89%，而其余3例则为局部向整体的增强模式；肺结核组患者中有55例为离心型增强模式，占比70.51%，13例患者为向心型增强模式，占比16.67%；10例患者表现为离心型、向心型均存在的增强模式，占比12.82%，将两组患者增强模式占比进行对比，差异有统计学意义($P<0.05$)；肺结核组患者中共有64例出现坏死区，占比82.05%，肺炎组患者中共有11例出现坏死区，占比29.73%，经比较，肺结核组患者的坏死区占比相较于肺炎组升高($P<0.05$)；肺结核组患者中有33例呈现为病灶内有许多间断的筛孔样坏死，占比51.56%，而24例则呈现为形态较为规整的大片状坏死，占比37.50%，7例则呈现为病灶内几乎完全坏死，占比10.94%；肺炎组患者中有2例为形态较为规整的大片状坏死，占比18.18%，9例呈现为形态较为规整的小片状坏死，占比81.82%，经对比，两组间有统计学差异($P<0.05$)；两组患者超声造影下正常肺组织开始增强时间、病灶开始增强时间等指标进行对比，均无明显差异(均$P>0.05$)。**结论** 肺结核病灶经常规超声检查为"瀑布征"，超声造影检查显示坏死区面积较大，且多为大片状坏死；而常规超声检查细菌性肺炎病灶为"碎片征"，坏死区面积较小，且形态较为规整，以上特点可作为鉴别两种疾病的标志。

【关键词】常规超声; 超声造影; 胸膜下肺结核; 细菌性肺炎; 影像特征

Analysis of Imaging Features of Subpleural Pulmonary Tuberculosis and Bacterial Pneumonia by Conventional Ultrasound Combined with Contrast-enhanced Ultrasound*

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Abstract: *Objective* To analyze the imaging features of conventional ultrasound combined with contrast-enhanced ultrasound in subpleural pulmonary tuberculosis and bacterial pneumonia. *Methods* 115 patients diagnosed with subpleural pulmonary tuberculosis or bacterial pneumonia in our hospital were selected, of which 78 were diagnosed as subpleural pulmonary tuberculosis. 37 patients diagnosed with bacterial pneumonia were included in the pneumonia group. All patients underwent conventional ultrasound and contrast-enhanced ultrasound, and the imaging findings of conventional ultrasound and contrast-enhanced ultrasound were analyzed. *Results* 52 of 78 patients in pulmonary tuberculosis group were wedge-shaped, accounting for 66.67%. 21 cases were quasi-circular, accounting for 26.92%; 5 cases were irregular, accounting for 6.41%. In the pneumonia group, 23 of 37 patients were wedge-shaped, accounting for 62.16%; 14 cases were circular, accounting for 37.84%. There was no significant difference between the two groups ($P>0.05$); in the pulmonary tuberculosis group, there were 24 patients with fragmentation, accounting for 30.77%, and in the pneumonia group, there were 30 patients, accounting for 81.08%. The proportion of fragmentation in the pneumonia group was higher than that in the pulmonary tuberculosis group ($P<0.05$); the high echo of comet tail sign was waterfall sign, the proportion of waterfall sign in pulmonary tuberculosis group was 62.82%, which was higher than 16.22% in pneumonia group ($P<0.05$); in the pneumonia group, 34 cases (91.89%) had centrifugal enhancement mode, while the other 3 cases had local to whole enhancement mode; in the pulmonary tuberculosis group, 55 cases were centrifugal enhancement mode, accounting for 70.51%, 13 cases were centripetal enhancement mode, accounting for 16.67%, 10 patients showed both centrifugal and centripetal enhancement patterns, accounting for 12.82%. The proportion of enhancement patterns between the two groups was compared, and the difference was statistically significant ($P<0.05$); a total of 64 patients in the pulmonary tuberculosis group had necrotic areas, accounting for 82.05%, and 11 patients in the pneumonia group had necrotic areas, accounting for 29.73%, the proportion of necrotic areas in the pulmonary tuberculosis group was higher than that in the pneumonia group ($P<0.05$); in the pulmonary tuberculosis group, 33 cases showed many intermittent ethmoidal necrosis in the lesion, accounting for 51.56%, while 24 cases showed large and orderly morphology of necrosis, accounting for 37.50%, and 7 cases showed almost complete necrosis in the lesion, accounting for 10.94%. In the pneumonia group, 2 cases showed large flake necrosis with relatively regular shape, accounting for 18.18%, and 9 cases showed small flake necrosis with relatively regular shape, accounting for 81.82%, there was statistical difference between the two groups ($P<0.05$); there was no significant difference between the two groups in the time of beginning enhancement of normal lung tissue and the time of beginning enhancement of lesion under CEUS ($P>0.05$). *Conclusion* The conventional ultrasound examination of pulmonary tuberculosis lesions showed "waterfall sign", and contrast-enhanced ultrasound examination showed that the necrotic area was large, and most of them were large flaky necrotic, conventional ultrasound examination of bacterial pneumonia lesions is "fragmentation", the necrotic area is small, and the shape is more regular, the above characteristics can be used as a sign to distinguish the two diseases.

Keywords: Conventional Ultrasound; Contrast Ultrasound; Subpleural Tuberculosis; Bacterial Pneumonia; Imaging Features

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肺结核患者的症状多为咳嗽、咳痰、高热等,上述症状与细菌性肺炎的典型症状较为相似。目前临床多通过CT、X线对典型肺结核进行诊断,但由于不典型肺结核的影像学表现多种多样,容易与细菌性肺炎混淆,增加了诊断的难度,出现漏诊、误诊的概率较高;且由于CT检查存在辐射,会使患者机体受损[1-2]。近年来有学者的研究表明,超声检查技术可较好地应用于肺部疾病的诊断中[3]。作为近年来发展起来的一种超声新技术,超声造影主要是采用超声对比剂在血管中的增强作用,从而评估病灶的微循环,从而可在贴壁周围型病灶的诊断中被应用[4]。已有学者在对良恶性病灶的诊断中,应用了超声造影开始增强的时间差,效果显著[5]。鉴于此,本研究主要分析了常规超声联合超声造影对胸膜下肺结核、细菌性肺炎的检查影像特征,现作如下报道。

1 资料与方法

1.1 一般资料 选择于本院确诊的115例胸膜下肺结核或细菌性肺炎患者,其中有78例胸膜下肺结核患者,将其作为肺结核组;剩余37例患者确诊为细菌性肺炎,将其作为肺炎组。肺结核组中男42例,女36例;年龄35~60岁,平均(49.80±2.56)岁。肺炎组患者中男25例,女12例;年龄36~62岁,平均(50.03±3.02)岁。纳入标准:经超声检查可显示胸膜下病灶,且图像较为清晰者;肺炎组患者经痰培养两次均分离出相同的病原菌而确诊者等。排除标准:存在心肺功能障碍者;患有肿瘤疾病者;存在肝肾功能障碍者等。

1.2 检查方法 所有患者采用超声诊断仪行常规超声检查,检查患者病灶的大小、位置等,之后调整至超声造影模式,设置机械指数、造影增益为合适的数值,静脉注射1.5 mL注射用六氟化硫微泡,之后用0.9%氯化钠溶液将管进行冲洗,采集图像。记录病灶的开始增强、达峰、消退情况,设置感兴趣区后作时间-强度曲线,对超声造影检查的各项定量参数进行记录,并记录60s、120s等时的增强强度,并计算病灶与正常肺组织的开始增强时间之差。对本次研究中图像进行分析的均为经验较为丰富的医师,且进行分析后交给上级进行复核,已保证图像分析的准确性。

1.3 观察指标 ①分析采用常规超声检查的影像学表现。②对超声造影下检查的增强模式、造影开始增强时间、坏死区表现进行分析,其中增强模式包括离心型、向心型等,以及两者均有;病灶、正常肺组织的开始增强时间之差在2.5 s以上为暗增强,在2.5 s以下为早增强[6]。

1.4 统计学方法 应用SPSS 23.0统计软件,计量资料以($\bar{x}$±s)表达,采用t检验,计数资料以[例(%)]表示,采用x^2检验,$P<0.05$为差异有统计学意义。

2 结 果

2.1 常规超声检查的影像学表现 肺结核组78例患者胸膜下肺结核病灶中,左肺31个,右肺47个;平均(4.08±1.50)cm;52例呈楔形,占比66.67%;21例呈类圆形,占比26.92%;5例为不规则形,占比6.41%。肺炎组37例患者中左肺20个,右肺17个;平均(4.28±1.60)cm;23例为楔形,占比62.16%;14例为类圆形,占比37.84%,将两组患者形态进行对比,无明显统计学差异(x^2=3.432,P=0.064)。

对患者进行扫查发现,病灶深部、后方含气肺组织可看到高回声,而边缘形状不规则、形态较为杂乱的高回声又被称之为"碎片征",肺结核组中出现碎片征的患者有24例,占比30.77%,在肺炎组中有30例,占比81.08%,将两组患者上述数值进行对比,肺炎组患者中碎片征的占比相较于肺结核组升高(x^2=25.504,$P<0.001$)。边缘较为规整,后方出现彗星尾征的高回声为瀑布征,肺结核组患者中瀑布征的占比为62.82%(49/78),相较于肺炎组患者中的占比16.22%(6/37)上升(x^2=21.844,$P<0.001$)。

2.2 超声造影的影像学表现

2.2.1 增强模式 肺炎组患者中有34例患者的病灶为离心型增强模式,占比91.89%,而其余3例则为局部向整体的增强模式;肺结核组患者中有55例为离心型增强模式,占比70.51%,13例患者为向心型增强模式,占比16.67%;10例患者表现为离心型、向心型均存在的增强模式,占比12.82%,将两组患者增强模式占比进行对比,差异有统计学意义(x^2=7.547,P=0.006)

2.2.2 造影开始增强时间 肺结核组中的病灶出现早增强的有73例,占比93.59%,肺炎组中的病灶出现早增强的有34例,占比91.89%;而肺结核组、肺炎组中出现晚增强的分别有5、3例,占比分别为6.41%、8.11%,经比较,无明显差异(x^2=0.112,P=0.738)。

2.2.3 坏死区表现 肺结核组患者中共有64例出现坏死区,占比82.05%,肺炎组患者中共有11例出现坏死区,占比29.73%,经比较,肺结核组患者的坏死区占比相较于肺炎组升高(x^2=30.285,$P<0.001$)。肺结核组患者中有33例呈现为病灶内有许多间断的筛孔样坏死,占比51.56%,而24例则呈现为形态较为规整的大片状坏死,占比37.50%,7例则呈现为病灶内几乎完全坏死,占比10.94%;肺炎组患者中有2例为形状规则的大片状坏死,占比18.18%,9例呈现为形态较为规整的小片状坏死,占比81.82%,经对比,两组间有统计学差异(x^2=7.634,P=0.006)。

2.2.4 胸膜下肺结核、细菌性肺炎超声造影定量指标 两组患者超声造影下病灶增强强度减半时间、病灶增强峰值强度等指标进行对比,均无明显差异(均$P>0.05$),见表1。

表1 胸膜下肺结核、细菌性肺炎超声造影定量指标比较

指标	肺结核组(78例)	肺炎组(37例)	t值	P值
正常肺组织开始增强时间(s)	6.70±2.10	5.80±2.70	1.953	0.053
病灶开始增强时间(s)	8.50±2.24	7.91±3.64	1.069	0.287
病灶与正常肺组织开始增强时间差(s)	1.51±0.45	1.70±0.68	1.782	0.078
病灶增强强度减半时间(s)	152.54±25.54	146.15±18.25	1.364	0.175
病灶增强峰值强度(dB)	-42.05±5.88	-43.04±5.91	0.842	0.402
病灶60 s增强强度(dB)	-48.02±7.04	-48.95±5.03	0.720	0.473
病灶120 s增强强度(dB)	-52.81±6.85	-54.64±5.01	1.450	0.150
病灶180 s增强强度(dB)	-57.65±5.78	-59.04±4.64	1.279	0.204

3 讨 论

肺结核的影像学表现多种多样,对于典型肺结核可通过CT、X线进行诊断,但对于不典型的肺结核,采用上述方法进行诊断时较易与细菌性肺炎混淆。既往研究显示,在对肺部疾病的诊断中,采用超声检查的临床价值不高[7]。但由于肺结核的病理变化可使正常肺含气结构遭受破坏,肺组织出现增生、渗出等,采用超声检查可清晰地显示胸膜下结节、肺不张等[8]。相较于CT、X线检查,超声检查虽不能较好地对肺内不贴壁病灶予以显示,但其对患者的创伤较小,且操作简单,因此在临床上应用较为广泛。

随着医学技术的不断进步,超声造影技术已不断地被应用于肺部疾病的诊断中。基于肺组织具有双重血供的特点,因此可以采用超声造影下开始增强的时间差对肺部肿瘤的良、恶性进行判断[9]。采用CT增强模式虽然也可以对病灶血供情况予以显示,但超声造影可对病灶、正常肺组织的开始增强时间、消退时间等进行测量,从而使诊断的准确性大大提高[10]。本研究对两组患者病灶开始增强时间、病灶-肺组织开始增强时间差等进行对比发现,无明显差异,表明了对肺结核与细菌性肺炎进行诊断无法将超声造影的病灶开始增强时间作为依据。本研究结果显示,病灶与正常肺组织碎片征、瀑布征、坏死区表现等均有统计学差异,提示