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超声弹性成像组织弥散定量分析诊断宫颈良恶性病变的临床效果*

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摘要 目的:探讨超声弹性成像组织弥散定量分析诊断宫颈良恶性病变中的临床效果。**方法:**选择2018年2月到2019年7月在我院诊治的宫颈病变患者88例,包括病理检查为良性病变68例(良性组)和恶性病变20例(恶性组)。所有患者都给予常规超声、多普勒血流超声与超声弹性成像组织弥散定量分析,记录影像学特征,分析诊断效果。**结果:**恶性组的超声血流分级2级和3级、超声弹性成像半定量评分4分和5分显著高于良性组($P<0.05$)。恶性组SR值显著高于良性组($P<0.05$)。超声弹性成像组织弥散定量诊断宫颈良恶性病变的敏感性与特异性分别为95.6%和95.0%。ROC曲线结果显示超声弹性成像组织弥散定量诊断宫颈良恶性病变的AUC值为0.914。**结论:**超声弹性成像组织弥散定量分析能有效诊断宫颈良恶性病变,敏感性与特异性均较高。

关键词:超声弹性成像;组织弥散定量;宫颈病变;血流分级;诊断效果

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Diagnostic Effects of Ultrasound Elastography Tissue Diffusion Quantitative Analysis on the Benign and Malignant Cervical Lesions*

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ABSTRACT Objective: To investigate the diagnostic clinical effects of ultrasound elastography tissue diffusion quantitative analysis in benign and malignant cervical lesions. **Methods:** 88 patients with cervical lesions were selected and treated in our hospital from February 2018 to July 2019, included 68 benign lesions (benign group) and 20 malignant lesions (malignant group). All patients were given conventional ultrasound, Doppler flow ultrasound and ultrasound elastography tissue diffusion quantitative analysis, recorded the imaging characteristics and were to judgment diagnosis. **Results:** Ultrasound blood flow grade 2 and 3, and ultrasound elastography semi-quantitative scores of 4 and 5 were significantly higher in the malignant group than in the benign group ($P<0.05$). The SR value of the malignant group were significantly higher than of the benign group ($P<0.05$). The sensitivity and specificity of ultrasound elastography tissue diffusion quantitative diagnosis and diagnosis of benign and malignant cervical lesions were 95.6% and 95.0%, respectively. The results of ROC curve showed that the AUC value of ultrasound elastography tissue diffusion quantitative diagnosis of benign and malignant cervical lesions was 0.914. **Conclusion:** Ultrasound elastography tissue diffusion quantitative analysis can effectively identify benign and malignant cervical lesions with high sensitivity and specificity.

Key words: Ultrasound elastography; Tissue diffusion quantification; Cervical lesions; Blood flow grading; Diagnostic effect

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前言

宫颈病变在临床上比较常见,其中良性病变包括宫颈肌瘤、宫颈息肉、宫颈病变等,恶性病变包括宫颈转移癌、宫颈癌等^[1,2],表现为宫颈组织反复充血、水肿及炎性细胞浸润等^[3]。随着宫颈病变早期筛查工作的推广,早诊早治得以实现,患者预后有了进一步的改善,但是随着宫颈病变发生率的增加,患者和医师对于诊断要求升高^[4]。

目前,宫颈病变的主要诊断方法包括内诊检查、阴道镜检查、超声检查等,以病理组织学检查作为金标准^[5,6]。而超声检查具有快捷、无创、方便、清晰等特点,常规的二维超声检查对已有形态学改变的宫颈有一定的诊断价值,但敏感性与特异性有待提高^[7,8]。彩色多普勒检查能显示宫颈的血流,但缺少形态学变化的判断依据。超声弹性成像作为一种超声新技术,通过分析组织硬度来判别良恶性,且可结合数字信号处理技术反映组织内部的差异,从而鉴别良恶性病变^[9,10]。但传统弹性成像不能

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定量诊断,因而诊断结果有一定的误差^[11,12]。组织弥散定量分析能够更加准确得到组织的弹性信息,具有明显的客观优势,所表达的组织弹性也更为准确^[13,14]。本研究主要探讨了超声弹性成像组织弥散定量分析诊断宫颈良性病变的临床效果,以期为早期鉴别宫颈良恶性病变提供参考依据。现将结果总结报道如下。

1 资料与方法

1.1 研究对象

选择 2018 年 2 月到 2019 年 7 月在我院诊治的宫颈病变患者 88 例,纳入标准:已婚女性;患者年龄 20-70 岁;有病理结果;有不同程度的下腹坠胀、白带增多或接触性出血;有完整的临床资料;无宫颈手术史;无其他恶性肿瘤史或放疗史;患者及家属愿意配合;获得了本院伦理委员会的批准。排除标准:精神系统疾者;妊娠及哺乳期者;严重肝、肾功能异常者。

88 例患者中,病理检查为良性病变 68 例(良性组),包括宫颈肌瘤 35 例、宫颈息肉 20 例、宫颈病变 13 例;年龄 24-67 岁,平均年龄(41.73±9.13)岁;平均病变组织直径(12.94±2.71) mm;平均体重指数(22.91±1.84) kg/m²。病理检查为恶性病变 20 例(恶性组),包括宫颈转移癌 17 例、宫颈癌 3 例;年龄 24-68 岁,平均年龄(41.67±5.92)岁;平均病变组织直径(12.11±1.22) mm;平均体重指数(22.43±1.22) kg/m²;临床分期: I 期 14 例, II 期 4 例, III 期 2 例;组织学分化:高分化 14 例,中分化 5 例,低分化 1 例。

1.2 超声方法

所有患者都给予常规超声、多普勒血流超声与超声弹性成像组织弥散定量分析,使用日本 Hitachi 公司的 HI VISION Preirus 超声诊断仪,配有经阴道腔内端扫式探头,频率 5.0-9.0 MHz。患者患者完善检查前准备取截石位,采用常规超声观察

宫颈病变特征,包括宫颈形态、厚度、血流分布状态、血供情况。再行多普勒血流成像,进行血流分级。0 级:病变组织内未见血流信号;1 级:病变组织内偶见 1-2 处点状、细棒状血流,管径<1 mm;2 级:病变组织内可见 3-4 个点状血管或一条重要血管;3 级:病变组织内点状血管数>5 条或两条重要血管。

然后启用弹性成像模式,操作者利用探头重复轴向轻微加压后放松,先探查病变组织,病变组织显示后将探头固定并在感兴趣区域采集影像,最后冻结并保存静态影像,同时将感兴趣区域放置于采集的弹性图中心进行半定量分析,1 分:病变组织整体或大部分显示为绿色;2 分:宫颈大部分区域为绿色,局部为不稳定蓝色,宫颈管清晰;3 分,病变组织内显示为绿色和蓝色所占比例相近;4 分:大致异常,蓝色区域大于红色区域,宫颈外轮廓存在;5 分,病变组织及周边组织均显示为蓝色内伴或不伴有绿色显示。定量分析:取宫颈病变区域后,勾勒感兴趣区域范围,然后选择周围毗邻正常组织,观察两个区域的弹性图像特征,并测定应变率比值(SR),测定 3 次取平均值。SR 以 4.045 为临界阈值,宫颈良性病变:SR<4.045,宫颈恶性病变:SR≥ 4.045。

1.3 统计学分析

应用 SPSS 19.00 软件对数据进行统计学分析,计数数据以%表示,组间比较行 χ^2 分析,以 $P<0.05$ 为差异具有统计学意义。计算曲线下面积 (Area under the curve, AUC), AUC 值 0.5-0.7 提示诊断效果不佳,0.7-0.9 提示具一定的诊断效果,>0.9 提示诊断效果较高。

2 结果

2.1 良性组和恶性组超声血流分级对比

恶性组的超声血流分级 2 级和 3 级显著高于良性组($P<0.05$)。见表 1。

表 1 两组超声血流分级对比(例,%)

Table 1 Comparison of the ultrasound blood flow grading between the two groups (n, %)

Groups	n	0 level	1 level	2 level	3 level
Benign group	68	23 (33.82)	35 (51.47)	6 (8.82)	4 (5.88)
Malignant group	20	0(0.00)	2(10.00)	3(15.00)	15(75.00)
χ^2		47.858			
P		0.000			

2.2 良性组和恶性组超声弹性成像半定量评分对比

恶性组的超声弹性成像半定量评分 4 分和 5 分显著高于良性组($P<0.05$)。见表 2。

2.3 良性组和恶性组超声弹性成像组织弥散定量对比

恶性组的 SR 值为 6.77±1.03,显著高于良性组(2.67±0.32, $P<0.05$)。

表 2 两组超声弹性成像半定量评分的对比(例,%)

Table 2 Comparison of semi-quantitative scores between two groups of ultrasound elastography (n, %)

Groups	n	1 Score	2 Score	3 Score	4 Score	5 Score
Benign group	68	34 (50.00)	30 (44.12)	3 (4.41)	1 (1.47)	0 (0.00)
Malignant group	20	0 (0.00)	0 (0.00)	0 (0.00)	12 (60.00)	8 (40.00)
χ^2				82.744		
P				0.000		

表 3 超声弹性成像组织弥散定量诊断宫颈良恶性病变的敏感性与特异性

Table 3 Sensitivity and specificity of ultrasound elastography tissue diffusion quantitative diagnosis of benign and malignant cervical lesions

Pathology	Ultrasound		Total
	Benign lesion	Malignant lesion	
Benign lesion	65	3	68
Malignant lesion	1	19	20
Total	66	22	88

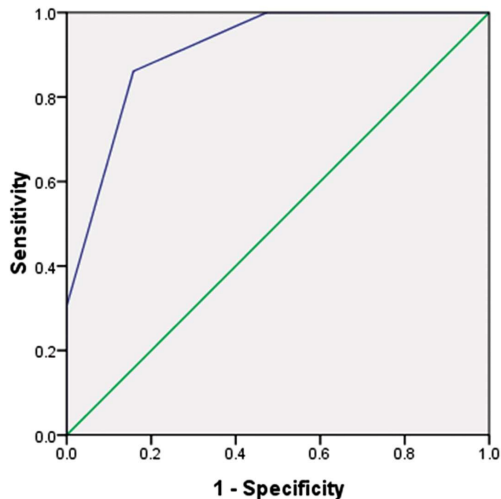


图 1 超声弹性成像组织弥散定量诊断宫颈良恶性病变的 ROC 曲线
Fig.1 ROC curve of ultrasound elastography tissue diffusion quantitative diagnosis of benign and malignant cervical lesions

2.4 超声弹性成像组织弥散定量的诊断效果

在 88 例患者中, 超声弹性成像组织弥散定量诊断为恶性病变 22 例, 良性病变 66 例, 超声弹性成像组织弥散定量诊断宫颈良恶性病变的敏感性与特异性 95.6%(65/68) 和 95.0%(19/20)。见表 3。接收者操作特征 (Receiver operating characteristic, ROC) 曲线结果显示超声弹性成像组织弥散定量诊断宫颈良恶性病变的 AUC 值为 0.914。

3 讨论

宫颈病变当前在临床上比较常见, 是中老年女性的主要疾病之一^[15], 其主要机制为子宫颈增大, 纤维结缔组织压迫腺管, 宫颈腺体管口被增生组织挤压, 分泌物不能外流而造成腺体扩张, 形成宫颈病变^[16,17]。良性宫颈病变发展为恶性宫颈病变的周期比较长, 但是早期症状不十分明显, 也无特殊体征, 在诊断时很容易漏诊^[18]。经阴道超声操作简便、无创, 可观察宫颈病变组织的形态、大小、血流分布等状况^[19]。特别是随着显像分辨率的不断更新, 能够清晰的显示细小血流^[20]。本研究显示恶性组的超声血流分级与良性组对比差异有统计学意义。从机制上分析, 恶性宫颈病变的组织细胞生长代谢旺盛, 对血液的需求大, 从而导致供血血管扩张, 导致血管的血流流速加快。但是对于部分病变组织位置过深、病变组织血流不丰富、病变组织直径过小, 难以探测血流信号而出现误诊和漏诊^[21]; 同时对于病变组织生长快, 有出现坏死的病变组织, 血流超声也很难探测血流信号。有一些恶性病变组织内的血流分布无特异性, 也会导致早期诊断效果下降^[22]。

生物组织具有弹性或硬度, 与病变组织的生物学特性相关, 从而有利于疾病诊断^[23]。弹性成像是组织施加一个内部或外部的刺激, 利用弹性力学的作用, 组织将会产生一个反应, 可在影像学上反映出来。超声弹性成像可根据宫颈组织间硬度和弹性系数的不同, 将组织受压前后回声信号移动变化进行显示, 从而有助于区分病变组织的良恶性^[24]。本研究显示恶性组的超声弹性成像半定量评分显著高于良性组, 主要在于良性病变组织较软, 应变较大, 弹性图像以较均匀的绿色为主; 恶性病变组织较硬, 应变减小, 弹性图像杂乱, 以蓝色为主^[25]。

宫颈恶性病变组织呈团块状融合且向周围浸润, 硬度大、弹性小, 与周围组织联系紧密, 受力后在弹性图像上反映出不同的表现^[26,27]。其中, SR 值通过组织弥散定量分析, 用良恶性病变组织的 SR 值来评价组织弹性有明显优势, 所表达的组织弹性也更为准确^[28,29]。本研究显示恶性组的 SR 值显著高于良性组; 超声弹性成像组织弥散定量诊断宫颈良恶性病变的敏感性与特异性 95.6%和 95.0%; ROC 曲线结果显示超声弹性成像组织弥散定量诊断宫颈良恶性病变的 AUC 值为 0.914, 诊断效果较高。因此, 宫颈病变的超声弹性成像组织弥散定量参数可在一定程度上反映宫颈病变严重程度^[30]。但其在临床实践中有局限性, 如对于出血坏死灶, 超声所见实性部分相对较少, 可导致假阳性情况的发生^[31]。同时, 本研究也存在一定的不足, 样本数量较少, 结果可能存在一定的偏倚, 后续还要根据病变状况合理采取多种诊断方法。

总之, 超声弹性成像组织弥散定量分析能有效反映宫颈良恶性病变的状况, 具有较高的诊断敏感性与特异性。

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