

doi: 10.13241/j.cnki.pmb.2019.09.025

弹性超声成像特征与宫颈癌病理学特征的相关性研究*

彭建美¹ 刘波^{1Δ} 朱娜² 于娇³ 管湘平¹ 付建莉¹

(1 陕西省人民医院超声科 陕西 西安 710068; 2 陕西省人民医院科研处 陕西 西安 710068;

3 陕西省人民医院放疗科 陕西 西安 710068)

摘要 目的:探讨宫颈癌弹性超声成像特征与病理学特征的相关性。**方法:**选择 2016 年 9 月到 2018 年 2 月在我院接受治疗的 50 例宫颈癌(宫颈癌组)与 190 例癌前病变患者(癌前组)为研究对象,所有患者都给予彩色多普勒超声与弹性超声成像,记录超声特征;调查宫颈癌患者的病理学特征并进行相关性分析。**结果:**癌前组中超声血流分型 I 型、II 型、III 型、IV 型分别为 160 例、26 例、4 例与 0 例,宫颈癌组分别为 0 例、6 例、20 例、24 例,两组超声血流分型分布比较差异有统计学意义($P<0.05$)。癌前组中弹性超声成像评分 1 分、2 分、3 分、4 分、5 分分别为 52 例、100 例、33 例、7 例、0 例,宫颈癌组分别为 0 例、2 例、6 例、12 例与 30 例,两组中弹性超声成像评分分布对比差异有统计学意义($P<0.05$)。在宫颈癌患者中,随着淋巴结转移、分化程度降低、临床分期增加,弹性超声成像评分显著增加,差异有统计学意义($P<0.05$)。弹性超声成像诊断 191 例癌前病变与 49 例宫颈癌,弹性超声成像鉴别诊断宫颈癌的敏感性为 100.0%,特异性为 98.0%。**结论:**弹性超声成像诊断与鉴别宫颈癌有很好的敏感性与特异性,与宫颈癌病理学特征有很好的相关性,可与彩色多普勒超声形成互补在临床上应用。

关键词:弹性超声成像;宫颈癌;癌前病变;相关性;病理学特征

中图分类号:R737.33;R445.1;R36 **文献标识码:**A **文章编号:**1673-6273(2019)09-1719-04

Correlation of the Characteristics of Elastography with the Pathological Features of Cervical Cancer*

PENG Jian-mei¹, LIU Bo^{1Δ}, ZHU Na², YU Jiao³, GUAN Xiang-ping¹, FU Jian-li¹

(1 Ultrasound department, Shaanxi People's Hospital, Xi'an, Shaanxi, 710068, China;

2 The scientific research department, Shaanxi People's Hospital, Xi'an, Shaanxi, 710068, China;

3 Radiotherapy Department, Shaanxi People's Hospital, Xi'an, Shaanxi, 710068, China)

ABSTRACT Objective: To investigate the correlation of elastography with the pathological features of cervical cancer. **Methods:** 50 cases of cervical cancer (cervical cancer group) and 190 precancerous lesions (precancerous group) were selected in our hospital from September 2016 to February 2018. All the patients were given color Doppler ultrasound and elastography, the characteristics of ultrasound were recorded, the pathological features of cervical cancer patients were investigated. **Results:** 160 cases of Type I, 26 cases of type II, 4 cases of type III and were, found in the precancerous group, while 6 cases of Type II, 20 cases of type III, 24 cases of type IV were found in the cervical cancer group, respectively, there were significant differences in the distribution of ultrasonic blood flow between two groups ($P<0.05$). Elastography score 1, 2, 3, 4 and 5 were found in 52, 100, 33, 7, 0 cases in the precancerous group and 0, 2, 6, 12, 30 cases in the cervical cancer group respectively, significant difference in the distribution of elastic ultrasonic imaging score was found between two groups ($P<0.05$). In patients with cervical cancer, with the metastasis of lymph node, the decrease of differentiation degree and the increase of clinical stage, the score of elastography was significantly increased ($P<0.05$). 191 cases of precancerous lesions and 49 cases of cervical cancer were diagnosed by elastography. The sensitivity and specificity of elastography in the differential diagnosis of cervical cancer were 100% and 98% respectively. **Conclusion:** Elastography had good sensitivity and specificity in the diagnosis and identification of cervical cancer, it has a good correlation with the pathological features of cervical cancer and can be complemented with color Doppler ultrasound in the clinical application.

Key words: Elastography; Cervical cancer; Precancerous lesion; Correlation; Pathological features

Chinese Library Classification(CLC): R737.33; R445.1; R36 **Document code:** A

Article ID: 1673-6273(2019)09-1719-04

前言

宫颈癌(cervical carcinoma)是女性生殖道最常见的恶性肿瘤,确诊时多为晚期,导致 5 年生存率在 60%左右^[1]。由于各种

* 基金项目:陕西省重点研发计划项目(2017SF-146)

作者简介:彭建美(1983-),女,硕士,主治医师,研究方向:妇产科超声诊断,E-mail:pengjianmei_1983@163.com

Δ 通讯作者:刘波(1982-),女,硕士,主治医师,研究方向:介入超声及肿瘤超声诊断,E-mail:pengjianmei_1983@163.com

(收稿日期:2018-08-06 接受日期:2018-08-31)

因素的影响,宫颈癌在我国发病人数逐年增加,也有显著低龄化的趋势^[2]。宫颈上皮内瘤变(CIN)是与宫颈癌密切相关的癌前病变,是宫颈癌的前期过程,其中有 30%的几率可发展为宫颈癌^[3-6]。人乳头状瘤病毒(HPV)持续感染是导致宫颈癌发生的主要因素,其发生与发展是个多阶段、多因素持续发展的过程^[7]。宫颈癌前病变在早期无明显临床症状,但是随着病情的发展,可导致宫颈癌的发生,因此,早期诊断有着重要意义。

目前,临床上检查宫颈癌的方法主要有 CT、超声、数字 X 线等^[8,9],以数字 X 线最为常用,但其对患者存在放射性损害等,而 CT、核磁共振的费用比较贵,应用也受到限制^[10,11]。随着超声技术的进步,其在宫颈疾病诊治方面起着越来越重要的作用^[12]。弹性成像原理及生理基础是从外部或内部激励软组织,不同的组织其弹性系数也不同,应变也不相同。根据组织的不同硬度,弹性超声成像可以显示出不同图像进行鉴别诊断^[13]。本研究主要探讨了宫颈癌弹性超声成像特征与病理学特征的相关性,现总结报道如下。

1 资料与方法

1.1 研究对象

采用回顾性、总结研究方法,研究时间为 2016 年 9 月到 2018 年 2 月,选择在我院接受治疗的 50 例宫颈癌(宫颈癌组)与 190 例癌前病变患者(癌前组)。纳入标准:病理确诊为宫颈癌或癌前病变;年龄 20-70 岁;临床与病理资料完整;医院伦理委员会批准了此次研究;入院前均未进行放疗、化疗及免疫抑制治疗;患者签署了知情同意书。排除标准:精神疾病患者;哺乳期和妊娠期妇女;临床资料缺项者。宫颈癌组:年龄最小 29 岁,最大 65 岁,平均年龄 56.22 ± 2.10 岁;平均病程 6.59 ± 1.29 年;平均体重指数为 $22.48 \pm 2.19 \text{ kg/m}^2$ 。癌前组:年龄最小 22 岁,最大 70 岁,平均年龄 57.92 ± 3.19 岁;平均病程 3.14 ± 1.02 年;平均体重指数 $23.09 \pm 1.84 \text{ kg/m}^2$ 。

1.2 超声方法

彩色超声:选择 GE E10 超声诊断仪,使用腔内探头,探头频率 5-9 MHz。让患者采取仰卧位,暴露宫颈组织,用直接接触法检查。观察病灶的内部回声、形态、大小,有无衰减;辅以侧卧位,然后在 CDFI 模式下放大局部进行观察,并嘱咐患者屏住呼吸。彩色超声模式下来观察患者病灶内部以及周围血流信号的分布与形态,寻找血流最丰富的切面,计算血管条数,进行血

流分型。

弹性超声成像:选择 GE E10 超声诊断仪,使用腔内探头,探头频率 5-9 MHz。让患者采取仰卧位,将宫颈完全露出,通过弹性超声成像来检查患者病灶,将观察部位放大至病灶范围两倍以上,使用探头来加压与解压,从而得到稳定与清晰的弹性图像。

1.3 观察指标

超声血流分级标准: I 型:肿块内部以及周边没有发现血流信号; II 型:出现少量血流,一条小血管或数个星点形状的血流信号; III 型:出现中量血流,有 2 条或 3 条血管,伸入或环绕病灶内部,相对粗大; IV 型:有 4 条或以上血管向病灶内延伸,相互交织成血管网,丰富血流。 I 型 + II 型判断宫颈癌前病变, III 型 + IV 型判断为宫颈癌。

弹性超声成像判定:按照五分法来评定弹性图像的表现,其中,5 分:患者病灶区被蓝色完全覆盖;4 分:患者病灶区被蓝色完全覆盖;3 分:患者病灶区蓝色与绿色共存,主要为蓝色,周边区域呈现绿色;2 分:患者病灶区蓝色与绿色共存,主要为绿色;1 分:患者病灶与周围组织都表现为绿色。评分在 1 到 3 分的可以确诊为宫颈癌前病变,评分在 4 到 5 分的确诊为宫颈癌。

全部患者的超声检查、记录及诊断均由同一小组完成。

1.4 统计学方法

采用软件 SPSS20.00 对本研究的计量数据与计数数据分析,通过百分比来描述计数数据,通过均数 $\pm$ 标准差($\bar{x} \pm s$)来描述计量资料,组间比较分别采用 χ^2 检验、t 检验,以 $P < 0.05$ 为差异具有统计学意义。

2 结果

2.1 宫颈癌患者的病理特征

在宫颈癌组 50 例患者中,临床分期: I 期 22 例, II 期 18 例, III 期 10 例;组织学分级:高分化 25 例,中分化 15 例,低分化 10 例;有转移者 20 例,无转移者 30 例;病理类型:鳞癌 45 例,腺癌 5 例。

2.2 癌前组和宫颈癌组的超声血流特征对比

癌前组中超声血流分型 I 型、II 型、III 型、IV 型分别为 160 例、26 例、4 例与 0 例,宫颈癌组分别为 0 例、6 例、20 例、24 例,两组超声血流分型分布比较差异有统计学意义($P < 0.05$),见表 1。

表 1 两组超声血流特征对比

Table 1 Comparison of the characteristics of ultrasound blood flow between two groups

Groups	n	Type I	Type II	Type III	Type IV
Precancerous group	190	160(84.2%)	26(13.7%)	4(2.1%)	0(0.0%)
Cervix cancer group	50	0(0.0%)	6(12.0%)	20(40.0%)	24(48.0%)
P		0.000			

2.3 癌前组和宫颈癌组的弹性超声成像评分对比

癌前组中弹性超声成像评分 1 分、2 分、3 分、4 分、5 分分别为 52 例、100 例、33 例、7 例、0 例,宫颈癌组分别为 0 例、2 例、6 例、12 例与 30 例,两组弹性超声成像评分分布比较差异有统计学意义($P < 0.05$)。见表 2。

2.4 宫颈癌患者的病理学特征与弹性超声成像特征的相关性

宫颈癌患者中,随着淋巴结转移、分化程度降低、临床分期增加,弹性超声成像评分显著增加,差异有统计学意义($P < 0.05$)。见表 3。

表 2 两组弹性超声成像评分对比

Table 2 Comparison of the characteristics of elastic ultrasound imaging scores between two groups

Groups	n	1 points	2 points	3 points	4 points	5 points
Precancerous group	190	52(27.4%)	100(52.6%)	33(17.4%)	7(3.7%)	0(0.0%)
Cervix cancer group	50	0(0.0%)	2(4.0%)	6(12.0%)	12(24.0%)	30(60.0%)
P				0.000		

表 3 宫颈癌病理学特征与弹性超声成像特征的相关性

Table 3 Correlation of the pathological features of cervical cancer with the characteristics of elastography

Pathological features	Cases (n=50)	The score of elastography (score)	P
Clinical stage - stage I	22	2.31± 0.62	0.008
stage II	18	3.56± 0.39	
stage III	10	4.52± 1.33	
Histological grade-well differentiated	25	2.54± 1.42	0.017
moderately differentiated	15	3.29± 1.49	
poorly differentiated	10	4.28± 1.40	
Lymph node metastasis -have	20	4.52± 0.44	0.009
have not	30	3.01± 0.32	
Pathological type -Squamous cell carcinoma	45	3.55± 0.91	0.665
Adenocarcinoma	5	3.67± 0.49	

2.5 弹性超声成像对宫颈癌的诊断价值

在 240 例患者中,弹性超声成像诊断为 191 例癌前病变与

49 例宫颈癌,诊断敏感性为 100.0%(190/190),特异性为 98.0%(49/50)。见表 4。

表 4 弹性超声成像诊断宫颈癌的敏感性与特异性

Table 4 The sensitivity and specificity of elastography for the diagnosis of cervical cancer

Pathology	Elastography Precancerosis	Cervical carcinoma	Total
Precancerosis	190	0	190
Cervical carcinoma	1	49	50
Total	191	49	

3 讨论

我国当前每年新增宫颈癌病例约 15 万人^[14],虽然近年来宫颈癌的诊治技术均有改进,但患者的 5 年生存率仍不令人满意,针对宫颈癌进行的靶向治疗具有重要的临床意义。HPV 持续感染是宫颈癌及癌前病变的主要因素,但多个异常的信号转导途径也可引起某些基因异常扩增,导致宫颈癌及癌前病变的形成^[15,16]。宫颈癌及癌前病变的发生与发展是个多因素、多阶段过程,因此其早期诊治尤其重要^[17]。

超声检查具有无创、简便、价格低等优点,能够早期检出宫颈癌。目前,二维超声已可检出 0.5-1.0 cm 大小的病灶,癌前病变规则、边缘光滑、多有包膜;宫颈癌病灶形态不规则,有微钙点,后方回声有衰减,边缘呈锯齿样或蟹足样,有周围组织浸润^[18]。但常规超声对较小病灶、不典型病灶的宫颈疾病难以定性诊断^[19]。彩色多普勒超声能够根据肿瘤内血管数量、血流速度、肿瘤内血管阻力等参数作为各种宫颈癌的鉴别指标^[20]。本研究显示癌前组、宫颈癌组超声血流显像分型分布比较差异有统计学意

义,当前血流显像可利用彩色编码红细胞散射能量的积分,将血流的显示范围放大至或低于机器的杂音水平,从而使杂音的变异度降低,增强显像的敏感度,尤其适用于研究肿瘤的血流特点^[21]。

弹性超声成像技术是最近几年才提出的一种新型技术,能够按照病灶的颜色评分。一般而言,宫颈癌的硬度是癌前病变的两倍到三倍。宫颈癌的弹性图像是蓝色或周边呈现蓝色,宫颈癌中髓样癌,其内癌细胞含量较纤维间质丰富,但弹性图可能只呈现 2-3 分声像^[22]。此次研究显示癌前组和宫颈癌组弹性超声成像评分分布比较差异有统计学意义。弹性成像图像可以明确的显示病灶边界,提高病灶轮廓的清晰度及病变组织的辨识度,减少漏诊^[23]。

宫颈癌的转移、低分化等是宫颈癌患者死亡的主要原因,也是恶性肿瘤的最主要特征^[24]。本研究显示在宫颈癌患者中,随着淋巴结转移、分化程度降低、临床分期增加,弹性超声成像评分显著增加。此外,弹性超声成像鉴别诊断宫颈癌的敏感性为 100.0%,特异性为 98.0%。从机制上分析,大部分宫颈癌的组

成为硬度较大的病变组织,跟周边结构粘连,降低了活动性,使得触诊效果不佳,而弹性超声成像能够在诊断宫颈癌时提供重要依据^[25-27]。但在超声扫描中,弹性成像彩色敏感性要设置在背景彩色刚好被抑制小血管能够被探查到的水平^[28-30]。

总之,弹性超声成像诊断与鉴别宫颈癌具有很好的敏感性与特异性,与宫颈癌病理学特征有显著的相关性,可与彩色多普勒超声形成互补在临床上应用。

参考文献(References)

- [1] Chung T, DO SI, Na K, et al. Stromal p16Overexpression in Gastric-type Mucinous Carcinoma of the Uterine Cervix [J]. *Anticancer Res*, 2018, 38(6): 3551-3558
- [2] Miyazaki A, Nakai H, Sonoda T, et al. LpMab-23-recognizing cancer-type podoplanin is a novel predictor for a poor prognosis of early stage tongue cancer[J]. *Oncotarget*, 2018, 9(30): 21156-21165
- [3] Zhu Y, Zhang G, Yang Y, et al. Perineural invasion in early-stage cervical cancer and its relevance following surgery[J]. *Oncol Lett*, 2018, 15(5): 6555-6561
- [4] Turashvili G, Morency EG, Kracun M, et al. Morphologic Features of Gastric-type Cervical Adenocarcinoma in Small Surgical and Cytology Specimens[J]. *Int J Gynecol Pathol*, 2018, 5(10): 989-992
- [5] Takamoto D, Kawahara T, Kasuga J, et al. The analysis of human papillomavirus DNA in penile cancer tissue by in situ hybridization[J]. *Oncol Lett*, 2018, 15(5): 8102-8106
- [6] Fathy A, Abdelrahman AE. EZH2, Endothelin-1, and CD34 as Biomarkers of Aggressive Cervical Squamous Cell Carcinoma: An Immunohistochemical Study [J]. *Turk Patoloji Derg*, 2018, 34 (2): 150-157
- [7] Marek T, Howe BM, Amrami KK, et al. Perineural Spread of Non-melanoma Skin Cancer to the Brachial Plexus: Identifying Anatomic Pathway(s)[J]. *World Neurosurg*, 2018, 1(114): e818-e823
- [8] Missaoui N, Mestiri S, Bdioui A, et al. HPV infection and p16(INK4A) and TP53 expression in rare cancers of the uterine cervix [J]. *Pathol Res Pract*, 2018, 214(4): 498-506
- [9] Iype EM, Santhosh Kumar N, et al. Clinicopathological Factors of Cervical Nodal Metastasis and the Concept of Selective Lateral Neck Dissection in the Surgical Management of Carcinoma Larynx and Hypopharynx and Its Outcome[J]. *Indian J Surg Oncol*, 2018, 9(1): 24-27
- [10] Tate K, Yoshida H, Ishikawa M, et al. Prognostic factors for patients with early-stage uterine serous carcinoma without adjuvant therapy[J]. *J Gynecol Oncol*, 2018, 29(3): e34
- [11] Boyraz G, Atalay FO, Salman MC, et al. Comparison of Mayo and Milwaukee Risk Stratification Models for Predicting Lymph Node Metastasis in Endometrial Cancer [J]. *Int J Gynecol Cancer*, 2018, 28 (5): 869-874
- [12] Saadi R, LaRusso S, Vijay K, et al. Elastography as a potential modality for screening cervical lymph nodes in patients with papillary thyroid cancer: A review of literature [J]. *Ear Nose Throat J*, 2018, 97 (1-2): 31-39
- [13] Xu Y, Zhu L, Liu B, et al. Strain elastography imaging for early detection and prediction of tumor response to concurrent chemo-radiotherapy in locally advanced cervical cancer: feasibility study[J]. *BMC Cancer*, 2017, 17(1): 427
- [14] Ma X, Li Q, Wang JL, et al. Comparison of elastography based on transvaginal ultrasound and MRI in assessing parametrial invasion of cervical cancer[J]. *Clin Hemorheol Microcirc*, 2017, 66(1): 27-35
- [15] Chen BB, Li J, Guan Y, et al. The value of shear wave elastography in predicting for undiagnosed small cervical lymph node metastasis in nasopharyngeal carcinoma: A preliminary study [J]. *Eur J Radiol*, 2018, 6(103): 19-24
- [16] Brar H, Hogen L, Covens A. Cost-effectiveness of sentinel node biopsy and pathological ultrastaging in patients with early-stage cervical cancer[J]. *Cancer*, 2017, 123(10): 1751-1759
- [17] Jondal DE, Wang J, Chen J, et al. Uterine fibroids: correlations between MRI appearance and stiffness via magnetic resonance elastography[J]. *Abdom Radiol (NY)*, 2018, 43(6): 1456-1463
- [18] You J, Chen J, Xiang F, et al. The value of quantitative shear wave elastography in differentiating the cervical lymph nodes in patients with thyroid nodules[J]. *J Med Ultrason* (2001), 2018, 45(2): 251-259
- [19] Mukama T, Ndejjo R, Musabyimana A, et al. Women's knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda[J]. *Bmc Womens Health*, 2017, 17(1): 9
- [20] Lin W, Jing J, Lu L, et al. Predictive value of hematological markers of systemic inflammation for managing cervical cancer[J]. *Oncotarget*, 2017, 8(27): 44824-44832
- [21] Chen B B, Li J, Guan Y, et al. The Value of Shear Wave Elastography in Predicting for Undiagnosed Small Cervical Lymph Node Metastasis in Nasopharyngeal Carcinoma: A Preliminary Study [J]. *European Journal of Radiology*, 2018, 103(3): 19-24
- [22] Tugut E, Celenk C, Tanrivermis S A, et al. Efficiency of B-mode Ultrasound and Strain Elastography in Differentiating Between Benign and Malignant Cervical Lymph Nodes[J]. *Ultrasound Quarterly*, 2017, 33(3): 201
- [23] Oturina V, Hammer K, Möllers M, et al. Assessment of cervical elastography strain pattern and its association with preterm birth[J]. *Journal of Perinatal Medicine*, 2017, 50(8): 925-932
- [24] You J, Chen J, Xiang F, et al. The value of quantitative shear wave elastography in differentiating the cervical lymph nodes in patients with thyroid nodules [J]. *Journal of Medical Ultrasonics*, 2017, 45(2): 1-9
- [25] Hejman J, Sedláčková Z, Vachutka J, et al. Differential Diagnosis of Parotid Gland Tumors: Role of Shear Wave Elastography[J]. *Biomed Research International*, 2017, 2017(3): 1-6
- [26] Choi S, Ko H, Shin J, et al. EP22.03: Cervical elastography for predicting the time to delivery[J]. *Ultrasound in Obstetrics & Gynecology*, 2017, 50(S1): 358-359
- [27] Dias T, Velautham S, Pathiraja M. EP18.05: Cervical elastography in high-risk pregnancy for preterm birth treated with cervical cerclage [J]. *Ultrasound in Obstetrics & Gynecology*, 2017, 50(S1): 343-343
- [28] Podobnik M, Brlecic P P, Vuković B G. EP18.13: Transvaginal 3D ultrasonography and quantitative elastography of the uterine cervix as a predictor of cervical incompetency and preterm delivery[J]. *Ultrasound in Obstetrics & Gynecology*, 2017, 50(S1): 346-346
- [29] Park H, Kwak D, Choi E, et al. EP18.11: Addition of cervical elastography may increase preterm delivery prediction performance in pregnancies with short cervix: a prospective study [J]. *Ultrasound in Obstetrics & Gynecology*, 2017, 50(S1): 345-346
- [30] Nagai R. OP12.11: Prediction of cervical changes and premature birth by cervical image pattern analysis using real-time tissue elastography [J]. *Ultrasound in Obstetrics & Gynecology*, 2017, 50(S1): 87-87