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## 彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性的应用价值\*

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**摘要 目的:**探讨彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性的应用价值。**方法:**选择 2018 年 2 月至 2019 年 8 月在本医院诊治的卵巢癌患者 548 例作为研究对象,所有患者都给予彩色多普勒超声,评估患者的周围血管受侵程度及可切除性,记录患者的超声血流频谱。**结果:**超声诊断为卵巢癌周围血管受侵犯 78 例,占比 14.2%,诊断敏感性与特异性为 97.5%和 100.0%,ROC 曲线面积为 0.963。超声诊断为卵巢癌可切除 450 例,占比 82.1%,诊断敏感性与特异性为 99.1%和 90.4%,ROC 曲线面积为 0.897。手术切除患者的年龄、体重指数、病理类型、病程等与未手术切除患者对比差异无统计学意义( $P>0.05$ )。手术切除患者的搏动指数(pulsation index, PI)和阻力指数(resistance index, RI)高于非手术切除患者,血管舒张末期流速(end-diastolic velocity, EDV)、峰值流速(peak systolic velocity, PSV)低于非手术切除患者,差异均有统计学意义( $P<0.05$ )。**结论:**彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性具有很好的敏感性与特异性,有利于指导卵巢癌患者的病情评估与治疗。

**关键词:**彩色多普勒超声;卵巢癌;周围血管受侵;可切除性;血流频谱

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## Application Value of Color Doppler Ultrasound for the Evaluation of Invasion Degree and Resectability of Blood Vessels Around Ovarian Cancer\*

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**ABSTRACT Objective:** To explore the application value of color Doppler ultrasound for assessing the degree of vascular invasion and resectable surrounding ovarian cancer. **Methods:** From February 2018 to August 2019, 548 cases of patients with ovarian cancer diagnosed and treated in our hospital were selected as the research object. All patients were given color Doppler ultrasound to assess the degree of invasion and resectability of the patients' peripheral blood vessels, the patient's ultrasound blood flow spectrum were recorded. **Results:** 78 cases of ovarian cancer with vascular invasion were diagnosed by ultrasonography, accounted for 14.2%, the diagnostic sensitivity and specificity were 97.5% and 100.0%, and the ROC curve area was 0.963. 450 cases of ovarian cancer resectable were diagnosed by ultrasonography, accounted for 82.1%, the diagnostic sensitivity and specificity were 99.1% and 90.4%, and the ROC curve area was 0.897. There was no significant difference in the age, body mass index, pathological type, course of disease, etc. between patients who were surgically resected and those who were not surgically resected. The pulsation index (PI) and resistance index (RI) of surgically resected patients were higher than those of non-surgical resection patients, and the end-diastolic velocity (EDV) and peak systolic velocity (PSV) of surgically resected patients were lower than those of non-surgical resection patients. **Conclusion:** Color Doppler ultrasound have good sensitivity and specificity for evaluating the degree of vascular invasion and resectable surrounding ovarian cancer, which were helpful to guide the judgment and treatment of patients with ovarian cancer.

**Key words:** Color Doppler ultrasound; Ovarian cancer; Peripheral blood vessel invasion; Resectable; Blood flow spectrum

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### 前言

卵巢癌是临床上最常见的妇科恶性肿瘤之一,具有很高的致死率<sup>[1,2]</sup>。该病的早期临床症状不典型,给临床诊断造成较大困难,因此很多患者在就诊时已属晚期,周围血管已经被浸润,

错过了手术治疗时期,使得 5 年生存率很少超过 40%,表明临床早期筛查与诊断具有重要价值<sup>[3,4]</sup>。手术切除仍然是治疗卵巢癌的首选方法,但是许多患者由于存在一定的禁忌症,手术风险比较大<sup>[5]</sup>。有研究表明对于肿瘤包膜完整、无转移、无大血管侵犯的部分卵巢癌患者,可在临床上给予手术治疗,为此评估

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卵巢癌周围血管受侵程度及可切除性 also 具有重要意义<sup>[6,7]</sup>。

临床上筛查卵巢癌的常规方法主要二维超声、X 线与血清肿瘤标志物测定,但是上述方法在临床上的应用受影响因素多,诊断的灵敏性与准确性较差,对于临床治疗的指导意义相对比较差<sup>[8,9]</sup>。因此,在临床上需要探讨一种科学、准确的诊断方法,以期改善卵巢癌患者的预后。彩色多普勒为技术成熟的影像学检查手段,可以提供清晰的血流图像,也可观察卵巢的空间立体解剖关系,也可以模拟卵巢切除术,并通过检测血流参数为卵巢癌的诊治提供参考建议<sup>[10,11]</sup>。本研究探讨了彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性的价值,以期临床诊断卵巢癌提供理论依据,现总结报道如下。

## 1 资料与方法

### 1.1 研究对象

选择 2018 年 2 月至 2019 年 8 月在本院诊治的卵巢癌患者 548 例作为研究对象,纳入标准:组织病理学诊断为卵巢癌;临床与随访资料完整;患者签署了知情同意书;本院伦理委员会批准了此次研究;临床主要表现为阴道出血、阴道分泌物增多、下腹部胀痛等;年龄 20~70 岁。排除标准:合并心、肝、肾等重大脏器病变;精神意识障碍患者;合并其他部位恶性肿瘤者;妊娠与哺乳期妇女;临床资料缺乏者。

### 1.2 彩色多普勒超声方法

所有患者都给予彩色多普勒超声,使用美国 GE E8 型彩色多普勒超声诊断仪,经阴道探头频率为 5~9 MHz。患者取截石位,检查前嘱患者排空尿液,将阴式探头套上一次性安全套,置入阴道内。常规记录卵巢癌病灶所在部位、大小、边缘、内部血

流状况、数目等特点,记录脉管有无癌栓,详细观察卵巢癌周围血管受侵程度与有无淋巴结转移等。然后启用彩色多普勒模式,待血流频谱图像稳定后,测定与记录动脉血管舒张末期流速(end-diastolic velocity, EDV)、搏动指数(pulsation index, PI)、峰值流速(peak systolic velocity, PSV)、阻力指数(resistance index, RI)等指标,所有参数连续测定 3 个稳定周期,取各参数的平均值。

### 1.3 判断指标

由两位影像诊断医师(工龄≥ 5 年,职称为副主任医师及以上)共同对原始图像及血管图像进行分析,明确卵巢癌周围血管受侵程度。卵巢癌可切除标准:肿瘤包膜完整、无淋巴结转移、无肝癌周围血管受累、无大血管侵犯和癌栓形成。

### 1.4 统计学分析

选择 SPSS 19.00 软件对本研究所有数据进行分析,计量资料以均数± 标准差表示,两组比较行独立样本 t 检验;计数数据以百分比表示,组间对比采用  $\chi^2$  检验,以  $P < 0.05$  为差异有统计学意义。

## 2 结果

### 2.1 卵巢癌周围血管受侵犯的程度

在 548 例患者中,彩色多普勒超声可清楚观察病灶部位主干及分支的位置关系以及血管受侵犯程度。超声诊断为卵巢癌周围血管受侵犯 78 例,占比 14.2%;病例诊断为卵巢癌周围血管受侵犯 80 例。因此,超声评估卵巢癌周围血管受侵犯的敏感性与特异性为 97.5%(78/80)和 100.0%(468/468),见表 1。

表 1 彩色多普勒超声评估卵巢癌周围血管受侵程度的敏感性与特异性(n=548)

Table 1 Sensitivity and specificity of color Doppler ultrasound in evaluating the degree of vascular invasion around ovarian cancer (n=548)

| Pathology                                 | Color doppler ultrasound             |                                           | Total |
|-------------------------------------------|--------------------------------------|-------------------------------------------|-------|
|                                           | Invasion of peripheral blood vessels | Surrounding blood vessels are not invaded |       |
| Invasion of peripheral blood vessels      | 78                                   | 2                                         | 80    |
| Surrounding blood vessels are not invaded | 0                                    | 468                                       | 468   |
| Total                                     | 78                                   | 470                                       | 548   |

### 2.2 卵巢癌可切除性

在 548 例患者中,超声诊断为卵巢癌可切除 450 例,占比 82.1%;实际进行手术切除 444 例,超声评估卵巢癌可切除性

的敏感性与特异性为 99.1%(440/444)和 90.4%(94/104),见表 2。

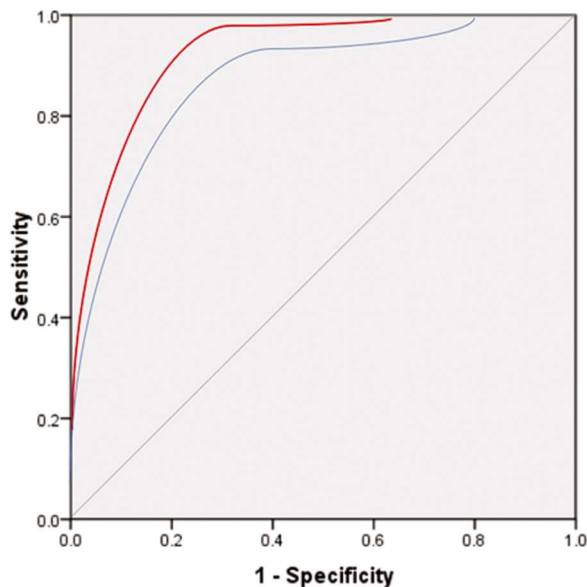
表 2 彩色多普勒超声评估卵巢癌可切除性的敏感性与特异性(n=548)

Table 2 Sensitivity and specificity of color Doppler ultrasound to evaluate the resectability of ovarian cancer (n=548)

| Clinical     | Color doppler ultrasound |              | Total |
|--------------|--------------------------|--------------|-------|
|              | Resectable               | Irresectable |       |
| Resectable   | 440                      | 4            | 444   |
| Irresectable | 10                       | 94           | 104   |
| Total        | 450                      | 98           | 548   |

### 2.3 彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性的 ROC 曲线

超声评估卵巢癌周围血管受侵犯的 ROC 曲线面积为 0.963,超声评估卵巢癌可切除的 ROC 曲线面积为 0.897,见图 1。



- color Doppler ultrasound in evaluating the degree of vascular invasion around ovarian cancer

- color Doppler ultrasound to evaluate the resectability of ovarian cancer

图1 彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性的ROC曲线

Fig.1 ROC curve of color Doppler ultrasound to assess the degree of vascular invasion and resectable surrounding ovarian cancer

## 2.4 彩色多普勒超声血流参数对比

表3 两组彩色多普勒超声血流参数对比( $\bar{x} \pm s$ )

Table 3 Comparison of the color Doppler ultrasound blood flow parameters between the two groups ( $\bar{x} \pm s$ )

| Groups                | n   | PSV(cm/s)         | EDV(cm/s)         | PI               | RI               |
|-----------------------|-----|-------------------|-------------------|------------------|------------------|
| Exairesis             | 444 | 23.11 $\pm$ 1.48* | 10.44 $\pm$ 2.18* | 1.44 $\pm$ 0.22* | 0.87 $\pm$ 0.11* |
| Unsururgical excision | 104 | 27.87 $\pm$ 1.42  | 15.09 $\pm$ 1.82  | 0.81 $\pm$ 0.17  | 0.42 $\pm$ 0.09  |

Note: Compared with the unsururgical excision, \* $P < 0.05$ .

卵巢癌组织在局部发展的过程中,癌细胞处于高代谢状态,此时需要大量的营养环境支持与新生血管生成,可导致血流灌注增加与血管阻力降低<sup>[22,23]</sup>。如果卵巢癌所有病灶不能切除,手术治疗就无意义,因此术前评价可切除性意义重大。传统的肿瘤分期是评估卵巢癌患者手术切除的主要方法,不过单靠临床分期判断和血清CA125肿瘤标记存在很大的缺陷<sup>[24]</sup>。本研究显示在548例患者中,手术切除患者的年龄、体重指数、病理类型、病程、术前血清CA125值与未手术切除患者对比差异无统计学意义。经阴道彩色多普勒超声更加靠近卵巢组织,能够对正常卵巢组织和卵巢肿瘤组织的血流情况进行判断,特别是卵巢癌局部组织存在血供异常的情况,通过超声能够评估患者的病情<sup>[25,26]</sup>。本研究显示在548例患者中,手术切除患者的PI和RI高于非手术切除患者,PSV、EDV低于非手术切除患者。从机制上分析,彩色多普勒超声多采用PI和RI作为诊断恶性肿瘤的参考标准,可反映血流阻力与预测血流频谱,PSV、EDV为重要的辅助参考指标<sup>[27]</sup>。卵巢癌细胞的增殖、分化及生长过程需要大量的新生血管生成,可导致血管阻力下降和血流灌注的增加,PI和RI随着卵巢癌临床分期的升高而下降,提示血流

在548例患者中,手术切除患者的PI和RI高于非手术切除患者,PSV、EDV低于非手术切除患者,差异都有统计学意义( $P < 0.05$ ),见表3。

## 3 讨论

卵巢癌是死亡率最高的妇科恶性肿瘤,60%以上的卵巢癌患者确诊时已属晚期,多伴有周围血管受侵与淋巴结转移,导致5年生存率一直比较低<sup>[12,13]</sup>。造影成像为卵巢癌的传统诊断方法,但是诊断的特异性有待提高,且对于患者有一定的损伤。超声检查具有经济无创、操作简便等优点,特别是经阴道超声检查方式靠近卵巢,提高了图像的清晰度和分辨率,避免了腹部脂肪组织和肠道气体对图像的干扰,有利于病情评估<sup>[14,15]</sup>。有研究以超声征象作为预测手术残留的参数,表明其预测手术切除的敏感性与特异性都在90%左右,但对晚期卵巢癌预测手术的效果还不明确<sup>[16,17]</sup>。本研究显示超声评估卵巢癌周围血管受侵犯的敏感性与特异性为97.5%和100.0%,ROC曲线面积为0.963;评估卵巢癌可切除性的敏感性与特异性为99.1%和90.4%,ROC曲线面积为0.897。从机制上分析,卵巢癌转移的某些解剖部位难以施行手术,如果患者伴有腹膜播散、广泛癌变和盆侧壁浸润也表明患者难以施行理想的手术<sup>[18,19]</sup>。经阴道彩色多普勒超声可排除腹部脂肪、肠道气体等对超声图像的干扰,提高凸显的分辨率和清晰度,有利于早期发现卵巢癌<sup>[20,21]</sup>。

阻力下降可用于反映患者很难进行手术切除<sup>[28,29]</sup>。并且彩色多普勒超声获取的血管图像能提供卵巢癌周围血管解剖信息,也可通过血流频谱参数来判断其评定状况<sup>[30,31]</sup>。

总之,彩色多普勒超声评估卵巢癌周围血管受侵程度及可切除性具有很好的敏感性与特异性,有利于指导卵巢癌患者的病情判断与治疗。

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