

doi: 10.3978/j.issn.2095-6959.2020.09.013  
View this article at: <http://dx.doi.org/10.3978/j.issn.2095-6959.2020.09.013>

## 经阴道三维超声联合超声造影对瘢痕妊娠的诊断价值

卓娜，汪娟

(大冶市中医院超声科，湖北 大冶 435100)

**[摘要]** 目的：探讨经阴道三维超声(three-dimensional transvaginal ultrasound, 3D-TVS)联合超声造影(contrast-enhanced ultrasonography, CEUS)对瘢痕妊娠(cesarean scars pregnancy, CSP)的诊断价值。方法：回顾性分析大冶市中医院2017年2月至2018年5月收治的120例经二维超声诊断疑似为CSP患者的临床资料，所有患者先后通过3D-TVS与CEUS诊断，并经术后病理结果证实，与术后病理结果进行对比，以阐述联合诊断价值。结果：经手术病理结果诊断CSP共89例，非CSP共31例，其中单独3D-TVS诊断CSP共84例，有14例CSP妊娠漏诊，9例非CSP患者误诊为CSP；3D-TVS联合CEUS检测诊断CSP共87例，有4例CSP妊娠漏诊，2例非CSP患者误诊为CSP；3D-TVS联合CEUS对CSP的诊断准确度、灵敏度、特异度、阳性预测值、阴性预测值分别为95.00%，95.50%，93.55%，97.70%，87.88%，高于单独3D-TVS检测80.83%，84.27%，70.97%，89.29%，61.11%( $P<0.05$ )；对89例经病理证实为CSP的患者进行分型，病理结果包括I型22例，II型51例，III型16例，3D-TVS联合CEUS对CSP患者的分型符合率93.26%高于3D-TVS的79.76%( $P<0.05$ )。结论：3D-TVS联合CEUS诊断CSP准确度较高，较单独的3D-TVS检测，可明显提高部分切口及部分宫腔内孕囊型CSP诊断效能。

**[关键词]** 瘢痕妊娠；经阴道三维超声；超声造影；联合诊断

## Diagnostic value of three-dimensional transvaginal ultrasound combined with contrast-enhanced ultrasonography in cesarean scar pregnancy

ZHUO Na, WANG Juan

(Department of Ultrasonography, Daye Hospital of Traditional Chinese Medicine, Daye Hubei 435100, China)

**Abstract** **Objective:** To explore the diagnostic value of three-dimensional transvaginal ultrasound (3D-TVS) combined with contrast-enhanced ultrasonography (CEUS) for cesarean scar pregnancy (CSP). **Methods:** A retrospective analysis was performed on the clinical data of 120 patients with suspected CSP by two-dimensional diagnosis who were admitted to the hospital from February 2017 to May 2018. All underwent 3D-TVS and CEUS in turn, and then they were confirmed by postoperative pathological results. The above results were compared with postoperative pathological results. The combination diagnostic value was explained. **Results:** Among the 120 patients, surgical pathology results showed that there were 89 cases with CSP and 31 cases without CSP. 3D-TVS

收稿日期 (Date of reception): 2020-04-26

通信作者 (Corresponding author): 汪娟, Email: 2928310043@qq.com

diagnosis showed that there were 84 cases with CSP. There were 14 CSP cases missing the diagnosis and 9 non-CSP cases misdiagnosed as CSP. The detection of 3D-TVS combined with CEUS showed that there were 87 cases with CSP. There were 4 CSP cases missing the diagnosis and 2 non-CSP cases misdiagnosed as CSP. The diagnostic accuracy, sensitivity, specificity, positive predictive value and negative predictive value of 3D-TVS combined with CEUS for CSP were 95.00%, 95.50%, 93.55%, 97.70% and 87.88%, which were higher than those of 3D-TVS alone (80.83%, 84.27%, 70.97%, 89.29%, 61.11%) ( $P<0.05$ ). The typing was conducted on the 89 patients who were confirmed with CSP by pathology, pathological results showed that there were 22 cases, 51 cases and 16 cases with type I, II and III, respectively. The typing coincidence rate of 3D-TVS combined with CEUS for CSP patients was higher than that of 3D-TVS (93.26% vs 79.76%) ( $P<0.05$ ). **Conclusion:** The accuracy of 3D-TVS combined with CEUS is relatively higher for diagnosis of CSP. Compared with simple 3D-TVS detection, the former can significantly improve diagnosis accuracy of gestational sac type CSP at partial incision sites and in uterine cavity.

**Keywords** cesarean scar pregnancy; three-dimensional transvaginal ultrasound; contrast-enhanced ultrasound; combination diagnosis

剖宫产术后子宫瘢痕妊娠(cesarean scars pregnancy, CSP)是指妊娠胚胎种植在剖宫产的子宫切口瘢痕位置，是发生在子宫内的异位妊娠，占异位妊娠的1%~6%<sup>[1]</sup>。CSP发生早期无特异性表现，漏诊和误诊率较高，患者绒毛和子宫肌层粘连后易植入，穿透宫壁造成胚胎生长发育不良，最终造成大出血等严重并发症，严重威胁患者身体健康及生命安全，因此对患者进行早期准确诊断和治疗具有重要价值<sup>[2]</sup>。近年来阴道三维超声(three-dimensional transvaginal ultrasound, 3D-TVS)逐渐发展成熟，与二维超声比较，可清晰显示宫腔、宫颈内口以及局部肌层形态、回声结构，立体显示子宫下段的妊娠组织和剖宫产切口位置关系，显示妊娠组织内部结构。超声造影(contrast-enhanced ultrasonography, CEUS)可增强超声影像，反映患者组织血流灌注信号，有利于正确判断病灶粘连和植入的部位、范围和程度<sup>[3]</sup>。本研究联合使用3D-TVS与CEUS，并通过与单独诊断结果进行对比，阐述联合诊断在瘢痕妊娠的诊断价值。

## 1 对象与方法

### 1.1 对象

回顾性分析大冶市中医院2017年2月至2018年5月收治的120例经二维诊断疑似但不明确未瘢痕妊娠患者临床资料。年龄22~38( $31.21\pm4.17$ )岁；距离上次剖宫产时间1.5~6.0( $2.81\pm1.49$ )年；停经时间34~74( $49.95\pm12.43$ )d。本研究经大冶市中医院医学伦理委员会批准，为回顾性研究，仅采集

患者临床资料，申请免除知情同意。

纳入标准：1)患者血人绒毛膜促性腺激素(human chorionic gonadotrophin, HCG)水平>8 mIU/mL；2)1次剖宫产史；3)经二维诊断不明确后，接受经阴道3D-TVS与CEUS检查；4)育龄期妇女；5)临床资料完整。排除标准：1)由于生理因素，包括畸形、疾病等不能正常进行正常检查；2)合并严重出血患者；3)临床资料不全。

### 1.2 方法

使用GE Voluson E8实时三维彩色多普勒超声诊断仪及ALOKEA 10诊断仪，E8阴道探头使用RIC5-9-D型腔内容积探头，频率设置为5~9 MHz。患者排空后膀胱，取截石位，双手握拳垫在臀部下以抬高臀部，将阴道探头上涂抹耦合剂并套上无菌避孕套置入患者阴道中。先通过阴道二维超声进行探查，观察患者子宫和附件，扫描其子宫矢状面和横断面，观察妊娠囊及妊娠包块与剖宫产切口位置关系以及切口周围肌层回声状态，并关注妊娠囊或妊娠包块的形态、内部结构(包括有无卵黄囊、胚芽和原始心管搏动等)以及周围血供情况，观察宫颈内膜和宫颈管情况，判断和测量前壁子宫肌层厚度。得到满意的二维图像后开启三维功能。并调节容积取样框，移动感兴趣区域，开启断层显像技术，分别得到矢状面、水平面、冠状面图像，调整X, Y, Z轴并选择多平面调整，对静态容积数据进行多方位的断层成像，显示妊娠包块与剖宫产位置关系并测量前壁肌层厚度，观察妊娠组织周围血流分布的情况，辨别阻力大小并判断滋养层血流侵蚀肌层深度。采

用低机械指数脉冲反向谐波成像技术, 机械指数(mechanical index, MI)设置为0.06, 抽取SonoVue造影剂1.0 mL在5 s内通过团注的方式注入肘正中静脉, 随后注入5 mL的生理盐水冲洗管路, 以双幅造影界面进行动态观察, 推注开始时需记录造影剂灌注的全过程, 并关注病灶造影的增强与消退情况, 连续观察3 min, 整个成像过程影像均存储于仪器硬盘中。造影结束后, 由2名具有高年资的影像学医师独立阅片, 当出现意见不一致时, 共同阅片分析并协商一致。

### 1.3 CSP 诊断及分型标准

参照中华医学会妇产科学分会计生学组CSP诊断及分型标准<sup>[4]</sup>: 妊娠囊部分或完全着床于子宫瘢痕, 患者子宫前壁下段肌层变薄, 瘢痕处可见滋养层血流低阻信号。1)I型: 妊娠囊部分着床于瘢痕, 往宫腔生长, 子宫前壁下段肌层厚度超过3 mm; 2)II型: 部分着床于瘢痕, 往宫腔内生长, 下段肌层厚度≤3 mm; 3)III型: 完全着床于瘢痕, 往膀胱突起, 宫腔和宫颈管中空虚, 下段肌层变薄、甚至缺失, 厚度≤3 mm, 其中包块型CSP属于III型中的特殊类型。

### 1.4 统计学处理

采用SPSS21.0进行数据统计及分析, 以手术结果作为金标准, 判断3D-TVS联合CEUS对CSP的

诊断效能, 行卡方检验,  $P<0.05$ 为差异有统计学意义。

## 2 结果

### 2.1 单独3D-TVS与3D-TVS联合CEUS对CSP的诊断效果比较

经手术病理结果诊断共有CSP共89例, 非CSP共31例, 其中单独3D-TVS诊断CSP共84例, 有14例CSP妊娠漏诊, 9例非CSP患者误诊为CSP; 3D-TVS联合CEUS检测诊断CSP共87例, 有4例CSP妊娠漏诊, 2例非CSP患者误诊为CSP(表1)。

### 2.2 单独3D-TVS与3D-TVS联合CEUS对CSP的诊断效能比较分析

3D-TVS联合CEUS对CSP的诊断准确度、灵敏度、特异度、阳性预测值、阴性预测值均高于单独3D-TVS检测的结果( $P<0.05$ , 表2)。

### 2.3 单独3D-TVS与3D-TVS联合CEUS对不同类型CSP的诊断效果比较

89例经病理证实为CSP的患者中I型22例, II型51例, III型16例, 3D-TVS联合CEUS对CSP患者的分型符合率93.26%高于3D-TVS的79.76%( $P<0.05$ , 表3)。

表1 单独3D-TVS与3D-TVS联合CEUS对CSP的诊断结果

Table 1 Diagnostic results of CSP by 3D-TVS alone and 3D-TVS combined with CEUS

诊断方法	结果	病理结果		合计
		CSP	非CSP	
3D-TVS	CSP	75	9	84
	非CSP	14	22	36
联合检测	CSP	85	2	87
	非CSP	4	29	33

表2 单独3D-TVS与3D-TVS联合CEUS对CSP的诊断效能比较分析

Table 2 Comparison on diagnostic efficiency of 3D-TVS alone and 3D-TVS combined with CEUS for CSP

诊断方法	准确度/%	敏感度/%	特异度/%	阳性预测值/%	阴性预测值/%
3D-TVS	80.83	84.27	70.97	89.29	61.11
联合检测	95.00	95.50	93.55	97.70	87.88

**表3 单独3D-TVS与3D-TVS联合CEUS对不同类型CSP诊断符合率比较(n=89)**

**Table 3 Comparison on diagnostic coincidence rates of 3D-TVS alone and 3D-TVS combined with CEUS for different types of CSP (n=89)**

诊断方法	I型/[例(%)]	II型/[例(%)]	III型/[例(%)]	总符合率/%
3D-TVS	16 (72.73)	40 (78.43)	15 (93.75)	79.76
3D-TVS联合CEUS	20 (90.91)	47 (92.16)	16 (100.00)	93.26
$\chi^2$	2.444	3.830	1.032	6.935
P	0.118	0.050	0.310	0.008

### 3 讨论

1978年, Larsen首先报道并定义了CSP。随着现阶段剖宫产手术的增加以及二胎政策的开放, CSP发病率逐年增加<sup>[5]</sup>。CSP发病机制为剖宫产手术以及宫内有创操作造成内膜基底层和肌层连续性中断, 影响正常血供, 愈合过程中瘢痕和内膜间形成瘘道或是裂隙, 妊娠组织在裂隙或裂隙周围生长, 在滋养细胞发育过程中慢慢穿透肌层或基底层, 当妊娠组织位于子宫下段被纤维组织和子宫肌层包围后形成CSP<sup>[6-8]</sup>。

超声具有简单、方便、无辐射、可重复性高的优点, 已经成为CSP诊断的重要检查方式, 尤其是经阴道超声, 由于其不受腹壁脂肪和肠壁气体的干扰, 可贴近宫颈检查, 分辨率较高<sup>[9]</sup>。3D-TVS可提供关于异位妊娠的详细信息, 在二维超声X轴基础上, 得到Y, Z轴的信息, 具有良好的空间定位功能, 可重建包块大小、形态及部位<sup>[10]</sup>。经阴道3D-TVS也存在一定的局限性, 由于三维图像需建立在清晰的二维图像基础上, 要求切面标准, 且容积取样框需尽量包绕宫体<sup>[11]</sup>。CEUS是近年来兴起的一种全新技术, 具有在多个领域内提高超声诊断的能力, 在反映正常与病变组织血流灌注方面具有独特的优势, 显示出常规超声难以分辨的血流信号, 获得微小血管的灌注成像信息, 正确辨别增强部位, 判断病灶种植位置, 在低机械指数特殊造影成像模式下的谐振行为产生非线性回声, 有效抑制周边组织信号, 提高了与周边组织的分辨率, 清晰勾画出子宫浆膜层的连续性, 和无灌注坏死组织形成鲜明对比, 准确判断病灶的大小以及和子宫浆膜层的关系<sup>[12-13]</sup>。

在本研究中, 3D-TVS联合CEUS诊断CSP与手术病理结果符合率高于3D-TVS, 联合诊断效能较高, 乐小莉等<sup>[14]</sup>研究结果支持本结论。单独的3D-TVS检测分辨率较高, 可清晰显示盆腔与周围

组织细微结构, 不受腹部及肠管的影响, 且患者无需憋尿, 缩短了临床诊断的时间, 但其聚焦距离较短且远场显示效果有限, 因此宫颈延长、子宫粘连、涉及宫底病变时显示存在一定的不足, 对水平位子宫显示具有一定的局限性。据相关报道<sup>[15]</sup>显示: 70%~80%剖宫产患者宫底和腹壁存在不同程度粘连, 其子宫和宫颈均被拉长, 同时多数女性婚后常伴有不同程度的宫颈肥大或宫颈炎等, 单独的3D-TVS难以全面了解宫体和宫底的情况, 存在一定的误诊和漏诊率。CEUS可反映病变组织血流灌注, 显示出常规超声较难分辨的血流信号, 很好地弥补了3D-TVS检测缺陷, 二者联合有利于提高诊断效能。本研究分析单独3D-TVS与3D-TVS联合CEUS对CSP分型的诊断结果与病理结果的符合率较高, 3D-TVS未准确显示出孕囊下段和切口的位置关系, 但结合CEUS可准确表达孕囊下段和切口的位置关系, 显示出滋养层血流侵入瘢痕, 准确度较高。

综上所述, 3D-TVS联合CEUS诊断CSP准确度较高, 与单独的3D-TVS检测比较, 可明显提高部分切口及部分宫腔内孕囊型CSP诊断效能。

### 参考文献

1. 马斌, 王艺璇, 冉婕, 等. 彩色多普勒超声在瘢痕妊娠术中大出血风险评估中的价值[J]. 中国医学影像学杂志, 2018, 26(4): 18-20.  
MA Bin, WANG Yixuan, RAN Jie, et al. The value of color Doppler ultrasound in the risk assessment of massive hemorrhage during scar pregnancy[J]. Chinese Journal of Medical Imaging, 2018, 26(4): 18-20.
2. Wu SW, He D, Zhang GWY. Labor onset, oxytocin use, and epidural anesthesia for vaginal birth after cesarean section and associated effects on maternal and neonatal outcomes in a tertiary hospital in China: a retrospective study[J]. Chine Med J, 2018, 131(8): 933-938.

3. Pomorski M, Fuchs T, Rosnertenerowicz A, et al. Morphology of the cesarean section scar in the non-pregnant uterus after one elective cesarean section[J]. Ginekologia Polska, 2017, 88(4): 174-179.
4. 孔子珍, 刘俊, 俞红英. 彩色多普勒超声在CSP早期诊断及治疗中的应用价值分析[J]. 中国医学装备, 2018, 15(10): 67-70.  
KONG Zizhen, LIU Jun, YU Hongying. Analysis on application value of color Doppler ultrasound in the early diagnosis and treatment of CSP[J]. China Medical Equipment, 2018, 15(10): 67-70.
5. Takahashi H, Usui R, Suzuki H, et al. Uterine-fundal hypoechoic mass: a possible ultrasound sign for cesarean scar pregnancy[J]. Clinical Exp Obstet Gyn, 2017, 44(1): 88-92.
6. 陈正云, 赵立, 阿斯燕·努斯拉提, 等. 剖宫产术后子宫瘢痕妊娠实施子宫病灶切除术与子宫切除术的临床对比分析[J]. 中华妇产科杂志, 2017, 52(2): 98-102.  
CHEN Zhengyun, ZHAO Li, ASIYAN-Nusitala, et al. Clinical comparative analysis of surgical resection of the pregnancy by hysterotomy and hysterectomy for cesarean scar pregnancy[J]. Chinese Journal of Obstetrics and Gynecology, 2017, 52(2): 98-102.
7. 李艳彬, 孟雷, 赵雅萍, 等. 经阴道超声联合磁共振对剖宫产术后子宫瘢痕妊娠的诊断价值[J]. 医学研究杂志, 2017, 46(2): 74-77.  
LI Yanbin, MENG Lei, ZHAO Yaping, et al. Value of MRI combined with transvaginal ultrasonography in the diagnosis of caesarean scar pregnancy[J]. Journal of Medical Research, 2017, 46(2): 74-77.
8. 陈桂清, 刘晓芳, 邹建中, 等. 高强度聚焦超声联合清宫术在治疗剖宫产术后子宫瘢痕妊娠中的临床应用[J]. 临床超声医学杂志, 2017, 19(9): 634-636.  
CHEN Guiqing, LIU Xiaofang, ZOU Jianzhong, et al. Clinical value of high intensity focused ultrasound combined with curettage in treatment of cesarean scar pregnancy[J]. Journal of Clinical Ultrasound in Medicine, 2017, 19(9): 634-636.
9. 刘洋洋, 吴文瑛, 王晓岩, 等. 超声检查在剖宫产术后子宫瘢痕妊娠诊疗中的应用价值[J]. 海军医学杂志, 2017, 38(2): 134-136.  
LIU Yangyang, WU Wenying, WANG Xiaoyan, et al. Value of ultrasonography in the diagnosis and treatment of caesarean scar pregnancy after cesarean section[J]. Journal of Navy Medicine, 2017, 38(2): 134-136.
10. 陈珏, 朱凤灵. 经阴道二维和三维超声对剖宫产术后子宫疤痕部位妊娠的诊断价值[J]. 重庆医学, 2017, 46(33): 4650-4652.  
CHEN Jue, ZHU Fengling. Value of transvaginal two-dimensional and three-dimensional ultrasound in diagnosis of scar pregnancy after uterine cesarean section[J]. Chongqing Medicine, 2017, 46(33): 4650-4652.
11. Li J, Li X, Yu H, et al. Combined laparoscopic and hysteroscopic management of cesarean scar pregnancy with temporary occlusion of bilateral internal iliac arteries[J]. Medicine (Baltimore), 2018, 97(32): 1371-1377.
12. 杨继, 同俊义, 张英伟, 等. 三维超声造影与子宫输卵管造影诊断输卵管不孕的临床价值比较[J]. 广西医科大学学报, 2017, 18(7): 16-17.  
YANG Ji, TONG Junyi, ZHANG Yingwei, et al. Comparison on the clinical value of three-dimensional ultrasound contrast and hysterosalpingography in diagnosis of tubal infertility[J]. Journal of Guangxi Medical University, 2017, 18(7): 16-17.
13. 黄惠益, 李秀明, 毕庶青. 经阴道子宫输卵管实时三维超声造影评价女性不孕症患者输卵管通畅性的临床分析[J]. 广西医科大学学报, 2017, 34(4): 588-590.  
HUANG Huiyi, LI Xiuming, BI Shuqing. Clinical analysis of transvaginal real-time three-dimensional hysterosalpingography in the evaluation of tubal patency of infertility females[J]. Journal of Guangxi Medical University, 2017, 34(4): 588-590.
14. 乐小莉, 范俊儿. 彩色多普勒超声联合超声造影早期诊断不同类型剖宫产瘢痕部位妊娠的临床价值[J]. 中国妇幼保健, 2018, 33(8): 1874-1876.  
LE Xiaoli, FAN Jun'er. Clinical diagnosis of color Doppler ultrasound combined with ultrasound contrast in early diagnosis of scar pregnancy of different types of caesarean section[J]. Maternal Child Health Care of China, 2018, 33(8): 1874-1876.
15. 李云娟, 刘凤霞, 莫毅. 子宫腹壁粘连分离术治疗剖宫产后子宫腹壁粘连伴不孕症的疗效观察[J]. 广西医学, 2017, 39(4): 543-545.  
LI Yunjuan, LIU Fengxia, MO Yi. Observation on curative effect of uterine abdominal wall adhesion separation on uterine abdominal wall adhesion combined with infertility after cesarean section[J]. Guangxi Medical Journal, 2017, 39(4): 543-545.

**本文引用:** 卓娜, 汪娟. 经阴道三维超声联合超声造影对瘢痕妊娠的诊断价值[J]. 临床与病理杂志, 2020, 40(9): 2302-2306. doi: 10.3978/j.issn.2095-6959.2020.09.013

**Cite this article as:** ZHUO Na, WANG Juan. Diagnostic value of three-dimensional transvaginal ultrasound combined with contrast-enhanced ultrasonography in cesarean scar pregnancy[J]. Journal of Clinical and Pathological Research, 2020, 40(9): 2302-2306. doi: 10.3978/j.issn.2095-6959.2020.09.013