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彩色多普勒超声联合监测胎儿脐动脉及大脑中动脉对重度子痫前期患者的临床意义*

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摘要 目的:研究彩色多普勒超声(CDU)联合监测胎儿脐动脉(UA)及大脑中动脉(ACM)对重度子痫前期患者的临床意义。**方法:**选择从2014年2月到2017年2月在我院分娩的90例重度子痫前期患者作为观察组。另选择同期在我院接受剖宫产分娩的90例健康孕妇作为对照组,比较两组孕妇胎儿UA及ACM的血流阻力指数(RI)、搏动指数(PI)、收缩期和舒张期的血流速度之比(S/D)、新生儿Apgar评分和体重,采用Spearman相关性分析法分析新生儿Apgar评分和体重与胎儿RI、PI和S/D值的相关性。**结果:**观察组患者胎儿UA的RI、PI和S/D值均明显高于对照组,差异均有统计学意义($P<0.05$)。观察组患者胎儿ACM的RI、PI和S/D值均明显低于对照组,差异均有统计学意义($P<0.05$)。观察组患者的新生儿Apgar评分和体重均明显低于对照组,差异均有统计学意义($P<0.05$)。根据Spearman相关性分析后发现,新生儿Apgar评分和体重与胎儿UA的RI、PI和S/D值均呈负相关($P<0.05$),而与胎儿ACM的RI、PI和S/D值均呈正相关($P<0.05$)。**结论:**CDU联合监测胎儿UA和ACM对于重度子痫前期患者具有重要的临床意义,可评价胎儿在子宫内的生长发育情况以及母婴结局,从而有助于辅助临床诊治工作的进行。

关键词:彩色多普勒超声;胎儿;脐动脉;大脑中动脉;重度子痫前期;临床意义

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Clinical Significance of Color Doppler Ultrasound in Joint Monitoring of Fetal Umbilical Artery and Arteriae Cerebri Media for Patients with Severe Preeclampsia*

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ABSTRACT Objective: To study clinical significance of color doppler ultrasound (CDU) in joint monitoring of fetal umbilical artery (UA) and arteriae cerebri media (ACM) for patients with severe preeclampsia. **Methods:** 90 patients with severe preeclampsia who were treated in our hospital from February 2014 to February 2017 were selected as the observation group, another 90 healthy pregnant women who were received cesarean section in our hospital during the same period were selected as control group. The blood flow resistance index (RI), pulsatility index (PI), the ratio of systolic and diastolic blood flow velocity (S/D), neonatal Apgar score and body weight were compared between two groups of pregnant women with fetal UA and ACM, correlation of neonatal Apgar score and body weight with fetal RI, PI and S/D values were analysed by Spearman correlation analysis. **Results:** The values of RI, PI and S/D in the fetal UA of the observation group were significantly higher than those of the control group, the differences were statistically significant ($P<0.05$). The values of RI, PI and S/D in the fetal ACM in the observation group were significantly lower than those in the control group, the differences were statistically significant ($P<0.05$). The neonatal Apgar score and body weight of the observation group were significantly lower than those of the control group, the differences were statistically significant ($P<0.05$). According to Spearman correlation analysis found that the neonatal Apgar score and body weight were negatively correlated with the values of RI, PI and S/D in fetal UA ($P<0.05$), which was a positive correlation with the values of RI, PI and S/D in fetal ACM ($P<0.05$). **Conclusion:** CDU in joint monitoring of fetal UA and ACM has important clinical significance in patients with severe preeclampsia, and it can evaluate the growth and development of fetus in uterus and the outcome of mother and infant, so as to assist the clinical diagnosis and treatment.

Key words: Color doppler ultrasound; Fetus; Umbilical artery; Arteriae cerebri media; Severe preeclampsia; Clinical significance

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前言

彩色多普勒超声(color doppler ultrasound, CDU)作为一种无创且重复性强的临床诊断技术,近年来已广泛用于孕妇产前

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超声检查,并对孕妇腹内胎盘和胎儿的血流动力学情况的评价提供了诊断依据^[1-3]。重度子痫前期是孕妇较为常见的一种产科并发症,其可严重威胁患者及胎儿的健康,并造成不良预后。有报道指出,CDU 诊断对于降低孕产妇的不良妊娠结局具有重要的作用^[4-6]。但应用 CDU 对重度子痫前期患者实施监测的报道较少,尤其是针对胎儿的脐动脉(umbilicalis arteria,UA)和大脑中动脉(arteriae cerebri media,ACM)情况的检测分析报道较少^[7-9]。UA 和 ACM 是胎儿重要的血管通道,其中 ACM 承担胎儿大脑的正常供血,而 UA 使胎儿与胎盘相连,因此 UA 和 ACM 的血流动力学变化均可对胎儿的发育造成影响^[10]。鉴于此,本文通过分析 CDU 联合监测胎儿 UA 及 ACM 对重度子痫前期患者的临床意义,旨在为重度子痫前期患者的临床诊治提供更加科学的理论和数据支持,现报道如下。

1 资料和方法

1.1 一般资料

选择从 2014 年 2 月到 2017 年 2 月在我院分娩的 90 例重度子痫前期患者作为观察组,纳入标准:(1)患者均符合乐杰主编第七版《妇产科学》教材的诊断及分类标准^[11];(2)均接受剖宫产;(3)单胎妊娠;(4)患者或家属对本研究知情同意并签署知情同意书。排除标准:(1)有糖尿病史者;(2)有高血压者;(3)患者的病历诊断资料缺失者;(4)有恶性肿瘤者;(5)有血液疾病者;(6)有心、肝、肾等脏器功能障碍者。观察组年龄 22~38 岁,平均(30.24±2.17)岁。孕周 33~40 周,平均(37.08±0.14)周。另选择同期在我院接受剖宫产分娩的 90 例健康孕妇作为对照组,年龄 21~36 岁,平均(30.21±2.65)岁。孕周 32~40 周,平均(36.89±0.27)周。两组孕妇一般资料比较差异无统计学意义($P>0.05$)。本研究经医院伦理委员会审核通过。

1.2 方法

采用美国 GE 公司的 VolusonE8 型彩色多普勒超声诊断仪对两组孕妇进行检测,重点监测孕 28 周时胎儿 UA 和 ACM 的血流动力学情况。具体步骤为:在孕妇安静休息的状态下开始监测,设置探头频率为 3.5~5MHz,取其仰卧位,获得胎儿 UA 和 ACM 平面,选取多普勒取样线及 $<30^\circ$ 的流动方向,再释放出大动脉的血流信号,监测并记录血流阻力指数(resistance index, RI)、搏动指数(pulsation index, PI)以及收缩期和舒张期的血流速度之比(ratio of blood flow velocity in systolic and diastolic periods, S/D)。

1.3 观察指标

比较两组孕妇胎儿 UA 及 ACM 的 RI、PI、S/D 值、新生儿 Apgar 评分和体重,分析新生儿 Apgar 评分和体重与胎儿 RI、PI 和 S/D 值的相关性。其中新生儿 Apgar 评分^[12]标准:新生儿出生后立刻根据其皮肤颜色、心搏速率、呼吸、肌张力及运动、反射进行评估,总分为 10 分,其中 8~10 分记为无窒息,4~7 分记为轻度窒息,0~3 分记为重度窒息,分值越高,表示新生儿的健康状况越好。

1.4 统计学方法

采用 SPSS21.0 软件进行统计分析,计数资料用率(%)表示,采用 χ^2 检验。计量资料用($\bar{x}\pm s$)表示,采用 t 检验,采用 Spearman 相关性分析进行统计分析, $P<0.05$ 为差异有统计学意义。

2 结果

2.1 两组孕妇胎儿 UA 的 RI、PI 和 S/D 值比较

观察组患者胎儿 UA 的 RI、PI 和 S/D 值均明显高于对照组,差异均有统计学意义($P<0.05$),详见表 1。

表 1 两组孕妇胎儿 UA 的 RI、PI 和 S/D 值比较($\bar{x}\pm s$)

Table 1 Comparison of values of RI, PI and S/D in pregnant women with fetal UA in two groups ($\bar{x}\pm s$)

Groups	n	RI value	PI value	S/D value
Observation group	90	0.78±0.11	1.23±0.16	3.57±0.50
Control group	90	0.53±0.07	0.83±0.13	2.46±0.37
t	-	18.190	18.407	16.930
P	-	0.000	0.000	0.000

2.2 两组孕妇胎儿 ACM 的 RI、PI 和 S/D 值比较

观察组患者胎儿 ACM 的 RI、PI 和 S/D 值均明显低于对照

组,差异均有统计学意义($P<0.05$),详见表 2。

表 2 两组孕妇胎儿 ACM 的 RI、PI 和 S/D 值比较($\bar{x}\pm s$)

Table 2 Comparison of values of RI, PI and S/D in pregnant women with fetal ACM in two groups ($\bar{x}\pm s$)

Groups	n	RI value	PI value	S/D value
Observation group	90	0.54±0.12	1.08±0.14	2.32±0.21
Control group	90	0.87±0.12	1.63±0.20	4.29±0.18
t	-	18.448	21.373	67.570
P	-	0.000	0.000	0.000

2.3 两组新生儿 Apgar 评分和体重比较

观察组患者的新生儿 Apgar 评分和体重均明显低于对照

组,差异均有统计学意义($P<0.05$),详见表 3。

表 3 两组新生儿 Apgar 评分和体重比较($\bar{x} \pm s$)
Table 3 Comparison of Neonatal Apgar score and body weight in two groups($\bar{x} \pm s$)

Groups	n	Apgar score (scores)	Body weight (g)
Observation group	90	6.52 $\pm$ 0.74	1619.48 $\pm$ 211.79
Control group	90	8.31 $\pm$ 0.52	2103.58 $\pm$ 253.48
t	-	18.776	13.904
P	-	0.000	0.000

2.4 两组新生儿 Apgar 评分和体重与胎儿 RI、PI 和 S/D 值的相关性分析

根据 Spearman 相关性分析后发现, 新生儿 Apgar 评分和

体重与胎儿 UA 的 RI、PI 和 S/D 值均呈负相关($P < 0.05$), 而与胎儿 ACM 的 RI、PI 和 S/D 值均呈正相关($P < 0.05$), 详见表 4。

表 4 新生儿 Apgar 评分和体重与胎儿 RI、PI 和 S/D 值的相关性分析(r, P)

Table 4 Correlation analysis of neonatal Apgar score and body weight with RI, PI and S/D values of fetal(r, P)

Item		Apgar score	Weight
Fetal UA	RI value	-0.653, 0.000	-0.598, 0.001
	PI value	-0.704, 0.000	-0.584, 0.002
	S/D value	-0.649, 0.000	-0.611, 0.000
Fetal ACM	RI value	0.691, 0.000	0.587, 0.000
	PI value	0.710, 0.000	0.591, 0.000
	S/D value	0.652, 0.000	0.568, 0.000

3 讨论

在妇产科临床上, 子痫前期属于孕妇妊娠期的一种特发性疾病, 其可影响孕妇机体内的多种器官系统, 并可使患者全身小动脉痉挛, 致使靶器官内的血流灌注降低, 进而引发缺血缺氧性损害, 甚至会使子宫胎盘的灌注降低, 最终影响其妊娠结局, 并导致母婴并发症^[13-15]。因此, 及时地对患者实施诊断并了解胎儿的情况, 对于改善母婴的预后具有较大的意义。随着超声医学科技的发展, CDU 已被应用于监测胎儿在孕妇子宫中的生长发育情况, 并为后续临床治疗提供一定的诊断依据^[16]。UA 是连接母体和胎儿的重要纽带, 在胚胎发育过程中, 从胎儿心脏发出, 将胎儿体内代谢废物和代谢产生的二氧化碳运送至胎盘, 转移至母体的动脉, 其血流情况能够反映胎盘、胎儿的生理病理变化^[17]。ACM 是颈内动脉的直接延续, 可直接反映胎儿大脑半球血液供应情况、颅脑血液循环状态^[18]。本文通过分析 CDU 联合监测胎儿 UA 及 ACM 对重度子痫前期患者的临床意义, 以期对重度子痫前期患者的临床诊治提供数据参考依据。

本文经过研究后发现, 观察组患者胎儿 UA 的 RI、PI 和 S/D 值均明显高于对照组($P < 0.05$), 这提示了重度子痫前期患者胎儿 UA 的 RI、PI 和 S/D 值水平明显升高。分析原因可能是与胎儿 UA 的血供不足有关, 具体而言, UA 作为连接胎儿和胎盘的一个重要血管通道, 可为胎儿供应生长发育所必需的营养和氧气, UA 的血流动力学变化通常能够准确地反映出孕妇胎盘和胎儿的生理改变^[19,20]。重度子痫前期患者因为受到全身型小动脉痉挛的影响, 对胎盘的正常供血造成干扰, 致使脐动脉的供血不足, 增大了血液浓度, 并使血液黏度及红细胞压积上升, 容易引起血管闭塞, 因此 UA 的 RI、PI 和 S/D 值水平明显升高^[21-23]。同时, 本文发现, 观察组患者胎儿 ACM 的 RI、PI 和 S/D 值水平均明显低于对照组($P < 0.05$), 这提示了重度子痫前

期患者胎儿 ACM 的 RI、PI 和 S/D 值水平明显降低。究其原因, 可能与胎儿 ACM 的血液循环异常有关。ACM 作为胎儿大脑半球主要的供血通道, 可占整体血供的 80%, 随着胎儿的生长发育, ACM 的血管管径逐渐变粗, 因此其血液流动的阻力降低, 而血供氧水平增大, 但由于重度子痫前期的患者可导致胎儿的血供不足, 使得胎儿通过自身的体液调节, 减少 ACM 的阻力以尽可能地维持其大脑发育所需的血供, 最终导致 ACM 的 RI、PI 和 S/D 值水平明显下降^[24,25]。本文还发现, 观察组患者的新生儿 Apgar 评分和体重均明显低于对照组 ($P < 0.05$), 这提示了重度子痫前期患者新生儿 Apgar 评分和体重均明显下降。分析原因, 主要可能与患者机体对胎盘的供血异常致使胎儿发育迟缓有关。具体而言, 重度子痫前期患者的胎盘中三级绒毛血管的分支不足, 导致血管直径异常狭窄, 胎盘功能减弱, 并使胎盘与母体实施物质交换的有效血流量下降, 影响到胎儿所需营养物质和氧气的正常供应, 最终导致胎儿缺氧, 且在宫内发育迟缓, 所以新生儿 Apgar 评分和体重均下降^[26-28]。此外, 本文根据 Spearman 相关性分析后发现, 新生儿 Apgar 评分和体重与胎儿 UA 的 RI、PI 和 S/D 值均呈负相关($P < 0.05$), 而与 ACM 的 RI、PI 和 S/D 值均呈正相关($P < 0.05$), 这也证实了胎儿 UA 和 ACM 的 RI、PI 和 S/D 值与新生儿 Apgar 评分和体重联系紧密, 同时也说明了临床监测胎儿 UA 和 ACM 的 RI、PI 和 S/D 值有助于对母婴结局进行评价。Stubert J 等人^[29-30]也有报道证实, 对子痫前期患者的胎儿 UA 实施监测能直观地反映出胎儿机体中的酸碱情况, 从而为新生儿窒息提供合理的参考依据。

综上所述, CDU 联合监测胎儿 UA 和 ACM 的 RI、PI 和 S/D 值对于重度子痫前期患者的母婴结局具有评估作用, 临床上可通过检测上述指标以更加科学准确地评价患者胎儿的预后情况, 值得给予关注。

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