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脐动脉血流对预测子痫前期新生儿和产妇结局的价值分析 *

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摘要 目的:探讨应用脐动脉血流用于预测子痫前期新生儿和产妇结局的临床价值。**方法:**选择在我院产科建档分娩的120例孕产妇作为研究对象,根据子痫前期发病情况分为子痫前期组60例与对照组60例,记录和比较两组孕产妇的一般资料、血脂、血糖水平、分娩前脐动脉血流与新生儿体重、胎盘的重量及Apgar评分,并进行相关性与危险因素分析。**结果:**两组孕产妇的年龄、孕次、产次、流产次数、孕周等对比差异均无统计学意义(P>0.05)。子痫前期组的血清HDL-C水平低于对照组(P<0.05),血清TC、TG、LDL-C、FBG水平高于对照组(P<0.05)。与对照组比较,子痫前期组脐动脉S/D、RI与PI值显著升高(P<0.05)。所有孕产妇都顺利完成分娩,孕产妇与新生儿都存活,子痫前期组的新生儿出生体重及Apgar评分和胎盘的重量均显著低于对照组(P<0.05)。在子痫前期组中,脐动脉S/D、RI、PI值与新生儿出生体重呈现显著负相关性(P<0.05)。多重线性回归分析显示子痫前期孕产妇的脐动脉S/D、RI、PI值为影响新生儿出生体重的独立危险因素(P<0.05)。**结论:**脐动脉血流与子痫前期新生儿出生体重显著相关,脐动脉S/D、RI、PI值为影响新生儿出生体重的独立危险因素,子痫前期脐动脉血流监测可为预测新生儿和产妇结局以及预后提供参考。

关键词:子痫前期;脐动脉血流;新生儿出生体重;相关性;危险因素

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Analysis of the Value of Umbilical Artery Blood flow for Predicting the Outcome of Preeclampsia Neonates and Parturients*

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ABSTRACT Objective: To investigate the clinical value of umbilical arterial blood flow for predicting the preeclampsia neonatal and maternal outcomes. **Methods:** 120 cases of pregnant women who gave birth in the obstetrics department of our hospital were selected and divided into 60 cases of the preeclampsia group and 60 cases of the control group according to the pre-eclampsia incidence. The general data, blood lipids and blood glucose level, umbilical arterial blood flow and neonatal birth weight and placental weight and Apgar score during the cesarean section were recorded and compared between two groups, and the correlative and risk factors analysis were performed. **Results:** There was no significant difference in the maternal age, pregnancy, birth, abortion, and gestational age between the two groups(P>0.05). The level of serum HDL-C in the preeclampsia group was lower than that in the control group(P<0.05), and the levels of serum TC, TG, LDL-C and FBG were higher than those in the non-eclamptic group (P<0.05). Compared with the control group, the umbilical artery S/D, RI and PI values were significantly increased in the preeclampsia group (P<0.05). All pregnant women successfully completed the delivery, both the maternal and the newborn survived. The birth weight and placental weight and Apgar score of the newborn in the preeclampsia group were significantly lower than those of the non-eclamptic group (P<0.05). In the preeclampsia group, the Pearson correlation coefficient showed significant negative correlation between the umbilical artery S/D, RI, and PI values and neonatal birth weight(P<0.05). Multiple linear regression analysis showed that the umbilical artery S/D, RI and PI values of preeclampsia were the independent risk factors for neonatal birth weight (P<0.05). **Conclusion:** Umbilical artery blood flow was closely related to the birth weight of preeclampsia. Umbilical artery S/D, RI and PI values are independent risk factors for neonatal birth weight. Preeclampsia umbilical artery blood flow monitoring can be used to provide references for predicting the prognosis of neonatal and maternal outcomes.

Key words: Preeclampsia; Umbilical artery blood flow; Neonatal birth weight; Correlation; Risk factors

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前言

子痫前期(Preeclampsia)指在妊娠20周后出现高血压[收缩压≥ 140 mmHg 和(或)舒张压≥ 90 mmHg]并伴蛋白尿升高,或伴有其他脏器、胎儿受累的临床疾病[1,2]。该病在临床上以高血压、蛋白尿为主要特征,随着疾病的发展,可逐渐出现子痫、

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HELLP 综合征 (Hemolysis,Elevated liver enzymes,and Low platelets syndrome,HELLP syndrome)、心脑血管意外、多器官功能衰竭、胎盘早剥、视网膜脱落等严重并发症,严重情况下可危及患者生命[3],也可导致孕产妇出现早产、胎儿生长受限、胎儿窘迫、胎死宫内等不良妊娠结局[4,5]。流行病学调查显示是孕产妇和围产儿病死率升高的主要原因之一,可直接导致约 15%的孕妇死亡[6]。子痫前期的发病机制涉及胎盘缺血缺氧学说、氧化应激学说、内皮细胞损伤学说、免疫失衡学说、营养缺乏学说、胰岛素抵抗、环境因素、遗传易感学说等[7-9]。研究显示在妊娠过程中,正常脐动脉在妊娠 12-14 周时,血管面积增加,胎盘阻力开始下降[10,11]。而子痫前期孕产妇全身小动脉可出现痉挛,子宫螺旋小动脉重铸不足,致使舒张期血流速度较正常妊娠期显著减慢,子宫动脉管径狭窄,循环阻力显著增加,血流阻力指标增高[12]。脐动脉多普勒频谱示 S/D、PI、RI 值逐渐增高,从而表现为胎盘血流灌注减少,影响胎儿发育[13,14]。本研究具体探讨了脐动脉血流预测子痫前期新生儿和产妇结局的价值,旨在为防治子痫的发生,临床及时纠正胎儿宫内缺氧,预测围产期的结果提供参考依据。现将结果总结报道如下。

1 资料与方法

1.1 研究对象

本研究经我院伦理委员会的批准,采用回顾性、总结性研究方法,选择 2017 年 2 月到 2018 年 6 月在我院妇产科建档分娩的 120 例孕产妇作为研究对象,纳入标准:单胎妊娠;孕周≥36 周;临床资料与超声学资料完整;年龄 20 岁 -40 岁;无吸烟、饮酒等不良嗜好; 患者或者家属在自愿条件下签署知情同意书。排除标准:多胎妊娠;严重脏器功能障碍或存在其他严重内外科合并症的患者。根据子痫前期发病情况分为子痫前期组(根据谢幸主编的妇《妇产科学》(第 8 版)中的相关诊断标准)与对照组, 每组 60 例。两组一般资料比较差异均无统计学意义(P>0.05),具有可比性,见表 1。

表 1 两组产妇一般资料对比(均数± 标准差)

Table 1 Comparison of the general data between two groups of pregnant women (mean± standard deviation)

Groups	n	Gestational week (week)	Number of abortions (times)	Age(years)	Gestational times (times)	Delivery times (times)
Preeclampsia group	60	37.93± 2.94	0.78± 0.22	26.33± 2.49	2.87± 1.42	1.66± 0.92
Control group	60	37.19± 3.19	0.82± 0.32	26.11± 2.10	2.71± 1.67	1.68± 0.67
t		0.934	0.564	0.370	0.400	0.096
P		0.354	0.575	0.713	0.691	0.924

1.2 脐动脉血流检测

两组孕产妇均在入院分娩前由专人对患者行胎儿超声。采用彩色多普勒超声诊断仪,孕妇取半卧位,平静呼吸,选择胎盘附着点 5cm 范围内脐动脉进行检测, 取 5 个以上连续心动周期血流频谱后,记录脐动脉收缩期最高血流速度与舒张期最低血流速度比值(S/D)、RI(阻力指数)和 PI(搏动指数)。

1.3 血液学指标检测

两组孕产妇均分娩当日抽取静脉外周血液 2 mL-3 mL,1500 r/min,离心半径 10 cm,离心 15 min,采集上层血清置于 1.5 mL 离心管中,分离血清 2 小时内测定。采用全自动生化分析仪(日本日立公司 7100 型)检测空腹血糖(FBG)、血脂(TG、TC、LDL-C、HDL-C)水平,检测试剂盒购自上海科华生物有限公司。

1.4 妊娠结局调查

记录新生儿出生体重、1 min Apgar 评分和胎盘的重量等妊娠结局。Apgar 评分主要是从 5 个方面(出生 1 min 的心率、呼吸、肌张力、喉反射和皮肤颜色),进行评价新生儿出生时的窒息情况和健康状态,每项评分 0-2,最高 10 分,8-10 分表示新生儿健康,4-7 分表示新生儿患有轻度窒息,0-3 分表示患有重度窒息。

1.5 统计学分析

应用 SPSS19.00 软件进行统计学分析, 计量资料以 (均数± 标准差)表示,组间比较采用 t 检验;计数资料以百分比表示,组间比较采用 x^2 检验;相关性分析采用多重线性回归分析或 / 和 Pearson 相关系数分析,以 P<0.05 为差异具有统计学意义。

2 结果

2.1 两组产妇血糖与血脂水平对比

与对照组比较,子痫前期组的血清 HDL-C 水平更低,血清 FBG、LDL-C、TG、TC 水平更高,对比差异均有统计学意义(P<0.05),见表 2。

表 2 两组血糖与血脂水平对比(均数± 标准差)

Table 2 Comparison of the blood glucose and blood lipids levels between two groups (mean± standard deviation)

Groups	n	FBG (mmol/L)	HDL-C (mmol/L)	LDL-C (mmol/L)	TG (mmol/L)	TC (mmol/L)
Preeclampsia group	60	5.01± 0.34	1.19± 0.06	3.06± 0.09	1.84± 0.18	4.81± 0.34
Control group	60	4.79± 0.29	1.52± 0.07	2.72± 0.11	1.41± 0.13	4.39± 0.56
t		12.134	19.605	13.103	10.603	3.511
P		0.000	0.000	0.000	0.000	0.001

2.2 两组脐动脉血流对比

与对照组比较，子痫前期组脐动脉 S/D、RI 与 PI 值显著升高，对比差异有统计学意义(P<0.05)，见表 3。

表 3 两组脐动脉血流对比(均数± 标准差)

Table 3 Comparison of the umbilical artery blood flow between two groups (mean± standard deviation)

Groups	n	S/D	RI	PI
Preeclampsia group	60	3.15± 0.55	0.67± 0.09	0.91± 0.10
Control group	60	2.43± 0.33	0.52± 0.08	0.82± 0.11
t		6.149	6.823	3.316
P		0.000	0.000	0.002

2.3 两组新生儿妊娠和产妇结局比较

所有孕产妇都顺利完成分娩，孕产妇与新生儿都存活。子痫前期组的新生儿出生体重、胎盘重量和 Apgar 评分均显著低于对照组(P<0.05)。见表 4。

表 4 两组新生儿妊娠结局比较

Table 4 Comparison of the pregnancy outcomes between two groups of newborns

Groups	n	Neonatal birth weight (kg)	Placental weight (kg)	1 min Apgar score(<7)
preeclampsia group	60	2.81± 0.28	0.47± 0.05	9.98± 0.15
control group	60	3.32± 0.56	0.55± 0.16	8.64± 2.12
t		4.462	2.614	3.453
P		0.000	0.013	0.001

2.4 相关性分析

在子痫前期组中，Pearson 相关系数显示脐动脉 S/D、RI、PI 值与新生儿出生体重呈现显著负相关性(P<0.05)，见表 5。

以新生儿出生体重作为因变量，以临床一般资料、血糖、血脂、脐动脉血流作为自变量，多重线性回归分析进行逐步校正后，子痫前期孕产妇的脐动脉 S/D、RI、PI 值都为影响新生儿出生体重的独立危险因素(P <0.05)，见表 6。

表 5 子痫前期脐动脉血流与新生儿出生体重的相关性(n =30)

Table 5 Correlation between umbilical artery blood flow and neonatal birth weight in preeclampsia (n =30)

Index	S/D	RI	PI
r	-0.333	-0.298	-0.331
P	<0.000	0.001	0.000

表 6 影响子痫前期孕产妇的新生儿出生体重的危险因素(n =30)

Table 6 Risk factors for birth weight of pregnant women with preeclampsia (n =30)

Variable	β	Standard error	Standardized β	R^2	t	P
S/D	4.541	0.121	0.544	0.982	9.123	0.000
RI	4.541	0.121	0.544	0.782	3.413	0.004
PI	0.988	1.652	0.332	0.882	4.566	0.000

3 讨论

子痫前期是孕产妇的常见疾病，在我国的发病率接近 3% 左右，是导致孕产妇死亡的主要原因之一[14,15]。子痫前期的病因至今仍未完全阐明，其一般在妊娠中、晚期发病，被认为是不完全自然流产的一种形式[16-20]。高血脂、高血糖等是子痫前期的主要危险因素，血脂代谢异常在子痫前期的发生发展中起重要作用[21]。本研究结果显示子痫前期组 TC、TG、LDL-C、FBG 水平高于对照组，HDL-C 水平低于对照组，提示子痫前期孕妇存在血脂、血糖代谢紊乱。

在孕产妇中，母亲和胎儿之间通过胎儿 - 胎盘血循环、母体 - 胎盘血循环两套血液循环系统进行物质交换，前者为胎儿的胎盘血循环，后者为妊娠子宫血循环，母体动脉血与绒毛内毛细血管的胎儿血进行物质交换[22]。正常妊娠条件下，在妊娠 6-18 周时滋养细胞开始侵入子宫组织内，滋养细胞取代被重铸子宫螺旋动脉的内皮细胞，血管阻力下降[23,24]。彩色多普勒超声实现了血流动力学与形态学相结合，其也属于脉冲多普勒，具有无创、可重复、操作简单的特点。PI 值可反映收缩期最大血流速度和舒张末期血流速度；RI 值的大小与舒张末期流速密切相关；S/D 值反映的是收缩期峰值流速和舒张末期流速，当上

述指标增加时,说明舒张末期流速、平均血流速度降低,血管阻力增高[25-27]。本研究结果显示子痫前期组与对照组比较,脐动脉S/D、RI与PI值显著升高。从机制上分析,子痫前期时全身小动脉痉挛,胎盘绒毛血管可出现梗塞、痉挛等,从而导致S/D、PI、RI值增高,影响胎儿发育[28]。

子痫前期是妊娠特有的疾病,是胎儿生长受限的主要原因。本研究结果显示子痫前期组的新生儿出生体重、胎盘重量和Apgar评分均显著低于对照组,子痫前期组脐动脉S/D、RI、PI值与新生儿出生体重呈现显著负相关性,子痫前期孕产妇的脐动脉S/D、RI、PI值都为影响新生儿出生体重的独立危险因素。从机制上分析,胎盘血流的供应不足和缺血缺氧,可导致滋养细胞产生毒性因子进入母体的血液循环,影响胎盘物质交换的特性,从而导致胎儿生长受限[29]。脐动脉血流水平与新生儿出生体重存在正相关,超声检测血流状况可为评估胎儿及新生儿体重提供理论依据。但是新生儿出生体重受很多因素的影响,如母体因素、环境因素等,也需要进行综合分析[30]。当前有研究显示胰岛素样生长因子2 (insulin-like growth factor 2, IGF2)可能参与脐血流的调节,并影响胎儿生长发育,影响胎儿体重,血清学检测新生儿脐血IGF2水平也可作为评估新生儿生长发育的一种辅助手段[31]。而当舒张末期血流速度减慢时,会导致脐动脉舒张末期血流缺失,形成异常的胎儿-胎盘循环状态,提示与不良围产儿结局及预后密切相关。在临床预防措施中,对于子痫前期孕产妇应寻找病因,治疗原发疾病,同时改善胎盘循环,密切监测脐动脉血流变化,采取最佳治疗措施,从而提高新生儿出生体重。本研究也有一定的不足,如研究的样本数量比较有限,数量少;未将子痫前期详细分度;对于新生儿其他结局的分析也不够明确;没有加入产后一周的随访,比较两组产妇与新生儿是否出现并发症,这些都将在下一步进行深入分析。

总之,脐动脉血流与子痫前期新生儿出生体重显著相关,脐动脉S/D、RI、PI值为影响新生儿出生体重的独立危险因素,子痫前期脐动脉血流监测可为预测新生儿和产妇结局以及预后提供参考。

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(上接第 1792 页)

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