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超声对早期糖尿病肾病的诊断价值及肾动脉血流阻力指数与血清hs-CRP、VEGF的关系分析*

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摘要 目的:研究彩色多普勒超声对早期糖尿病肾病的诊断价值及肾动脉血流阻力指数与血清超敏C反应蛋白(hs-CRP)、血管内皮生长因子(VEGF)的关系。**方法:**选取从2017年2月~2018年2月兰州大学第二医院收治的早期糖尿病肾病患者50例记为病变组,另取同期于该院进行体检的健康人员50例记为对照组。分别对两组人员进行彩色多普勒超声检查,比较肾血流参数。采用酶联免疫吸附法检测两组人员血清hs-CRP、VEGF水平,并作指标间的相关性分析。**结果:**病变组肾主动脉、肾锥体两侧叶间动脉、肾段动脉的收缩期峰值速度、舒张期最低速度较对照组降低,病变组肾主动脉、肾锥体两侧叶间动脉、肾段动脉的阻力指数较对照组升高(均 $P<0.05$)。病变组血清hs-CRP、VEGF水平较对照组升高(均 $P<0.05$)。经Pearson相关性分析显示:早期糖尿病肾病患者肾主动脉、肾锥体两侧叶间动脉、肾段动脉的血流阻力指数与血清hs-CRP、VEGF均呈正相关关系(均 $P<0.05$)。**结论:**彩色多普勒超声应用于早期糖尿病肾病的诊断价值较高,且肾动脉血流阻力指数与血清hs-CRP、VEGF密切相关,临床工作中通过联合检测血清hs-CRP、VEGF,从而有助于早期糖尿病肾病的诊断。

关键词:早期;糖尿病肾病;彩色多普勒超声;诊断;肾动脉血流阻力指数;超敏C反应蛋白;血管内皮生长因子

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Diagnostic Value of Ultrasonography in Early Diabetic Nephropathy and the Relationship Analysis between Renal Arterial Blood Flow Resistance Index and Serum hs-CRP and VEGF*

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ABSTRACT Objective: To study the diagnostic value of color doppler ultrasound in early diabetic nephropathy and the relationship between renal arterial blood flow resistance index, serum hypersensitive c-reactive protein (hs-CRP) and vascular endothelial growth factor (VEGF). **Methods:** 50 cases of patients with early diabetic nephropathy who were admitted to Second Hospital of Lanzhou University from February 2017 to February 2018 were selected as the lesion group, and another 50 cases of healthy personnel who underwent physical examination in the hospital during the same period were selected as the control group. The two groups were examined by color Doppler ultrasound. Renal blood flow parameters were compared. The serum hs-CRP and VEGF levels in the two groups were detected by enzyme-linked immunosorbent assay, and the correlation between the indexes was analyzed. **Results:** The systolic peak velocity and diastolic minimum velocity of the renal aorta, bilateral interlobular arteries of renal pyramid and renal segmental arteries in the lesion group were lower than those in the control group. The resistance indexes of the renal aorta, bilateral interlobular arteries of renal pyramid and renal segmental arteries in the lesion group were higher than those in the control group (all $P<0.05$). Serum hs-CRP and VEGF levels in the lesion group were higher than those in the control group (all $P<0.05$). Pearson correlation analysis showed that the blood flow resistance indexes of the renal aorta, bilateral interlobular arteries of renal pyramid and renal segmental arteries in patients with early diabetic nephropathy were positively correlated with serum hs-CRP and VEGF (all $P<0.05$). **Conclusion:** The application of color doppler ultrasound in the diagnosis of early diabetic nephropathy has high value, and renal arterial blood resistance index is closely related to serum hs-CRP and VEGF. In clinical work, serum hs-CRP and vascular endothelial growth factor can be detected jointly, which is helpful for the diagnosis of early diabetic nephropathy.

Key words: Early; Diabetic nephropathy; Color doppler ultrasound; Diagnostic; Renal arterial blood resistance index; Hypersensitive c-reactive protein; Vascular endothelial growth factor

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表 2 两组血清 hs-CRP、VEGF 水平对比($\bar{x} \pm s$)
Table 2 Comparison of serum hs-CRP and VEGF levels between the two groups($\bar{x} \pm s$)

Groups	n	hs-CRP(mg/L)	VEGF(ng/L)
Lesion group	50	8.52± 3.05	302.58± 55.29
Control group	50	2.60± 0.88	78.23± 16.08
t	-	13.187	27.551
P	-	0.000	0.000

2.3 早期糖尿病肾病患者肾动脉血流阻力指数与血清 hs-CRP、VEGF 的相关性分析

经 Pearson 相关性分析可得:早期糖尿病肾病患者肾主动

脉、肾锥体两侧叶间动脉、肾段动脉的血流阻力指数与血清 hs-CRP、VEGF 均呈正相关关系(均 $P < 0.05$),见表 3。

表 3 早期糖尿病肾病患者肾动脉血流阻力指数与血清 hs-CRP、VEGF 的相关性分析

Table 3 Correlation analysis of renal arterial blood resistance index with serum hs-CRP and VEGF in patients with early diabetic nephropathy

Indexes	Resistance index of renal aortic blood flow		Resistance index of bilateral interlobular arteries of renal pyramid blood flow		Resistance index of renal segmental arteries blood flow	
	flow		arteries of renal pyramid blood flow		arteries blood flow	
	r	P	r	P	r	P
hs-CRP	0.628	0.000	0.611	0.000	0.634	0.000
VEGF	0.652	0.000	0.683	0.000	0.679	0.000

3 讨论

糖尿病属于临床上最为常见的一种内分泌代谢障碍性疾病,而糖尿病肾病是该患者较为常见的一种并发症,一旦患者出现肾功能损害将会发生不可逆的损伤,最终进入终末期肾功能衰竭,严重威胁患者生命健康^[10,11]。既往,临床上主要采用传统血生化以及尿生化检查进行糖尿病肾病的诊断,但上述诊断方式均存在一定的局限性,如在疾病早期血生化以及尿生化相关指标水平变化不明显,从而增加了临床漏诊率的发生。随着近年来医疗水平的不断进步以及影像学技术的逐渐发展,彩色多普勒超声已被广泛应用于糖尿病肾病的诊断中,且获得较为明显的效果^[12-14]。肾动脉血流阻力指数主要是用于反映肾小动脉血流阻力状态,其状态的改变可能和多种细胞因子作用密切相关^[15-17]。其中 VEGF 作为重要的血管生长因子,在血管发生中起着至关重要的作用。hs-CRP 属于血管炎性反应敏感指标之一,可能通过多种途径对肾脏造成肝损伤,关于肾动脉血流阻力指数与 VEGF、hs-CRP 的关系的报道不多见。

本文结果显示病变组肾主动脉、肾锥体两侧叶间动脉、肾段动脉的收缩期峰值速度、舒张期最低速度较对照组降低,病变组肾主动脉、肾锥体两侧叶间动脉、肾段动脉的阻力指数较对照组升高,这与王彦敏等人的研究报道相符^[18],说明了彩色多普勒检查可作为诊断早期糖尿病肾病的有效手段之一。分析原因,笔者认为彩色多普勒超声检查过程中的收缩期峰值流速可有效反映肾血管的充盈程度与血流供应状况,而舒张期最低速度可有效反映肾脏血流灌注量,血流阻力指数则可用以评价血管弹性情况,通过综合上述血流参数可有效反映肾功能情况,继而实现对早期糖尿病肾病的诊断^[19-21]。另有研究报道表明^[22],早期糖尿病肾病患者的彩色多普勒图像可呈现出肾内血流信号减少,甚至是血流信号断续等现象,且血管狭窄以及不规则逐渐扩张,大部分弓形动脉以及叶间动脉血流信号消失,病

情越严重,血流信号改变越显著,这为临床诊断糖尿病肾病提供了参考依据。此外,病变组血清 hs-CRP、VEGF 水平高于对照组,这表明了 hs-CRP、VEGF 可能在糖尿病肾病的发生、发展过程中起着至关重要的作用。究其原因,血液中高浓度的 hs-CRP 会直接影响全身或局部炎症反应,继而促进血管内皮因子的释放,导致肾小球系膜细胞的增生以及增加肾小球内皮细胞通透性,进一步诱发微血管病变^[23-25];同时,hs-CRP 可通过合成黏附因子与化学趋化物,从而刺激白细胞的合成、浸润,并释放超氧化物以及蛋白水解酶,继而加剧肾组织的损伤^[26];另外,hs-CRP 参与机体的氧化应激,从而促进低密度脂蛋白被氧化成为过氧化低密度脂蛋白,进一步发挥细胞毒作用,对肾小动脉内皮细胞以及平滑肌细胞造成损伤,同时提高单核细胞对血管内皮的黏附和浸润,导致蛋白尿的出现^[27,28]。VEGF 可有效刺激血管内皮细胞生长,于肾脏组织中 VEGF 水平表达异常会引起肾小球肥大以及细胞外基质增多,促进了微血管病变,且 VEGF 具有增强血管通透性的作用,继而改变内皮细胞的结构以及功能,参与糖尿病肾病的发生、发展过程^[29,30]。本文经 Pearson 相关性分析可得:早期糖尿病肾病患者肾主动脉、肾锥体两侧叶间动脉、肾段动脉的血流阻力指数与血清 hs-CRP、VEGF 均呈正相关关系。这提示了在临床工作中可通过对彩色多普勒超声联合血清 hs-CRP、VEGF 水平检测,有利于诊断早期糖尿病肾病。

综上所述,彩色多普勒超声用于诊断早期糖尿病肾病效果显著,其中肾动脉血流阻力指数与血清 hs-CRP、VEGF 存在密切相关。临床工作中可通过联合检测血清 hs-CRP、VEGF 水平作为早期糖尿病肾病的辅助检查手段。

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