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老年心力衰竭患者 BNP、LVEDD、LVEF 水平与心脏功能的关系 *

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摘要 目的:探究老年心力衰竭患者的脑利钠肽(Brain natriuretic peptide, BNP)、左室舒张末径(Left ventricular end diastolic diameter, LVEDD)、左室射血分数(Left ventricular ejection fraction, LVEF)水平与心脏功能的关系。**方法:**选择 2019 年 3 月-2020 年 12 月于我院接受治疗的 150 例老年心力衰竭患者, 按照其 BNP 水平将其分为 A (BNP 水平 <94 pg/mL, 43 例)、B (BNP 水平 94~349.9 pg/mL, 40 例)、C (BNP 水平 350~988.9 pg/mL, 44 例)、D (BNP 水平 ≥ 989 pg/mL, 23 例) 4 组, 对比 4 组患者 LVEDD、LVEF 水平、血同型半胱氨酸(Homocysteine, HCY)水平, 对比 4 组患者不同心功能分级比率, 对比 4 组患者随访 2 个月心脏不良事件发生率, 最后分析 BNP、LVEDD 和 LVEF 与心力衰竭患者心功能分级相关性。**结果:**A、B、C、D 四组患者 LVEDD、HCY 呈递增趋势, LVEF 呈递减趋势, C、D 两组患者的 LVEDD、HCY 水平明显高于 A、B 两组($P<0.05$), C、D 两组 LVEF 水平明显低于 A、B 两组患者 ($P<0.05$); A、B、C、D 四组患者心功能分级逐渐加重, A 组患者 I 级 70 例, II 级 27 例, B 组患者 II 级 60 例, III 级 29 例, C 组 III 级 68 例, IV 级 20 例, D 组 III 级 3 例, IV 级 43 例, 各组间对比心功能分级差异具有统计学意义($P<0.05$); A、B、C、D 四组患者心脏不良事件发生率分别为 4.12%、11.24%、26.14%、43.48%, 不良事件发生率逐渐升高, 差异具有统计学意义($P<0.05$); BNP、LVEDD 与心功能分级呈正相关 ($r=0.878, 0.564, P<0.05$), LVEF 与心功能分级呈负相关 ($r=-0.781, P<0.05$)。 **结论:**BNP、LVEDD 与 LVEF 指标可以作为心力衰竭评估指标, 能够对心力衰竭患者心脏功能及预后进行评估。

关键词:老年; 心力衰竭; BNP; LVEDD; LVEF; 心脏功能

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The Relationship between BNP, LVEDD, LVEF levels and Cardiac Function in Elderly Patients with Heart Failure*

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ABSTRACT Objective: To explore BNP, LVEDD, and LVEF levels in elderly patients with heart failure Relationship with heart function. **Methods:** Select 150 elderly heart failure patients who were treated in our hospital from March 2019 to December 2020 as the research objects, and divided them into A according to their BNP level (BNP level <94 pg/mL, 43 cases), B (BNP level 94~349.9 pg/mL, 40 cases), C (BNP level 350~988.9 pg/mL, 44 cases), D (BNP level ≥ 989 pg/mL, 23 cases) 4 groups, Compare 4 groups of patients with LVEDD, LVEF levels, blood homocysteine (Homocysteine, HCY) levels, compare 4 groups of patients with different cardiac function classification ratios, compare the incidence of adverse cardiac events in 4 groups of patients followed up for 2 months, and finally analyze BNP, LVEDD and LVEF are correlated with the heart function classification of patients with heart failure. **Results:** LVEDD and HCY of the four groups A, B, C, and D showed an increasing trend, while the LVEF showed a decreasing trend. The levels of LVEDD and HCY were significantly higher than those in groups A and B ($P<0.05$). The levels of LVEF in groups C and D were significantly lower than those in groups A and B ($P<0.05$); patients in groups A, B, C, and D Cardiac function classification gradually worsened, 70 patients in group A were grade I, 27 patients were in grade II, 60 patients in group B were grade II, 29 patients were in grade III, 68 patients in group C were grade III, 20 patients were in grade IV, and 3 patients in group D were grade III. 43 cases of grade IV, the difference in cardiac function classification between the groups was statistically significant ($P<0.05$); the incidence of adverse cardiac events in the four groups of patients A, B, C, and D were 4.12%, 11.24%, 26.14% and 43.48%, respectively. The incidence of adverse events gradually increased, and the difference was statistically significant ($P<0.05$); BNP, LVEDD and cardiac function classification were positively correlated ($r=0.878, 0.564, P<0.05$), LVEF and cardiac function classification were negative correlation ($r=-0.781, P<0.05$). **Conclusion:** BNP, LVEDD and LVEF can be used as heart failure assessment indicators, which can evaluate the heart function and prognosis of patients with heart failure.

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前言

心力衰竭是一类因心脏收缩功能或舒张功能出现障碍,导致个体静脉回心血量无法充分排除心脏,使个体出现静脉系统血液淤滞、动脉系统血液灌注相对不足,最终引发心脏循环障碍症候群的疾病^[1,2]。心力衰竭临床上最为集中的表现包括肺淤血和腔静脉淤血等,患者的主要临床表现为夜间阵发性呼吸困难、急性肺水肿、腹部水肿、运动耐力下降等,部分严重患者还会出现心源性休克、低氧血症等,危及患者生命^[3,4]。我国临床数据统计显示,心衰患病率约为2%~3%,且70~79岁人群患病率高达30.8%^[5-7]。心力衰竭的诱发因素与感染、贫血、妊娠等有关,严重威胁患者的生命健康安全^[8,9]。BNP是当前心力衰竭常用实验室指标之一,LVEDD及LVEF是反映心脏功能的常用指标,本文作者通过研究发现,BNP、LVEDD与LVEF指标可以作为心力衰竭评估指标,有助于对心力衰竭患者心脏功能及预后进行检测评估。

1 资料与方法

1.1 一般资料

选择2018年6月至2020年6月于我院接受治疗150例老年心力衰竭患者。纳入标准:(1)入组患者均符合中华医学会心血管病学分会2014年制定的心力衰竭诊断标准且超声检测显示心功能不全^[10,11];(2)患者意识清醒,具有一定自理能力,能够配合实施调研;(3)患者签署知情同意书;(4)年龄≥60周岁;排除标准:(1)合并严重其他器质性疾病者;(2)合并精神疾病者;(3)合并肝肾功能不全者;(4)无生活自理能力者;(5)合并器质性心脏病如心肌炎、心脏瓣膜疾病者;(6)合并严重感染性疾病、免疫系统疾病或血液系统疾病者;(7)合并恶性肿瘤者。

1.2 研究方法

按照入组患者的BNP水平将其分为A(BNP水平<94 pg/mL,43例)、B(BNP水平94~349.9 pg/mL,40例)、C(BNP水平350~988.9 pg/mL,44例)、D(BNP水平≥989 pg/mL,23例)4组,采集4组患者清晨空腹静脉血并检测BNP及HCY

水平,HCY水平检测应用全自动生化分析仪进行,BNP水平的检测采用酶联免疫吸附法(ELISA)实施,LVEDD及LVEF水平的检测选择西门子彩色超声心动图进行,每个指标检测3次并取平均值作为最终结果。

1.3 观察指标

① 四组患者LVEDD、LVEF及HCY水平:分别检测四组患者LVEDD、LVEF及HCY水平,并实施组间对比,分析其差异性是否具有统计学意义。

② 四组患者心功能分级:按照NYHA心功能分级^[12,13]将四组患者的心功能区分为I-IV级,其中I级标准为患者有心脏病但日常活动无影响,一般体力劳动不会引起过度疲劳或气喘、心绞痛,II级标准为患者日常活动受到一定影响,一般体力劳动引起轻度气喘、心悸或心绞痛,III级标准为患者日常生活影响明显,小于一般体力劳动即可引起过度疲劳、心悸或气喘,IV级标准为患者无法从事任何体力劳动,休息状态下也有心衰症状。

③ 心脏不良事件发生率:对四组患者实施为期2个月的随访,记录其心脏不良事件诸如心源性休克、新发心衰、心肌梗死等的发生率,并进行组间对比。

④ BNP、LVEDD、LVEF与心功能分级相关性分析:采用相关性分析就BNP、LVEDD、LVEF与心功能分级的相关性进行分析。

1.4 统计学方法

使用SPSS22.0对采集的数据实施分析,计数资料以率(%)的形式表示,采用卡方检验,计量资料以($\bar{x} \pm s$)的形式表示,采用t检验,相关性分析使用Pearson相关性分析,以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 四组一般资料比较

四组患者一般临床资料如性别比率、平均年龄、疾病类型等对比差异不具有统计学意义($P > 0.05$),具有可比性,具体数据如表1所示。

表1 两组患者一般临床资料对比

Table 1 Comparison of general clinical data of the two groups of patients

Index		Group A (n=43)	Group B (n=40)	Group C (n=44)	Group D (n=23)	χ^2/t	P
Sex	Male	23	20	23	12	0.762	<0.05
	Female	20	20	21	11		
Age(year)		67.98± 3.87	68.23± 3.01	68.10± 2.98	67.99± 3.22	1.098	<0.05
Type of disease	Hypertensive heart disease	13	12	14	7	0.889	<0.05
	Dilated heart disease	10	10	13	6		
	Coronary heart disease	12	12	10	6		
	Rheumatic heart disease	8	6	7	4		

2.2 四组患者 LVEDD、HCY 及 LVEF 水平对比

A、B、C、D 四组患者 LVEDD、HCY 呈递增趋势, LVEF 呈递减趋势, 组间对比显示 C、D 两组患者的 LVEDD、HCY 水平明显高于 A、B 两组患者 ($P<0.05$), C、D 两组患者的 LVEF 水

平明显低于 A、B 两组患者 ($P<0.05$), A、B 两组患者指标对比差异不具有统计学意义 ($P>0.05$), C、D 两组患者其他指标对比差异不具有统计学意义 ($P>0.05$), 见表 2 所示。

表 2 四组患者 LVEDD、HCY 及 LVEF 水平对比($\bar{x} \pm s$)

Table 2 Comparison of LVEDD, HCY and LVEF levels of the four groups of patients($\bar{x} \pm s$)

Groups	LVEDD(mm)	HCY($\mu\text{mol/L}$)	LVEF(%)
Group A(n=43)	45.31 $\pm$ 3.90	22.66 $\pm$ 2.17	49.98 $\pm$ 5.87
Group B(n=40)	46.33 $\pm$ 4.43	23.76 $\pm$ 2.83	49.88 $\pm$ 7.71
Group C(n=44)	60.82 $\pm$ 4.38 ^{*#}	26.88 $\pm$ 3.88 ^{*#}	40.78 $\pm$ 3.43 ^{*#}
Group D(n=23)	65.98 $\pm$ 4.98 ^{*#}	28.87 $\pm$ 4.30 ^{*#}	35.99 $\pm$ 4.98 ^{*#}

Note: Compared with group A, ^{*} $P<0.05$, compared with group B, [#] $P<0.05$.

2.3 四组患者心功能分级比较

A、B、C、D 四组患者心功能分级逐渐加重, A 组患者 I 级 70 例, II 级 27 例, B 组患者 II 级 60 例, III 级 29 例, C 组 III 级

68 例, IV 级 20 例, D 组 III 级 3 例, IV 级 43 例, 各组间对比心功能分级差异具有统计学意义 ($P<0.05$), 见表 3 所示。

表 3 四组患者心功能分级比较(例, %)

Table 3 Comparison of cardiac function classification of four groups of patients (n, %)

Groups	I	II	III	IV
Group A(n=43)	70(72.16)	27(27.84)	0(0.00)	0(0.00)
Group B(n=40)	0(0.00) [*]	60(67.42) [*]	29(32.58) [*]	0(0.00) [*]
Group C(n=44)	0(0.00) ^{*#}	0(0.00) ^{*#}	68(77.27) ^{*#}	20(22.73) ^{*#}
Group D(n=23)	0(0.00) ^{*#&}	0(0.00) ^{*#&}	3(6.52) ^{*#&}	43(93.48) ^{*#&}

Note: Compared with group A, ^{*} $P<0.05$, compared with group B, [#] $P<0.05$, compared with group C, [&] $P<0.05$.

2.4 四组患者心脏不良事件发生率

A、B、C、D 四组患者心脏不良事件发生率分别为 4.12 %、

11.24 %、26.14 %、43.48 %, 不良事件发生率逐渐升高, 差异具有统计学意义 ($P<0.05$), 见表 4 所示。

表 4 四组患者心脏不良事件发生率对比

Table 4 Comparison of the incidence of adverse cardiac events in the four groups of patients

Groups	Number of adverse cardiac events	Rate of adverse cardiac events
Group A(n=43)	4	4.12%
Group B(n=40)	10	11.24% [*]
Group C(n=44)	23	26.14% ^{*#}
Group D(n=23)	20	43.48% ^{*#&}

Note: Compared with group A, ^{*} $P<0.05$, compared with group B, [#] $P<0.05$, compared with group C, [&] $P<0.05$.

2.5 相关性分析

经 Pearson 相关性分析发现, BNP、LVEDD 与心功能分级呈正相关($r=0.878$ 、 0.564 , $P<0.05$), LVEF 与心功能分级呈负相关($r=-0.781$, $P<0.05$)。

3 讨论

随着近些年居民生活水平的提高和饮食结构的改变, 各类心血管事件的发生率也有逐年上升趋势, 尤其是老年患者群体, 患病率呈现激增态势, 数据显示当前心血管疾病已成为全球死亡病历首因^[14,15]。心力衰竭是心室重构、左心室功能不全等

多种心脏疾病发展的终末阶段, 在老年群体中具有较高的发病率和死亡率^[16,17]。临床研究指出, 随着年龄的增长, 个体的新陈代谢能力和心血管修复能力逐年下降, 尤其是储备功能有明显下降, 导致个体心肌张力和心脏排血量下降, 增加了心力衰竭的患病率^[18,19]。心力衰竭患者因心脏排血量无法满足组织器官需求, 因而患者常常出现倦怠、乏力、消化不良、运动能力下降等症状, 部分患者还会因呼吸困难或体液滞留危及生命安全^[20,21], 因而临床上建议及早实施诊治, 以改善老年患者预后, 提高其生活质量。

BNP 是临床上常用的心衰定量标志物, 该标志物对心力衰

竭具有高度准确性,同时还是心力衰竭的最强大预测因子,因而常常被应用于心力衰竭患者心脏功能指标的评测中。有研究指出,BNP具有兴奋神经系统的作用,能够减轻对心室的压力^[22,23],同时还与心室舒张压、呼吸困难、心肌纤维牵张等进程具有密切联系,一般正常个体血清中BNP水平含量较低,但当个体出现心室体积增大、心室负荷压力提升等病变时,患者机体会释放大量的BNP,因而可将该因子作为评估心力衰竭患者病情的指标之一^[24,25]。本研究通过将320例心力衰竭患者进行分组对比发现,随着BNP水平的升高,患者HCY水平也有显著上升趋势,A组HCY水平为 $(22.66 \pm 2.17) \mu\text{mol/L}$,B组为 $(23.76 \pm 2.83) \mu\text{mol/L}$,C组为 $(26.88 \pm 3.88) \mu\text{mol/L}$,D组为 $(28.87 \pm 4.30) \mu\text{mol/L}$ 。HCY已被证实是一种能够评估心衰患者病情严重程度的血清因子,其水平会随着心力衰竭患者心功能分级的增加而升高,而本文中结果也印证了该观点,BNP水平与心力衰竭患者心功能分级存在正相关联系,提示患者血样BNP水平的升高反映患者病情的加重^[26,27]。与王海艳^[28]的研究类似,该学者探究了BNP、hs-CRP、HCY、尿酸(UA)浓度水平在老年慢性心力衰竭患者中的临床意义及与心功能的关系,结果显示BNP、hs-CRP、HCY和UA两两之间呈正相关。

LVEDD与LVEF是反映心脏功能的常用指标,已有多项研究指出,心力衰竭患者会出现明显的LVEDD升高和LVEF下降现象^[29,30],本研究结果提示,A、B、C、D四组心力衰竭患者LVEDD和LVEF存在较明显的组间差异,C、D两组的LVEDD水平明显高于A、B两组,LVEF明显低于A、B两组,进一步的心功能分级对比显示,A组患者心功能分级以I、II级为主,分别为70例、27例,B组以II、III级为主,分别为60例、29例,C组以III、IV级为主分别为68例、20例,D组以III、IV级为主,分别为3例、43例,总体分析可以发现随着患者血清BNP水平的升高,患者心功能分级呈现递增趋势,而相关性分析也提示BNP水平与心功能分级呈现正相关联系($r=0.878$, $P<0.05$),与刘悦晴^[31]等学者的研究类似,该学者探讨血清BNP和超声心动图在评估慢性心力衰竭患者心功能中的临床价值,观察组的血清BNP、LVEDD水平均高于健康对照组,LVEF低于对照组,按照心力衰竭级别分组,各组间的BNP水平不同,且任意两组间的BNP有统计学差异,随着心力衰竭级别的增加,BNP逐渐增加;随着心力衰竭级别的增加,LVEF逐渐降低;各组间的LVEDD不同,且心力衰竭III级与I级,IV级与I级,IV级与II级间差异有统计学意义;随着心力衰竭级别的增加,BNP水平逐渐增加,但LVEF水平逐渐降低;各组间的LVEDD不同,且心力衰竭III级与I级,IV级与I级,IV级与II级间差异有统计学意义。血清BNP与LVEF呈负相关。本研究还就不同心力衰竭病情患者心脏不良事件发生率进行了对比,结果显示,A、B、C、D四组患者发生率分别为4.12%、11.24%、26.14%和43.48%,组间对比差异明显,这说明BNP对心脏不良事件的发生率还具有一定的预测作用,BNP水平越高则代表患者心功能越差,发生心脏不良事件的几率越高。与陈蓉^[32]的研究类似,目的探讨血浆BNP检测在慢性心力衰竭早期诊断中的应用价值,BNP水平分为A组($\text{BNP} \geq 400 \text{ ng/L}$)和B组($\text{BNP} < 400 \text{ ng/L}$),随访1年A组心脏不良事件发生率和再次住院率均高于B组。本研究结果可以为临床对心力衰竭患者心脏

功能及预后诊断提供指示作用。

综上所述,BNP、LVEDD与LVEF指标可以作为心力衰竭评估指标,有助于对心力衰竭患者心脏功能及预后进行检测评估,值得在临床上进行推广应用。

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