

· 临床研究 ·

高敏肌钙蛋白 T 对非急性冠脉综合征老年住院衰弱患者预后的影响

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【摘要】目的 探讨高敏肌钙蛋白 T(hs-cTnT) 对非急性冠脉综合征(ACS)老年住院衰弱及衰弱前期患者预后的影响。**方法** 选择 2017 年 1 月至 2019 年 12 月于首都医科大学附属复兴医院综合老年科收住院的经 Fried 量表评估为衰弱及衰弱前期患者。检测患者的 hs-cTnT 水平,记录患者的一般资料、实验室检查指标及超声心动指标,出院后每 3 个月进行电话随访,记录患者的全因死亡情况。根据 hs-cTnT 三分位数将患者分为低值组、中值组和高值组,采用乘积极限(Kaplan-Meier)法(K-M 曲线)比较 3 组患者生存曲线的差异,采用 Cox 回归模型分析 hs-cTnT 三分位分组对患者死亡风险的影响。采用 SPSS 18.0 软件进行数据分析。根据数据类型,组间比较分别采用 *t* 检验、方差分析、Wilcoxon 检验及 χ^2 检验。**结果** 本研究共纳入衰弱及衰弱前期老年住院患者 450 例,其中 72.4%(326/450)患者 hs-cTnT 超过切点值 0.014 $\mu\text{g/L}$ 。低值组、中值组和高值组年龄[(83.67 $\pm$ 5.72)和(86.06 $\pm$ 4.93)和(87.67 $\pm$ 5.23)岁]、男性患者[62(41.3%)和 94(62.7%)和 108(72.0%)]、慢性心力衰竭患者[(4(2.7%) 和 5(3.3%) 和 22(14.7%)]、高血压患者[(116(77.3%) 和 119(79.3%) 和 133(88.7%)]、心律失常患者[41(27.3%) 和 38(25.3%) 和 60(40.0%)]、慢性肾脏病患者[27(18.0%) 和 38(25.3%) 和 61(40.7%)]、共病(≥ 4 种共病)患者[72(48.0%) 和 73(48.7%) 和 99(66.0%)]、血红蛋白[(125.11 $\pm$ 16.03)和(121.50 $\pm$ 18.08)和(115.38 $\pm$ 16.97)g/L]、肾小球滤过率[(87.91 $\pm$ 30.74)和(76.73 $\pm$ 23.08)和(66.69 $\pm$ 27.80)ml/(min $\cdot$ 1.73m²)]、白蛋白[(38.15 $\pm$ 3.81)和(37.60 $\pm$ 3.98)和(36.04 $\pm$ 4.41)g/L]、总胆固醇[(4.01 $\pm$ 0.98)和(3.62 $\pm$ 0.88)和(3.70 $\pm$ 0.85)mmol/L]、低密度脂蛋白胆固醇[(2.42 $\pm$ 0.88)和(2.05 $\pm$ 0.73)和(2.19 $\pm$ 0.77)mmol/L]、N 末端 B 型钠利尿肽前体[163.5(104.8, 398.9)和 314.7(171.4, 683.8)和 547.3(288.3, 1568.3)pg/ml]、室间隔厚度[(11.30 $\pm$ 0.83)和(11.42 $\pm$ 0.79)和(11.71 $\pm$ 1.07)mm]、左室后壁厚度[(11.31 $\pm$ 0.83)和(11.46 $\pm$ 0.75)和(11.65 $\pm$ 0.83)mm]、左室质量指数[(107.38 $\pm$ 13.32)和(109.90 $\pm$ 13.86)和(112.72 $\pm$ 19.29)g/m²]及左室射血分数[(60.65% $\pm$ 2.97%) 和(59.58% $\pm$ 3.91%) 和(58.54% $\pm$ 5.08%)]比较,差异均有统计学意义(均 $P<0.05$)。Cox 回归模型分析显示,校正性别、年龄、合并疾病、化验指标及超声心动指标后,高值组患者死亡风险较中值组明显增高($HR=3.133$, 95% CI 1.381~7.109; $P<0.01$);生存曲线显示,低值组、中值组和高值组中位生存时间估计值分别为 53、51 和 48 个月,在出院后 10~20 个月后高值组生存率明显低于低值组和中值组;在出院后 20~30 个月后,高值组、中值组患者生存率明显低于低值组,生存曲线 Log-Rank 检验显示生存率差异有统计学意义($P<0.001$)。**结论** 本研究结果显示,无 ACS 老年衰弱及衰弱前期住院患者,hs-cTnT 水平高,高于切点值的比例高,hs-cTnT 高值组患者死亡风险明显增加,不同水平 hs-cTnT 升高均会对患者全因死亡产生不良影响,hs-cTnT 水平越高对死亡风险的影响越明显。

【关键词】 老年人;高敏肌钙蛋白 T;衰弱;住院患者;预后

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Influence of high-sensitivity cardiac troponin T on prognosis of frail elderly inpatients

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【Abstract】Objective To explore the influence of high-sensitivity cardiac troponin T (hs-cTnT) on the prognosis of frail and pre-frail elderly hospitalized patients without acute coronary syndrome (ACS). **Methods** The elderly patients who were admitted to our department and identified as frailty or pre-frailty by Fried Frailty Phenotype assessment from January 2017 to December 2019 were enrolled in this study. Their hs-cTnT level, general information, laboratory indicators and echocardiographic indicators were recorded. Follow-up was conducted each three months through phone call after discharge and all-cause deaths of the patients were observed. These patients were divided into low-, median-, and high-value groups according to hs-cTnT tertiles. The survival curves of the three

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groups were compared using Kaplan-Meier method (K-M curve). Cox proportional hazard-regression model was used to analyze the effect of 3 hs-cTnT groups on the risk of death. SPSS statistics 18.0 was used for statistical analysis. Data comparison between two groups was performed using *t* test, Fisher exact test, Wilcoxon test or χ^2 test depending on data type. **Results** A total of 450 frail and pre-frail elderly inpatients were subjected in this study, 72.4% (326/450) of them had hs-cTnT levels exceeding the cut-off value of 0.014 $\mu\text{g/L}$. There were significant differences in age [(83.67 $\pm$ 5.72) *vs* (86.06 $\pm$ 4.93) *vs* (87.67 $\pm$ 5.23) years], male ratio [62 (41.3%) *vs* 94 (62.7%) *vs* 108 (72.0%)], chronic heart failure ratio [4 (2.7%) *vs* 5 (3.3%) *vs* 22 (14.7%)], hypertension ratio [116 (77.3%) *vs* 119 (79.3%) *vs* 133 (88.7%)], arrhythmia ratio [41 (27.3%) *vs* 38 (25.3%) *vs* 60 (40.0%)], chronic kidney disease ratio [27 (18.0%) *vs* 38 (25.3%) *vs* 61 (40.7%)], comorbid conditions [$\geq$ 4, 72 (48.0%) *vs* 73 (48.7%) *vs* 99 (66.0%)], hemoglobin level [(125.11 $\pm$ 16.03) *vs* (121.50 $\pm$ 18.08) *vs* (115.38 $\pm$ 16.97) g/L], estimated glomerular filtration rate [(87.91 $\pm$ 30.74) *vs* (76.73 $\pm$ 23.08) *vs* (66.69 $\pm$ 27.80) ml/(min $\cdot$ 1.73m²)], albumin level [(38.15 $\pm$ 3.81) *vs* (37.60 $\pm$ 3.98) *vs* (36.04 $\pm$ 4.41) g/L], total cholesterol level [(4.01 $\pm$ 0.98) *vs* (3.62 $\pm$ 0.88) *vs* (3.70 $\pm$ 0.85) mmol/L], low-density lipoprotein cholesterol level [(2.42 $\pm$ 0.88) *vs* (2.05 $\pm$ 0.73) *vs* (2.19 $\pm$ 0.77) mmol/L], N-terminal pro-brain natriuretic peptide level [163.5 (104.8, 398.9) *vs* 314.7 (171.4, 683.8) *vs* 547.3 (288.3, 1568.3) pg/ml], interventricular septal thickness [(11.30 $\pm$ 0.83) *vs* (11.42 $\pm$ 0.79) *vs* (11.71 $\pm$ 1.07) mm], left ventricular post-wall depth [(11.31 $\pm$ 0.83) *vs* (11.46 $\pm$ 0.75) *vs* (11.65 $\pm$ 0.83) mm], left ventricular mass index [(107.38 $\pm$ 13.32) *vs* (109.90 $\pm$ 13.86) *vs* (112.72 $\pm$ 19.29) g/m²] and left ventricular ejection fraction [(60.65 $\pm$ 2.97)% *vs* (59.58 $\pm$ 3.91)% *vs* (58.54 $\pm$ 5.08)%] among 3 groups (all $P < 0.05$). Cox regression model analysis showed that after adjustment for gender, age, comorbidities, laboratory indicators and echocardiographic indicators, the mortality risk was significantly higher in the patients of the high-value group than those in the low-value group ($HR = 3.133$, 95% CI 1.381–7.109, $P < 0.01$). Survival curve analysis indicated that median survival time was estimated at 53, 51 and 48 months in the low-, median- and high-value groups, respectively. And in 10–20 months after discharge, the survival rate of the high-value group was significantly lower than that of the other two groups, and even in 20–30 months after discharge, the rate of the high-value group and the median-value group was obviously lower than that of the low-value group. Log-Rank test showed that the survival rates of the three groups was significantly different ($P < 0.001$). **Conclusion** For the frail and pre-frail elderly inpatients without ACS, higher hs-cTnT level, higher than the cut-off value, indicates higher risk of death. The increment exerts adverse effect on all-cause death, with the higher the level, the higher risk of death.

【Key words】 aged; high-sensitivity cardiac troponin T; frailty; inpatients; prognosis

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人口老龄化是当今社会面临的严峻话题,老年人衰弱增加住院、跌倒、失能、骨折及死亡风险^[1],增加患者及社会负担,衰弱是老年医学研究的热点。研究发现衰弱与冠心病、心力衰竭、急性冠脉综合征(acute coronary syndrome, ACS)等心血管疾病相关,且与不良预后相关。衰弱与心血管疾病有着共同的发病机制,常同时存在且相互促进。高敏肌钙蛋白T(high-sensitivity cardiac troponin T, hs-cTnT)主要用于ACS的诊断及危险分层,但有研究发现,无ACS人群尤其老年人轻度hs-cTnT升高的情况较常见,多种因素可以引起hs-cTnT轻度升高,且与不良预后相关^[2–4]。我们前期研究发现hs-cTnT与老年住院患者衰弱独立相关^[5],本研究旨在探讨hs-cTnT对衰弱患者预后的影响,报道如下。

1 对象与方法

1.1 研究对象

本研究为前瞻性队列研究。选择2017年1月至2019年12月于首都医科大学附属复兴医院综合老年科收住院的经Fried量表评估为衰弱及衰弱前

期患者,出院后每3个月进行电话随访,终点事件为全因死亡。本研究通过首都医科大学附属复兴医院伦理委员会批准。

纳入标准:年龄 ≥ 65 岁,签署知情同意书,Fried衰弱量表评估符合1项及以上(衰弱及衰弱前期)。排除标准:临床诊断ACS、急性心力衰竭、活动性肿瘤、肾功能衰竭需透析者、无衰弱、卧床不能完成衰弱评估、严重精神疾病不能配合交流、严重肝病、疾病终末期及各种原因不能完成衰弱评估的患者。

1.2 方法

收集患者的一般资料,包括性别、年龄、体质量指数(body mass index, BMI)及血压等,记录患者的慢性疾病情况,高血压、冠心病、2型糖尿病、心律失常、慢性心力衰竭、慢性肺疾病、慢性肾脏病及共病情况。根据hs-cTnT三分位数将患者分为低值组、中值组和高值组各150例。

实验室检查:入院第2天清晨空腹12 h以上抽血,检测患者hs-cTnT、N末端B型钠利尿肽前体(N-terminal pro-brain natriuretic peptide, NT-proBNP)、血红蛋白、血肌酐、白蛋白、丙氨酸转氨酶(alanine

transaminase, ALT)、总胆固醇 (total cholesterol, TC)、低密度脂蛋白胆固醇 (low-density lipoprotein cholesterol, LDL-C), 计算估算肾小球滤过率 (estimated glomerular filtration rate, eGFR)。

心脏彩色超声: 测量左心房内径 (left atrium diameter, LAD)、左心室舒张末期内径 (left ventricular end-diastolic diameter, LVEDD)、室间隔厚度 (inter-ventricular septal thickness, IVST)、左心室后壁厚度 (left ventricular post-wall depth, LVPWD) 和左室射血分数 (left ventricular ejection fraction, LVEF), 根据 Devereux 和 Reichek 法估测左心室质量指数 (left ventricular mass index, LVMI)。

采用 Fried 表型衰弱量表评估衰弱状况, 包含 5 项内容: (1) 非自主性体质量下降为过去 1 年体质量下降 >4.54 kg 或与 1 年前比较体质量下降 >5%; (2) 自我感觉疲劳; (3) 入院前 1 个月内体力活动下降为男性每周消耗 <1 603 kJ, 女性每周消耗 <1 130 kJ; (4) 步速下降为男性 <0.650 m/s, 女性 <0.600 m/s; (5) 握力下降为男性 <22 kg, 女性 <14 kg。(1)(2)(3) 项参照 Fried 标准。(4)(5) 参考一项关于亚洲老年人步速、握力标准^[6]。符合 3 条及以上为衰弱, 符合 1 或 2 条为衰弱前期, 符合 0 条为无衰弱。该研究纳入衰弱及衰弱前期患者。

1.3 统计学处理

采用 SPSS 18.0 统计软件进行数据分析。符合正态分布的计量资料均数±标准差 ($\bar{x} \pm s$) 表示, 2 组

间比较采用 *t* 检验, 多组间比较采用方差分析; 非正态分布的计量资料, 用中位数 (四分位数间距) [$M(Q_1, Q_3)$] 表示, 采用 Kruskal-Wallis 检验。计数资料用例数 (百分率) 表示, 采用 χ^2 检验。采用乘积极限 (Kaplan-Meier) 法 (K-M 曲线) 比较 3 组生存曲线的差异, 采用 Cox 回归模型分析 hs-cTnT 三分位分组对患者死亡风险的影响。 $P < 0.05$ 为差异有统计学意义。

2 结果

该研究共纳入患者 450 例, 年龄 65 ~ 107 (85.80 ± 5.54) 岁。hs-cTnT 0.003 ~ 0.513 μg/L, 326 例 (72.4%) 患者超过切点值 0.014 μg/L, 中位数 0.018 μg/L, 三分位数分别为 0.014 和 0.022 μg/L, 根据 hs-cTnT 三分位分组, 分为低值组 (0.003 ~ 0.014), 中值组 (0.015 ~ 0.022), 高值组 (0.023 ~ 0.513) 各 150 例。

2.1 3 组一般资料比较

3 组 BMI、收缩压、舒张压、冠心病、糖尿病、慢性肺疾病发生率比较, 差异均无统计学意义 (均 $P > 0.05$); 与低值组比较, 中值组和高值组年龄、男性比例、死亡比例增加, 差异均有统计学意义 (均 $P < 0.05$); 高值组年龄、慢性心力衰竭、高血压、心律失常、慢性肾脏病 (chronic kidney disease, CKD) 发生率、≥4 种共病、死亡人数比例明显高于低值组和中值组, 差异均有统计学意义 (均 $P < 0.05$; 表 1)。

表 1 3 组患者一般资料比较

Table 1 Comparison of baseline data among three groups

Item	Total (n = 450)	Low group (n = 150)	Median group (n = 150)	High group (n = 150)	P value
Age (years, $\bar{x} \pm s$)	85.80 ± 5.54	83.67 ± 5.72	86.06 ± 4.93 **	87.67 ± 5.23 **##	<0.001
Male [n (%)]	264 (58.7)	62 (41.3)	94 (62.7) **	108 (72.0) **	<0.001
BMI (kg/m ² , $\bar{x} \pm s$)	23.53 ± 4.09	23.41 ± 4.01	23.67 ± 3.97	23.50 ± 4.30	0.858
SBP (mmHg, $\bar{x} \pm s$)	134.96 ± 18.67	133.14 ± 18.96	136.75 ± 17.22	134.99 ± 19.82	0.264
DBP (mmHg, $\bar{x} \pm s$)	67.62 ± 9.21	66.71 ± 9.03	68.76 ± 8.22	67.36 ± 10.31	0.160
CAD [n (%)]	189 (42.0)	60 (40.0)	55 (36.7)	74 (49.3)	0.072
CHF [n (%)]	31 (6.9)	4 (2.7)	5 (3.3)	22 (14.7) **##	<0.001
Hypertension [n (%)]	368 (81.8)	116 (77.3)	119 (79.3)	133 (88.7) **	0.027
DM [n (%)]	188 (41.8)	56 (37.3)	58 (38.7)	74 (49.3)	0.072
Arrhythmology [n (%)]	139 (30.9)	41 (27.3)	38 (25.3)	60 (40.0) **	0.012
COPD [n (%)]	122 (27.1)	35 (23.3)	37 (24.7)	50 (33.3)	0.108
CKD [n (%)]	127 (28.2)	27 (18.0)	38 (25.3)	61 (40.7) **##	<0.001
Number of comorbidities [n (%)]					0.003
≤1	40 (8.9)	18 (12.0)	17 (11.3)	5 (3.3)	
2-3	166 (36.9)	60 (40.0)	60 (40.0)	46 (30.7)	
≥4	244 (54.2)	72 (48.0)	73 (48.7)	99 (66.0) **##	
Total death	113 (25.1)	20 (13.3)	35 (23.3) *	58 (38.7) **##	<0.001

BMI: body mass index; SBP: systolic blood pressure; DBP: diastolic blood pressure; CAD: coronary atherosclerotic heart disease; CHF: chronic heart failure; DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease. Compared with low group, * $P < 0.05$, ** $P < 0.01$; compared with median group, # $P < 0.05$, ## $P < 0.01$.

2.2 3组化验指标和超声心动指标比较

3组ALT、LAD及LVEDD指标比较,差异均无统计学意义;与低值组比较,中值组和高值组血肌酐、NT-proBNP升高,eGFR、TC、LDL-C、LVEF降低,差异均有统计学意义(均 $P<0.05$);高值组血红蛋白、eGFR、白蛋白、LVEF明显低于中值组和低值组,血肌酐、NT-proBNP、IVST、LVPWD明显高于中值组和低值组,差异均有统计学意义($P<0.05$);高值组LVMI高于低值组,差异有统计学意义($P<0.05$;表2)。

2.3 hs-cTnT三分位分组对衰弱患者预后的影响

采用Cox回归模型分析hs-cTnT三分位分组对患者死亡风险的影响,在校正性别、年龄、合并疾病、

化验指标及超声心动指标后,高值组患者死亡风险较低值组明显增高($HR=3.133$, 95%CI 1.381~7.109, $P<0.01$;表3)。

2.4 hs-cTnT三分位分组生存曲线的比较

所有患者随访时间3~54个月,中位生存时间51个月。采用K-M曲线比较3组中位生存时间及生存率,低值组、中值组和高值组中位生存时间估计值分别为53、51和48个月;3组生存曲线Log-Rank检验显示生存率有统计学意义($P<0.001$)。生存曲线显示,在出院后10~20个月后高值组生存率明显低于低值组和中值组;在出院后20~30个月后,高值组、中值组患者生存率明显低于低值组($P<0.001$;图1)。

表2 3组化验指标和超声心动指标的比较

Table 2 Comparison of laboratory test results and echocardiographic index of subjects among three groups

Item	Total ($n=450$)	Low group ($n=150$)	Median group ($n=150$)	High group ($n=150$)	P value
Hemoglobin (g/L, $\bar{x}\pm s$)	120.66 $\pm$ 17.48	125.11 $\pm$ 16.03	121.50 $\pm$ 18.08	115.38 $\pm$ 16.97 ^{***}	<0.001
Creatinine (U/L, $\bar{x}\pm s$)	88.60 $\pm$ 38.31	74.52 $\pm$ 24.93	86.67 $\pm$ 30.73 ^{**}	104.62 $\pm$ 48.94 ^{***}	<0.001
eGFR [ml/(min $\cdot$ 1.73m ²), $\bar{x}\pm s$]	77.11 $\pm$ 28.67	87.91 $\pm$ 30.74	76.73 $\pm$ 23.08 ^{**}	66.69 $\pm$ 27.80 ^{***}	<0.001
ALT (U/L, $\bar{x}\pm s$)	16.96 $\pm$ 11.26	16.33 $\pm$ 8.77	17.89 $\pm$ 13.53	16.67 $\pm$ 10.98	0.452
Albumin protein (g/L, $\bar{x}\pm s$)	37.26 $\pm$ 4.16	38.15 $\pm$ 3.81	37.60 $\pm$ 3.98	36.04 $\pm$ 4.41 ^{***}	<0.001
TC (mmol/L, $\bar{x}\pm s$)	3.78 $\pm$ 0.92	4.01 $\pm$ 0.98	3.62 $\pm$ 0.88 ^{**}	3.70 $\pm$ 0.85 ^{**}	<0.001
LDL-C (mmol/L, $\bar{x}\pm s$)	2.22 $\pm$ 0.81	2.42 $\pm$ 0.88	2.05 $\pm$ 0.73 ^{**}	2.19 $\pm$ 0.77 [*]	<0.001
NT-proBNP [pg/ml, $M(Q_1, Q_3)$]	318.1(149.0,717.3)	163.5(104.8,398.9)	314.7(171.4,683.8) ^{**}	547.3(288.3,1568.3) ^{**} ^{###}	<0.001
LAD (mm, $\bar{x}\pm s$)	37.49 $\pm$ 4.73	37.20 $\pm$ 4.47	37.28 $\pm$ 4.39	37.99 $\pm$ 5.26	0.280
LVEDD (mm, $\bar{x}\pm s$)	43.57 $\pm$ 3.25	43.38 $\pm$ 2.45	43.52 $\pm$ 2.86	43.78 $\pm$ 4.18	0.522
IVST (mm, $\bar{x}\pm s$)	11.47 $\pm$ 0.92	11.30 $\pm$ 0.83	11.42 $\pm$ 0.79	11.71 $\pm$ 1.07 ^{***}	<0.001
LVPWD (mm, $\bar{x}\pm s$)	11.47 $\pm$ 0.81	11.31 $\pm$ 0.83	11.46 $\pm$ 0.75	11.65 $\pm$ 0.83 ^{***}	0.001
LVMI (g/m ² , $\bar{x}\pm s$)	110.00 $\pm$ 15.84	107.38 $\pm$ 13.32	109.90 $\pm$ 13.86	112.72 $\pm$ 19.29 ^{**}	0.014
LVEF (% , $\bar{x}\pm s$)	59.59 $\pm$ 4.16	60.65 $\pm$ 2.97	59.58 $\pm$ 3.91 [*]	58.54 $\pm$ 5.08 ^{***}	<0.001

eGFR: estimated glomerular filtration rate; ALT: alanine transaminase; TC: total cholesterol; LDL-C: low-density lipoprotein cholesterol; NT-proBNP: N-terminal pro-brain natriuretic peptide; LAD: left atrium diameter; LVEDD: left ventricular end-diastolic diameter; IVST: interventricular septal thickness; LVPWD: left ventricular post-wall depth; LVMI: left ventricular mass index; LVEF: left ventricular ejection fraction. Compared with low group, ^{*} $P<0.05$, ^{**} $P<0.01$;compared with median group, [#] $P<0.05$, ^{###} $P<0.01$.

表3 hs-cTnT三分位分组对衰弱患者死亡风险的影响

Table 3 Effect of hs-cTnT tripartite grouping on risk of death in patients with frailty

Low group		Median group		High group	
		<i>HR</i> (95% <i>CI</i>)	<i>P</i> value	<i>HR</i> (95% <i>CI</i>)	<i>P</i> value
Model 1	1 (reference)	1.616(0.930–2.811)	0.089	2.833(1.673–4.796)	<0.001
Model 2	1 (reference)	1.616(0.930–2.810)	0.089	2.574(1.512–4.383)	<0.001
Model 3	1 (reference)	1.518(0.817–2.647)	0.141	2.425(1.421–4.138)	0.001
Model 4	1 (reference)	1.343(0.544–3.315)	0.523	3.133(1.381–7.109)	0.006

Model 1 adjusted for age and gender; Model 2 adjusted for model 1+number of comorbidities, hypertension, coronary atherosclerotic heart disease, diabetes mellitus, chronic heart failure, arrhythmology, chronic kidney disease; Model 3 adjusted for model 2 + haemoglobin, albumin protein, estimated glomerular filtration rate, N-terminal pro-brain natriuretic peptide, total cholesterol, low-density lipoprotein cholesterol; Model 4 adjusted for model 3+ interventricular septal thickness, left ventricular post-wall depth, left ventricular mass index, left ventricular ejection fraction.

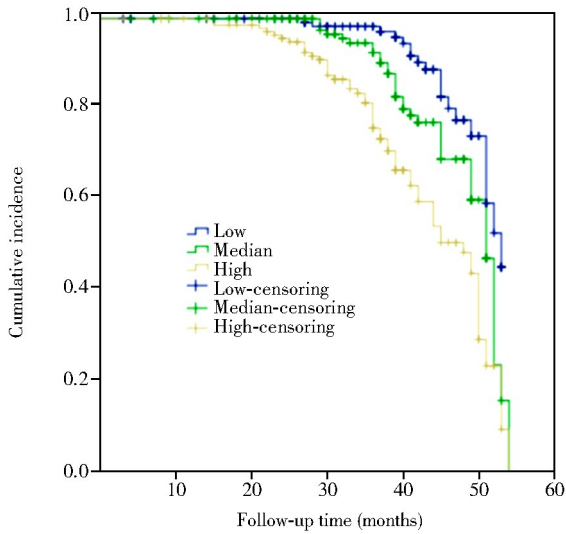


图1 hs-cTnT 三分位分组生存曲线比较

Figure 1 Comparison of survival curves among three groups

3 讨论

肌钙蛋白 T 是心肌损伤标志物,主要用于 ACS 的诊断及危险分层^[7,8]。研究发现,健康人群尤其是老年人 hs-cTnT 轻度升高常见^[9]。我们前期研究^[10]发现,无 ACS 老年人 hs-cTnT 检出率高,高于切点值 (0.014 $\mu\text{g/L}$) 的比例达 52%。本研究中 72.4% (326/450) 的患者 hs-cTnT 水平超过切点值,高于前期研究,考虑与本研究纳入的为衰弱及衰弱前期患者有关。

衰弱是一个多器官、多系统的概念,其核心为老年人生理储备能力及应激能力下降。越来越多的研究开始关注衰弱的分子和细胞机制及其病理生理机制。有研究发现衰弱与心血管疾病有共同的发病机制,常同时存在且相互促进^[11-13],衰弱使心血管疾病不良预后增加,心血管疾病加重衰弱^[14,15]。我们既往的研究显示,hs-cTnT 水平与衰弱独立相关^[5],结合本研究发现,年龄、慢性肾脏病、心功能指标、血红蛋白、白蛋白及共病等是影响 Hs-cTnT 与衰弱的共同因素。Picca 等^[16]的研究显示,血红蛋白、白蛋白与衰弱呈负相关。本研究显示高值组血红蛋白、白蛋白、胆固醇水平更低,反应患者的营养状况差,生理储备能力下降、应激能力差,更容易发生衰弱;Leibowitz 等^[17]的研究发现老年人心脏结构和收缩功能指标与衰弱相关,我们的研究显示高值组 IVST、LVPWD、左室质量指数增加,提示心肌肥厚比例增加,LVEF 值下降,提示心脏射血能力下降,心肌功能和结构

异常会导致 hs-cTnT 水平升高,同样会导致心功能储备能力下降,进一步导致机体储备能力下降,引起衰弱的发生。

本研究显示衰弱人群 hs-cTnT 高值组患者死亡比例明显增加,Cox 回归模型分析显示,校正年龄、性别、共病、化验指标及超声心动指标后,高值组死亡风险仍高于低值组 ($P=0.006$)。K-M 曲线显示,在出院后 1 年多时高值组生存率明显低于低值组和中值组;在出院后 2 年多以后,高值组、中值组患者生存率明显低于低值组。提示不同水平 hs-cTnT 升高均会对患者全因死亡产生不良影响,hs-TnT 水平越高对死亡风险的影响越明显。

本研究具有一定局限性。首先,为单中心研究,且纳入的为住院衰弱患者,不能反映社区衰弱及衰弱前期患者情况;衰弱评估的方法有很多,如 Frail 量表评估(衰弱量表评估)、衰弱指数、临床衰弱量表等,每种方法评估的结果不一定完全相同,本研究只采用了 Fried 衰弱表型评估法,对衰弱及衰弱前期的评估可能不准确;其次,影响衰弱及 hs-cTnT 的混杂因素很多,仍存在其他指标可能未纳入;此外,该研究终点事件为全因死亡,未进一步分析 hs-cTnT 升高对衰弱患者其他方面预后的影响。

综上,本研究结果显示,无 ACS 老年衰弱及衰弱前期住院患者,hs-cTnT 水平高,高于切点值的比例高。hs-cTnT 高值组患者死亡风险明显增加,不同水平 hs-cTnT 升高均会对患者全因死亡产生不良影响,hs-TnT 水平越高对死亡风险的影响越明显。

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