

超声心电图参数对非瓣膜性房颤相关脑栓塞的预测价值

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摘要

目的: 探究超声心电图参数对非瓣膜性房颤相关脑栓塞的预测价值。方法: 我们选取脑梗死患者210例, 包括非瓣膜性房颤(NVAF)相关脑栓塞患者98例及非心源性栓塞患者112例, 比较两组间差异, 应用二元Logistic回归分析筛选出NVAF相关脑栓塞的独立危险因素, 绘制受试者工作特征曲线(ROC)判断各危险因素对NVAF相关脑栓塞的预测价值。结果: NVAF相关脑栓塞患者较非心源性栓塞患者左房内径水平高, 左室射血分数水平低。二元Logistic分析显示左房内径(OR = 17.159, 95%CI: 4.429~66.471, P < 0.001)及左室射血分数(OR = 0.899, 95%CI: 0.824~0.98, P = 0.016)是NVAF相关脑栓塞的独立危险因素。左房内径、左室射血分数及两种指标联合模型预测NVAF相关脑栓塞患者的受试者工作特征(ROC)曲线下面积分别为0.826、0.658、0.846 (P < 0.001)。结论: 超声心动图参数对预测NVAF相关脑栓塞有显著价值, 尤其是左房内径。左房内径及左室射血分数可作为早期发现NVAF相关卒中患者的筛查工具。

关键词

心源性卒中, 心房颤动, 超声心动图, 左房内径

The Value of Electrocardiographic Parameters in Predicting Non-Valvular Atrial Fibrillation-Related Stroke

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Abstract

Objective: To investigate the value of electrocardiographic parameters in predicting non-valvular atrial fibrillation-related stroke. **Materials and Methods:** A total of 210 patients with acute ischemic stroke, including 98 patients with non-valvular atrial fibrillation (NVAF)-related stroke and 112 patients with non-cardiogenic embolism were selected. The differences between the two groups were compared, and independent risk factors of NVAF-related stroke were screened using binary logistic regression analysis. The diagnostic value of risk factors for NVAF-related stroke was determined by plotting the receiver operating characteristic (ROC) curves. **Results:** Patients with NVAF-related stroke had higher levels of left atrial diameter and lower levels of left ventricular ejection fraction than those with non-cardiogenic embolism. Binary logistic regression analysis indicated that left atrial diameter (LAD) (OR = 17.159, 95%CI: 4.429~66.471, $P < 0.001$) and left ventricular ejection fraction (LVEF) (OR = 0.899, 95%CI: 0.824~0.98, $P = 0.016$) were independent risk factors for NVAF-related stroke. The areas under the ROC curve for LAD, LVEF, and the combined model of two indicators were 0.826, 0.658, and 0.846, respectively, that predicted the incidence of NVAF-related stroke ($P < 0.001$). **Conclusions:** Echocardiographic parameters have significant value in predicting NVAF-related cerebral embolism, especially LAD. LAD and LVEF could be used as screening tools to identify NVAF-related stroke patients early.

Keywords

Cardioembolic Stroke, Atrial Fibrillation, Echocardiography, LAD

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1. 引言

心房颤动(简称房颤)是临床上最常见的快速性心律失常,是心源性栓塞最常见的原因[1][2]。房颤诱发的缺血性脑卒中较其他原因引起的缺血性脑卒中致残率高、复发率高和死亡率高[3]。抗凝治疗能够预防非瓣膜性房颤患者缺血性脑卒中复发[4]。早期识别非瓣膜性房颤相关脑栓塞至关重要。

目前的社会指南在很大程度上仍然依赖于单一的临床风险评分(CHA2DS2-VASC)来确定房颤患者是否有资格接受药物或机械性中风预防[5][6]。但是该评分没有考虑几个关键的解剖学、生理学和其他已被证明影响房颤患者卒中风险的因素[7][8]。临床医生有必要寻找及时有效的诊断指标来识别非瓣膜性房颤相关脑栓塞。房颤引起的左房结构重构的进展导致收缩能力和功能的降低,从而使个体容易出现血流停滞和血栓形成[9]。超声心动图在临床上应用极为广泛,有研究表明超声心动图参数与房颤有着密切联系[10]。本研究旨在探讨超声心动图参数对 NVAF 相关脑栓塞预测价值,指导临床治疗。

2. 对象与方法

2.1. 研究对象

选取青岛大学附属医院神经内科收治的急性脑梗死患者 220 例,纳入标准:所有患者均符合急性脑梗死的诊断标准,均经头部 MRI 证实为急性脑梗死,发病时间均在 7 天以内,均知情同意。排除标准:已知的活动性感染、癌症、肾脏疾病(肌酐 $> 132 \mu\text{mol/L}$)、自身免疫性疾病、目前的类固醇治疗、

具有血流动力学障碍的严重瓣膜病、急性心肌梗死及甲状腺功能亢进等患者排除在外。其中男性患者 129 例, 女性患者 91 例, 平均年龄 70 岁, 在既往史方面, 141 例为高血压, 58 例为糖尿病, 41 例为冠心病, 72 例为吸烟, 61 例为饮酒。将这些患者分成 NVAf 相关脑栓塞组和非心源性栓塞组, NVAf 相关脑栓塞组根据病史、心电图、动态心电图及超声心动图明确诊断为非瓣膜性心房颤动相关脑栓塞患者。

该研究所选病例经过伦理委员会批准。

2.2. 方法

收集两组患者的病史, 包括年龄、性别、吸烟史、饮酒史、冠心病史、高血压病史、糖尿病史、既往卒中/TIA 病史、入院收缩压、入院舒张压、入院 NIHSS 评分、空腹血糖、D-二聚体、纤维蛋白原、C 反应蛋白、尿素氮、肌酐、尿酸、总胆固醇、高密度脂蛋白、低密度脂蛋白、甘油三酯以及超声心动图参数(左室射血分数、左心房内径、左房扩大、左室肥厚)。

2.3. 统计学方法

应用 SPSS 25.0 统计软件包对数据进行统计分析。正态分布计量资料以 $\bar{x} \pm s$ 表示, 组间比较满方差齐性采用独立样本 t 检验, 方差不齐采用 t' 检验; 非正态分布的计量资料以中位数(四分位数间距)表示, 组间比较采用非参数检验。计数资料以百分率表示, 采用 χ^2 检验。应用二元 Logistic 回归分析筛选出 NVAf 相关脑栓塞的独立危险因素, 用 ROC 曲线下面积(area under the curve, AUC)反映相关指标在 NVAf 相关脑栓塞患者的预测价值。以 $P < 0.05$ 为差异有统计学意义。

3. 结果

3.1. 基线资料

2 组性别、高血压病史、糖尿病史、既往卒中及 TIA 病史、吸烟史、饮酒史、入院收缩压、入院舒张压、入院 NISS 评分、空腹血糖、总胆固醇、甘油三酯、低密度脂蛋白、高密度脂蛋白、尿素氮、肌酐、尿酸及左室肥厚比较均无明显统计学差异($P > 0.05$)。两组年龄、冠心病史、D-二聚体、纤维蛋白原、CRP、左房内径、左室射血分数比较均有明显统计学差异($P < 0.05$)。NVAf 相关脑栓塞患者较非心源性栓塞患者年龄大, 冠心病史、左房扩大病例多, D-二聚体、纤维蛋白原、CRP、左房内径水平高, 左室射血分数水平低(表 1)。

Table 1. Baseline information

表 1. 基线资料

变量	NVAf 相关脑栓塞(n = 98)	非心源性栓塞(n = 112)	T 值、U 值或 χ^2	P 值
年龄(岁)	72 ± 9	67 ± 12	4.047	0.000
男性[例(%)]	59.2 (60)	71 (63.4)	0.391	0.532
高血压[例(%)]	69 (70.4)	72 (64.3)	0.888	0.346
糖尿病[例(%)]	26 (26.5)	32 (28.6)	0.109	0.741
高血脂[例(%)]	4 (4.1)	6 (5.4)	0.187	0.665
冠心病[例(%)]	30 (30.6)	11 (9.8)	14.379	0.000
既往卒中/TIA[例(%)]	26 (26.5)	22 (19.6)	1.406	0.236
吸烟史[例(%)]	27 (27.6)	45 (40.2)	3.699	0.054
饮酒史[例(%)]	27 (27.6)	34 (30.4)	0.2	0.655

Continued

入院收缩压(mmHg)	155 ± 20	157 ± 22	-0.735	0.463
入院舒张压(mmHg)	84 ± 14	86 ± 13	-1.056	0.292
入院 NISS(分)	5 (1~12)	4 (2~8)	-1.271	0.204
空腹血糖(mmol/L)	5.59 (4.6, 6.76)	5.33 (4.63, 6.956)	-0.03	0.976
总胆固醇(mmol/L)	4.02 ± 1.00	4.22 ± 1.0	1.465	0.144
甘油三酯(mmol/L)	1.27 ± 0.63	1.28 ± 0.81	-0.084	0.933
低密度脂蛋白(mmol/L)	2.39 ± 0.82	2.66 ± 0.94	-1.934	0.055
高密度脂蛋白(mmol/L)	1.25 ± 0.3	1.2 ± 0.24	1.275	0.204
尿素氮(mmol/L)	4.95 (4.24, 6)	4.9 (4.09, 5.77)	-0.706	0.48
肌酐(umol/L)	89.05 ± 15.68	85.42 ± 12.5	1.866	0.063
尿酸(umol/L)	310 (242, 368)	282 (246, 364)	-0.356	0.722
D-二聚体(ng/mL)	380 (228, 660)	240 (150, 360)	-4.246	0.000
纤维蛋白原(g/L)	3.16 ± 1.35	2.87 ± 1.29	2.507	0.013
CRP(mg/L)	2.84 (0.9, 14.4)	0.69 (0.25, 3.14)	-4.663	0.000
左房内径(cm)	4.2 (3.9, 4.7)	3.7 (3.5, 3.9)	-8.164	0.000
左室射血分数(%)	62 (60, 64)	63 (62, 64)	-3.988	0.000
左房扩大[例(%)]	90 (90.8)	52 (46.4)	49.219	0.000
左室肥厚[例(%)]	18 (18.4)	15 (13.4)	0.997	0.323

注: CRP: C 反应蛋白。

3.2. 二元 logistic 回归分析

将上述危险因素纳入二元 logistic 回归分析显示, 左房内径(OR = 17.159, 95%CI: 4.429~66.471)及左室射血分数(OR = 0.899, 95%CI: 0.824~0.98)是非瓣膜性房颤相关脑栓塞患者的独立危险因素(P < 0.05) (表 2)。

Table 2. Binary logistic regression analysis

表 2. 二元 logistic 回归分析

	P值	OR	OR的95%置信区间	
			下限	上限
年龄(岁)	0.064	1.035	0.998	1.073
冠心病(例)	0.426	1.484	0.562	3.923
D-二聚体(ng/mL)	0.236	1.000	1.000	1.000
纤维蛋白原(g/L)	0.111	1.507	0.917	2.324
CRP (mg/L)	0.849	0.997	0.976	1.020
左房内径(cm)	<0.001	17.159	4.429	66.471
左房扩大(例)	0.247	1.898	0.642	5.614
左室射血分数(%)	0.016	0.899	0.824	0.98

注: CRP: C 反应蛋白。

3.3. ROC 分析

左房内径预测 NVAF 相关脑栓塞患者的受试者工作特征(ROC)曲线下面积(AUC)为 0.826、0.658、0.846 ($P < 0.001$), 敏感度为 74.5%, 特异度为 82.1%。左室射血分数的 AUC 为 0.658 ($P < 0.001$), 敏感度为 64.3%, 特异度为 65.2%。以上二种指标联合模型的 AUC 为 0.846 ($P < 0.001$), 敏感度为 80.6%, 特异度为 79.5% (表 3、图 1)。

Table 3. ROC analysis

表 3. ROC 分析

变量	AUC	敏感度(%)	特异度(%)	P值	渐近95%置信区间	
					下限	上限
左房内径(cm)	0.826	74.5	82.1	<0.001	0.768	0.884
左室射血分数(%)	0.658	64.3	65.2	<0.001	0.582	0.734
三种指标联合	0.846	80.6	79.5	<0.001	0.793	0.900

注: AUC: ROC 曲线下面积。

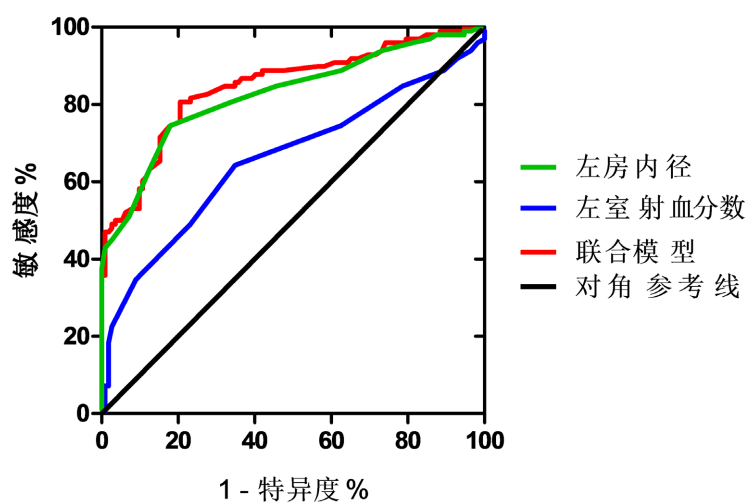


Figure 1. The areas under the ROC curve for Left atrial diameter, left ventricular ejection fraction, and the combined model of two indicators were 0.826, 0.658, and 0.846, respectively, that predicted the incidence of NVAF-related stroke

图 1. 左房内径、左室射血分数及两种指标的联合模型预测非瓣膜房颤相关脑栓塞的受试者特征工作曲线, 其曲线下面积分别为 0.826、0.658、0.846

4. 讨论

由于缺血性中风是一种病因异质性疾病, 确定每个患者的具体病因具有重要的临床意义, 因为不同类型的缺血性中风的预后、急性管理和预防复发的长期策略可能有很大差异[11]。我们的研究表明, 非瓣膜性房颤相关脑栓塞较非心源性栓塞有着更宽的左房内径及更多的左室射血分数, 心动图参数(左房内径及左室射血分数)是非瓣膜性房颤相关脑栓塞患者的独立危险因素。左房内径及左室射血分数有助于区分心源性卒中和其他卒中亚型。当中风实际上是心源性栓塞时, 将超声心动图参数(左房内径、左室射血分数)用于确定缺血性卒中的病因亚型, 增加了正确诊断的可能性。

在各种超声心动图参数中, 左房内径是提示房颤患者房颤进展的一个有希望的预测指标[12] [13]。房颤患者左房舒张末期容量负荷增加使左房扩大, 房颤还可导致左房发生电重构及结构重构, 使房颤持续

存在[14][15]。房颤与左房扩大关系密切,互为因果。当心房颤动发生时,左心房的收缩功能下降,射血减少,残余血量增多,使心脏血流动力学发生异常,左心室射血分数下降[16]。房颤和左房重构通常可以共存,因为潜在的合并症通常是重叠的。使用超声心动图及其他生物标志物可能是一种可行的策略,以改善急性心源性脑栓塞的诊断,从而快速指导其他诊断试验并加速最佳二级预防的开始。到目前为止,使用口服抗凝剂是唯一一种持续且明确显示可以提高AF患者生存率的治疗干预[17][18]。

本研究尚有一定局限性,第一:样本量较小;第二:收集超声心动图参数较少。

5. 结论

我们研究发现超声心动图参数对预测心源性卒中的危险性具有突出的价值,尤其是左房内径。左房内径及左室射血分数有助于早期筛选NVAF相关脑栓塞患者,指导临床治疗。

作者贡献

宋文豪负责收集数据及文章撰写;刘长根负责数据收集及分析;解霖霖负责收集数据及文章修改。

利益冲突

本人与其他作者宣称没有任何利益冲突,未接受任何不当的职务或财务利益。

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