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Risk factors for postoperative delirium in patients after coronary artery bypass grafting: A prospective cohort study ☆☆☆★

Wei-ying Zhang, RN, PhD ^a, Wen-lin Wu, RN, MS ^a, Jun-jun Gu, RN, BA ^a, Yan Sun, RN, MS ^a, Xiao-fei Ye, PhD ^b, Wen-juan Qiu, RN, BA ^a, Chuan-qin Su, RN, BA ^a, Shu-qi Zhang, RN, MS ^c, Wen-qin Ye, RN, MS ^{c,*}

^a Department of Cardiothoracic Surgery, Changhai Hospital, Second Military Medical University, Shanghai, China

^b Department of Health Statistics, Second Military Medical University, Shanghai, China

^c Nursing Department, Changhai Hospital, Second Military Medical University, Shanghai, China

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ABSTRACT

Purpose: This study was designed to identify the incidence and independent perioperative risk factors associated with postoperative delirium of patients who underwent coronary artery bypass grafting (CABG) in a large intensive care unit setting in China.

Methods: Delirium was diagnosed by the confusion assessment method for the intensive care unit (CAM-ICU). Baseline demographics, perioperative data, and postoperative outcomes of 249 consecutive patients who underwent CABG were recorded prospectively and analyzed via univariate analysis and multivariate logistic regression to determine the independent risk factors of postoperative delirium.

Results: Postoperative delirium was detected in 76 patients according to CAM-ICU criteria. The incidence was 30.52%. Patients with and without delirium differed significantly on 34 variables ($P < .05$). Multivariate logistic regression analysis revealed that preoperative atrial fibrillation (odds ratio [OR], 3.957; 95% confidence interval [CI], 1.727–9.066), elevated European system for cardiac operative risk evaluation (OR, 1.178; 95% CI, 1.018–1.364), cognitive impairment (OR, 3.231; 95% CI, 1.008–10.356), prolonged surgery duration (OR, 1.008; 95% CI, 1.003–1.014), postoperative poor quality of sleep (OR, 5.001; 95% CI, 2.476–10.101), and electrolyte disturbance (OR, 2.095; 95% CI, 1.041–4.216) were independently associated with postoperative delirium after CABG.

Conclusions: Delirium is a frequent complication. Factors independently associated with delirium are preoperative atrial fibrillation, elevated European system for cardiac operative risk evaluation and cognitive impairment, longer surgery duration, postoperative poor quality of sleep, and electrolyte disturbance. The study may be helpful in decreasing the incidence of postoperative delirium after CABG by treating these predictors properly.

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1. Introduction

With the improvement of global living standards, more people now have coronary artery disease. Coronary artery bypass grafting (CABG) is an effective method to relieve angina, improving life quality, and also reducing mortality and morbidity of coronary artery disease. During the postoperative period after CABG, patients are closely monitored for signs of insufficiency.

Delirium is defined as a disturbance of consciousness and cognition that presents during a short period (hours or days) and has a fluctuating course [1]. Advances in CABG practice have improved

the outcomes of patients; however, delirium remains a frequent postoperative complication. The reported incidence of delirium after CABG varies to a large extent, ranging between 10.5% and 50.6% [2–5]. The wide range of reported incidences could be explained by the differences in the number and characteristics of the studied populations, the design and methods of the studies, the assessment of delirium, the differences in cardiac operative procedure, and perioperative management.

Generally, delirium is a serious problem because of its negative clinical outcomes, such as prolonged intensive care unit (ICU) stay and hospitalization, decreased cognitive functioning, higher mortality rate, and increased odds of institutionalization after discharge [6–8]. Fortunately, delirium is preventable [9]. The prevention of delirium has been demonstrated by modifying some crucial risk factors. Despite increasing interest in delirium, no thorough research on risk factors of postoperative delirium after CABG has been done in a large ICU in China. Therefore, the aim of our study was to obtain information about the incidence, risk factors, and clinical outcomes of delirium among our population that underwent CABG.

☆☆ Competing interests: The authors declare that they have no competing interests.

☆☆☆ Authors' contributions: ZWY conceived the study with the supervision of all authors. YXF supervised the statistical analysis. All authors approved the manuscript after critical reading.

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* Corresponding author at: Changhai Hospital, Second Military Medical University, 168 Changhai Road, 200433, Shanghai, China. Tel.: +86 13386273918; fax: +86 21 65490979.

E-mail address: 18217301505@126.com (W. Ye).

Table 1Perioperative risk factors of postoperative delirium in CABG patients (univariate analysis)^a

Variable	With delirium, total n = 76, n (%)	No delirium, total n = 173 n (%)	P
Preoperative variables			
Age, y, mean (SD)	64.71 (9.95)	62.10 (9.08)	.0441
Male	63 (83)	134 (77)	.2067
BMI			
Underweight (BMI <18.5)	7 (9)	7 (4)	.7363
Normal (18.5 ≤ BMI < 24)	34 (45)	90 (52)	
Overweight (24 ≤ BMI < 28)	29 (38)	57 (33)	
Obesity (BMI ≥28)	6 (8)	19 (11)	
Education level			
Illiteracy	5 (7)	19 (11)	.6524
Primary school	21 (28)	32 (19)	
Middle school or above	50 (66)	122 (71)	
Hearing or language barrier	7 (9)	4 (2)	.0147
Tobacco use (3 mo before operation)	35 (46)	75 (43)	.6928
Alcohol use (3 mo before operation)	42 (55)	74 (57)	.0689
Diabetes mellitus	29 (38)	45 (26)	.0535
Hypertension	46 (61)	93 (54)	.3219
Predisposing cerebral disease	12 (16)	6 (3)	.0005
Predisposing cardiac surgery	5 (7)	2 (1)	.0171
Renal dysfunction (creatinine >110 mg/dL)	11 (14)	11 (5)	.0351
AF	26 (34)	16 (9)	<.0001
NYHA heart function			
Class I	1 (1)	7 (4)	.0337
Class II	22 (29)	67 (39)	
Class III	50 (66)	97 (56)	
Class IV	3 (4)	2 (1)	
EuroSCORE, mean (SD)	4.13 (2.57)	2.44 (2.16)	<.0001
LVEF <50%	15 (20)	23 (13)	.1930
Anemia	5 (7)	18 (10)	.3370
Carotid artery plaque	26 (34)	64 (37)	.6737
Anxiety (HAS ≥ 14)	12 (16)	10 (6)	.0104
Cognitive impairment (MMSE <27)	12 (16)	7 (4)	.0013
MRS, mean (SD)	1.38 (0.82)	1.16 (0.49)	.0095
Intraoperative variables			
Emergency operation	2 (3)	2 (1)	.4130
With CPB	71 (93)	163 (94)	.8087
Surgical type			
CABG	51 (67)	150 (87)	.0003
CABG +	25 (33)	23 (13)	
No. of distal anastomosis			
1	13 (17)	27 (16)	.7153
2	18 (24)	30 (17)	
3	24 (32)	72 (42)	
4	17 (22)	41 (24)	
5	4 (5)	3 (2)	
Surgery duration, min, mean (SD)	259.89 (80.97)	211.82 (54.64)	<.0001
Hypoxia (PaO ₂ <60 mm Hg)	8 (11)	5 (3)	.0176
Blood transfusion >1 L	9 (12)	11 (6)	.1426
Postoperative variables			
Blood transfusion >1 L	31 (41)	25 (14)	<.0001
Sedation treatment	71 (93)	127 (73)	.0003
Type of inotropic medication			
None	–	4 (2)	<.0001
1	37 (49)	140 (81)	
2	28 (37)	25 (14)	
3	10 (13)	4 (2)	
4	1 (1)	0	
Duration of inotropic medication, d, mean (SD)	8.18 (8.95)	4.34 (2.81)	<.0001
Duration of mechanic ventilation, h, median (IQRs)	21.5 (17.0, 45.5)	19.0 (14.0, 21.0)	<.0001
Analgesia use	34 (45)	33 (19)	<.0001
Higher creatinine	17 (22)	12 (7)	.0005
AF	27 (36)	15 (9)	<.0001
HCT, %, mean (SD)	33 (5)	34 (4)	.0952
Low cardiac output (CI)	18 (24)	10 (6)	<.0001
Hypoxia (PaO ₂ <60 mm Hg)	22 (29)	19 (11)	.0004
Quality of sleep			
Good	2 (3)	2 (1)	<.0001
Moderate	38 (50)	150 (87)	
Bad	36 (47)	21 (12)	
Mobilization			
Good	5 (7)	13 (8)	<.0001
Average	41 (54)	141 (82)	
Bad	30 (39)	19 (11)	
Diuresis treatment	75 (99)	151 (87)	.0042

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