



Prevalence and Risk Factors of Postoperative Delirium in Patients Undergoing Open Heart Surgery in Northwest of Iran

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ABSTRACT

Introduction: Delirium as a relatively common complication following cardiac surgery remains a contributory factor in postoperative mortality and an obstacle to early discharge of patients.

Methods: In the present study 329 patients who underwent open heart surgery between 1st January 2008 to 1st January 2009 in Shahid Madani Heart Center, Tabriz, Iran were enrolled.

Results: Overall 4.9% of patients developed delirium after cardiac surgery. We found atrial fibrillation ($P = 0.005$), lung diseases ($P = 0.04$) and hypertension ($P = 0.02$) to be more common in patients who develop delirium postoperatively. Furthermore, the length of intensive care unit (ICU) stay, cardiopulmonary bypass (CPB) time, and ventilation period were also significantly increased. Also a statistically meaningful relationship between the female gender and development of delirium was also noted ($P = 0.02$). On the other hand no meaningful relationship was detected between diabetes, history of cerebral vascular diseases, peripheral vascular diseases, myocardial infarction, development of pneumonia following surgery, and laboratory levels of sodium, potassium, glucose, and complete blood cell count (CBC) including white blood cells, red blood cells, platelets in the blood-hemoglobin and hematocrits. Also environmental factors like presence of other patients or companion with the patient, and objects like clock, window and calendar in the patient's room did not affect prevention of delirium.

Conclusion: Based on this and other investigations, it can be suggested to use MMPI test to recognize pathologic elements to prevented delirium after surgery and complementary treatment for coping with delirium.

Introduction

Delirium is a frequently encountered problem in hospitalized patients that could even be life threatening.¹ Virtually any medical condition can potentially cause delirium. For example, delirium may be the first sign of a serious, life-threatening illness such as a heart attack. The efficacy of costly medical interventions mandating prolonged hospitalizations which may contribute to delirium development should be carefully considered.² This issue has been addressed in some studies.³ Thus the aim of the present study is to evaluate the prevalence and risk factors for development of delirium in patients undergoing open heart surgery in Shahid Madani Heart Center, Tabriz, Iran.

Literature review

Delirium as an underdiagnosed disorder is classified as a

syndrome rather than a disease.⁴ Delirium is frequently encountered in patients undergoing heart surgery and in some studies has been reported with a frequency of up to 90% in these patients.⁵

In a study it was shown that 5.23% of cases after thorax Surgery experienced delirium from second day to 12th day after the operation. Older age, abnormal levels of sodium or glucose levels, insomnia, duration of surgery and diabetes are considered as risk factors.⁶

In another study a percentage of about 80 of cases with risk factors of diabetes, duration of surgery etc. was reported to have developed delirium after surgery.⁷ A report from San Diego Veterans Administration medical center shows delirium occurred in 77% of patients with a peak incidence around 72 hours post operatively.⁸ In similar studies, it was also shown that there are further risk factors including cognitive, visual and auditory impairment, immobility,

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dehydration, sleep deprivation⁹ age 65 years old or higher¹⁰, being jobless, unmarried, prolonged operation¹¹, impaired behavior¹², levels of albumin¹³, post-surgery vs. post-trauma¹⁴, head/neck cancer surgery¹⁵, alcoholism and laryngeal cancer¹⁶ major depression, peripheral arterial disease history and cognitive impairments.¹⁷

Most of the aforementioned studies indicated older age as the most important risk factor.¹⁸

Materials and Methods

Subjects who underwent open heart surgery between 1st January 2008 to 1st January 2009 in Shahid Madani Heart Center, Tabriz, Iran were enrolled in this study. The obtained data were analyzed by *t*-test statistical procedure, average value, standard derivation and ANOVA.

Results

A close correlation was observed between hypertension ($P=0.02$), atrial fibrillation ($P=0.005$), carotid bruit ($P=0.005$) and lung disease ($P=0.04$) and developing delirium. However, there was no significant relationship between diabetes, cerebrovascular diseases history, environmental-vascular diseases, myocardial infarction, postoperative pneumonia, dementia, epilepsy, congenital diseases, sodium levels, potassium levels, creatinine, glucose and CBC. Furthermore, between interferences of environmental factors such as presence of patient companion, clock, window, night light, and calendar no significant relationship was observed.

The frequency of delirium intensity and the frequency of delirium itself have been presented in Table 1.

Thus, totally about 4.9% of patients undergoing heart surgery developed delirium. The present study indicates the incidence of delirium to be 4.2% for coronary surgery, 5.9% for valve aortic surgery and 3.4% for other operations of delirium. The above percentage based on the standards was $\chi^2=4.28$ and the level was $P=0.033$. Delirium was not reported in congenital surgery cases.

Between gender and delirium, a significant relationship was present ($P=0.02$). It can be said that the number was higher between and especially between female patients ($P=0.005$). The marginal findings supported the use of MMPI- test (in Persian) as a tool. Other findings were

Table 1. Degree of delirium for patients

Degree	Frequency	Percent	Valid Percent
0.00	312	95.1	95.1
5.00	1	0.3	0.3
13.00	10	3.0	3.0
27.00	2	0.6	0.6
29.00	1	0.3	0.3
33.00	2	0.6	0.6
Total	328	100.0	100.0

successful to show in delirious patients, the scales such as MA scale ($P=0.000$), PT scale ($P=0.01$), PD scale ($P=0.01$), SC Scale ($P=0.02$) and PA scale ($P=0.02$) as significant.

Table 2 represents the significant relationship between staying in ICU, CPB, ventilator time and delirium development.

Discussion

It was observed that the severity of delirium in 95.1% of the cases in the present study was the least, and 4.9% of patients undergoing heart surgery developed delirium. The research demonstrated that 4.8% with risk factors such as older age, longer ICU stay, longer CPB time, and longer mechanical ventilation time developed delirium. These findings confirm the previous studies.

Comparison of the average CPB time among individuals who developed delirium and who did not develop delirium was significant ($P=0.03$). This was in accordance with the findings of San Diego University in which delirium risk factors were studied among Cardiac Pulmonary Bypass surgery cases.

As figured out in our study, more than 14% of surgeries had psychological disorders that required psychotherapy. The consequences of our study confirm the Shelly's study¹⁹ in which they demonstrated that cardiac patients generally have psychological-neurotic profiles.

Kampman studies in Finland showed the constructive impact of psychological conditions during heart surgery upon their physical recovery.²⁰

The various studies in Finland on heart surgery cases indicated that neurotic diseases such as hypochondriacs and anxiety accompanied mitral value malfunction patients.²¹ Similarly in our study; depression, hypochondriasis and hysteria were seen in 14% of the subjects in the present investigations.

The obtained tests by MMPI demonstrated that 48 people completed questionnaires rated by numbers above 70 (14%) based on the procedure of scaling by one or two or probably several MMPI tests. It seems that regarding the presence of psychological disorders, the cases should be treated with pharmacotherapy or pathological treatments. Collectively the studies which were carried out by Universities of Kerman, Gilan, Vancouver, and University of Brigham in Boston (United States) are in line with the present study in defining age as a principle factor to cause delirium. None of the cases undergoing surgery for congenital heart disease developed delirium. Semi-literacy was a prevalent characteristic in most of the delirious patients. It can be pointed that cognitive disorders are less frequent when somebody is educated and have enough familiarity with environment and surrounding vicinity.

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Table 2. Significant findings between ICU staying, CPB, ventilator time and delirium developing

	Not delirious patients	Delirious Patients	P
Age	55.37± 14.11	59.50 ± 13.44	NS
ICU stay	4.14 ± 3.10	7.16 ± 3.90	0.001
Anesthesia Time (hours)	5.76 ± 2.46	4.91 ± 1.68	NS
CPB time (minutes)	103.71 ± 75.73	155.90 ± 77.02	0.03
Hospital Stay (days)	5.25 ± 3.38	6.00 ± 4.51	NS
Ventilation Time (hours)	13.13 ± 13.66	25.96 ± 21.94	0.006

we are also indebted to our colleagues.

Ethical issues: This study was reviewed and confirmed by the ethics committee of Tabriz University of Medical Sciences.

Conflict of interests: The authors declare no conflicts of interest.

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