OPEN-HEART SURGERY AND CEREBROVASCULAR ACCIDENT: RETROSPECTIVE STUDY AT KING KHALID UNIVERSITY HOSPITAL

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Background: Stroke after coronary bypass grafting (CABG) is often disabling. The incidence of ischemic stroke may approach 3% to 5%. Several risk factors have been identified including previous history of stroke, prolonged cardiopulmonary bypass time, and postoperative atrial fibrillation.

Objective: To determine the incidence, and risk factors of neurological deficit after open-heart surgery.

Methods: Retrospective study during the period 1992-1995 at the King Khalid University Hospital, Riyadh, Saudi Arabia.

Results: There were 350 patients who were subjected to (CABG), 10 patients (2.8%) found to suffer from cerebrovascular accidents (CVA) following open-heart surgery. In 18 patients, the complaint lasted more than 24 hours (stroke), while 2 patients developed transient ischemic attacks (TIA). Five factors were found to be associated with increased risk of post cardiac surgery CVA. These factors are postoperative atrial fibrillation, carotid bruit, past history of heart failure, past history of CVA and smoking.

Conclusion: The authors concluded that it is necessary to start a prospective study to verify the area of improvement with regards to technique, selection of patients and mode of perfusion during cardiopulmonary bypass (CPB).
The diagnosis of cerebrovascular accidents was based on history of a neurological deficit after open-heart surgery within 24 to 48 hours, which was clinically confirmed by a neurologist. Brain CT-scan, MRI, and cerebral angiography were done for confirmation of the clinical diagnosis. The data recorded include age, sex, carotid bruit, history of heart failure, previous myocardial infarction, presence of hypertension, diabetes mellitus, previous transient ischemic events or previous cerebrovascular accident and smoking habits.

Anesthesia and surgery were performed in standard manner. The data of the patients of CV A were cases for study while patients without CV A acted as control. Logistic regression analysis was adopted to calculate odds ratio (OR) corresponding to the potential risk factors and subsequently adjusted for confounders; 95% confidence interval (95% CI) was also calculated.

The etiological fraction of stroke was estimated by applying the method of Bruzzi, assuming that the patients without stroke were taken randomly. 5% significance level was used to test null hypothesis.

Results

We studied a total of 350 patients, comprising 250 males (72.6%) and 98 females (27.4%). Ages ranged between 7 and 76 years and the mean age was 56 years. Ten patients (2.8%), 8 males and 2 females had cerebrovascular accidents during the first week after open-heart surgery. Eight patients had focal neurologic deficits that lasted for more than 24 hours and classified as strokes. In two patients, the deficits were improved within hours and classified as TIA. One patient had bilateral weakness accompanied by aphasia indicating bilateral stroke (Table 1).

Seven patients had ischemic strokes after CABG surgery, while 3 had strokes after valve or valves replacement (Table 2).

Table 3 shows the results of univariate and multivariate analysis, respectively, demonstrating...
the significant risk factors. It also shows the odds ratios adjusted for age and sex (Adj OR).

Patients of atrial fibrillation (AF) were 5 times more susceptible to develop CV A in comparison to those without AF. Also, patients with carotid bruit were almost 14 times more susceptible than those with a negative history.

Past history of heart failure also increase the risk of CV A up to 42 times compared to those with no history of heart failure. Smokers were almost 28 times more susceptible to develop CV A compared to non-smokers.

Diabetes mellitus and hypertension were not found to be significant risk factors of CV A. From the results of logistic regression analysis, P-value of the risk factors were calculated (Table 3).

Discussion

The reported incidence of neurological complications of open heart surgery varies widely depending upon the type of the study, ranging from 7% to 61% for transient and from 16% to 23% for permanent complication. Retrospective evaluations give considerably lower rates of postoperative neurological complications than careful prospective assessment. A review of 1669 patients who underwent coronary artery bypass graft surgery showed that 75 patient (4.5%) developed cerebral complications, 13 of them with cerebral infarction (0.8%).10 However, in another study, the incidence of ischemic stroke approached 3%.11 The incidence of CV A in the present study was 2.8%, found to be less post-valvuloplasty replacement (2.5%) than post-CABG surgery (3.4%), which may be related to the younger age of valvular patients in this study (a similar finding was reported by Furman et al).12 Smokers were 28 times more risky to develop CV A than non-smokers. The calculated odd ratios (DRs) of each risk factor were not consistently changed after age and sex adjustment. The redundancy of the confidence interval may be due to the small number of patients with CV A as well as the strong intercorrelation between the lifestyle habits like smoking and other clinical problems like history of stroke and atrial fibrillation.

P-values were significant for past history of stroke, carotid bruit, history of heart failure, smoking and postoperative atrial fibrillation. This study shows also that special care should be paid to patients with past history of stroke, past history of heart failure, as well as those with carotid bruit. It shows also that postoperative atrial fibrillation was associated with five-fold elevation of risk in univariate and multivariate analysis. This is consistent with the findings of Tyifor et al.,13 that history of congestive heart failure (leading to cerebral hypoperfusion and embolization) 14 is a significant risk factor.

Several risk factors for stroke after open-heart surgery were identified by Reed et al.10 These factors are carotid bruit, history of stroke, history of congestive heart failure, post-operative atrial fibrillation, cardiopulmonary bypass time of more than 120 minutes and previous history of myocardial infarction.

Intraoperative measures, which can be taken to reduce the risk of CV A postoperatively 15,16 include reducing CPB time, microscopic filtration of arterial blood on CPB and prevention of longstanding severe hypotension.

Conclusion

In this retrospective study the incidence of cerebrovascular accidents after open-heart surgery in KKUH was found to be 2.8%. The incidence of CV A after CABG was 3.4%, while it was 2.4% after valvular surgery. These figures show similarity to reported incidence in literature. Five risk factors were identified and found to be associated with increased risk of CV A after open-heart surgery. These factors are carotid bruit, previous history of CV A, history of heart failure, and postoperative atrial fibrillation.

Further, well-designed studies are recommended to be performed to reveal the nature and magnitude of above-mentioned and other potential risk factors.

References

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