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# Risk and Results of Concurrent Cardiac and Carotid Surgery: Single Center Experience

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**Abstract**

Patients who are having open heart surgery may be at higher risk and have worse outcomes if they have carotid artery stenosis. The study's goal was to analyse the risks and results of concurrent carotid and heart surgery. Over the course of a 5-year period, we looked back at the medical records of 100 patients who had simultaneous open-heart surgery and carotid surgery (from 2006 to 2010). The mean age of the patients, who were split between 30 women and 70 men, was 70.9 years (median: 71.8 years). On 73 patients, coronary bypass grafting (CABG) was performed; on 18 patients, CABG and valve surgery were combined; on 7 patients, CABG was combined with other procedures; and on 3 patients, valve surgery was performed alone. 51 individuals had bilateral carotid artery disease, including 12 occurrences of contralateral carotid artery blockage. 71 patients underwent carotid artery patch plasty, and 29 underwent eversion method. An intraluminal shunt was employed in 75 instances. The 30-day mortality rate was 7%, and the causes were diffuse cerebral embolism (n=1), metabolic disruption (n=1), and cardiac problems (n=5). There were no fatalities as a result of carotid surgery. Following surgery, one patient experienced acute cerebral ischemia, whereas the other experienced a stroke with a minor, long-term neurological disability (Rankin level 2). The risk of simultaneous open-heart surgery and carotid artery surgery is low. The outcome is affected by the underlying heart condition.

**Keywords:** Carotid artery stenting; Carotid endarterectomy; Coronary artery bypass surgery; Carotid stenosis; Stroke

## Introduction

Depending on the type and intricacy of the surgery, stroke is a feared consequence. Following heart surgery, there is an increased risk of stroke. Carotid artery stenosis has been identified as a risk factor for postoperative stroke. The mechanism of brain injury associated with cardiac surgery is multifaceted. Carotid stenosis treatment may therefore reduce postoperative neurologic sequelae. The phased method and the simultaneous approach are the two main management approaches that have emerged over time for the management of concurrent carotid stenosis. The investigation of the results and risks of carotid artery surgery and heart surgery performed together in our hospital was the goal of the current study. We questioned whether this method is safe or if it puts our patients at a very high danger [1].

The most typical psychiatric symptom seen in an intensive care setting is delirium. The Diagnostic and Statistical Manual, Fourth Edition (DSM-IV), published by the American Psychiatric Association, lists four key characteristics of delirium: disturbance of consciousness, a change in cognition, or the development of a perceptual disturbance, with acute onset and fluctuating course, and evidence from the history, physical examination, or laboratory findings that the disturbance is brought on by a medical condition, substance intoxication, or medication side effect [2].

In patients undergoing general surgery, the incidence of postoperative delirium ranges from 10 to 46%, and it rises to 50-67% in that receiving heart surgery. Wide discrepancies in reported incidence are a result of methodological variations between research, primarily relating to the use of diagnostic scales and tools for delirium and the examination of population traits. Acute disorientation states following heart surgery continue to be a contentious and important topic despite substantial research. Numerous investigations have recognised the significant impact that psychotic disorders have on surgical results. It has been demonstrated that postoperative delirium is linked to longer and more expensive hospital stays, decreased postoperative cognition, and a higher risk of postoperative death within the first year [3].

Increased prevalence of cognitive decline following delirium in an intensive care unit has a significant effect on postoperative rehabilitation, the patient's dependence on social support systems, and the general quality of life following surgery. Due to the variable course and high prevalence of hypoactive manifestations, monitoring and detection of delirium after surgery remain inconsistent. Postoperative disorientation episodes are less common than severe neurological consequences. Additionally, the wide range of symptoms that coincide with dementia and the normal changes brought on by ageing of the brain make it very challenging for senior people to recognise this issue. The proportion of recognition increases and a higher standard of early treatment are ensured with the use of delirium rating scales and checklists. On the other hand, precise diagnostic technologies avoid delirium hyper diagnosis and treatment delivery based on an individual's subjective assessment of the patient's mental state.

Our study's objective was to evaluate the prevalence and risk factors for postoperative delirium in patients who underwent cardiac surgery at our institution, using the Intensive Care Delirium Screening Checklist (ICDSC) [4].

## Materials and Methods

In our facility over a 5-year period, 100 consecutive patients (70 men

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and 30 women) underwent carotid endarterectomy (CEA) and open heart surgery simultaneously (2006 to 2010). 440 isolated carotid artery operations were carried out concurrently. Retrospective reviews and analyses of the clinical data and the results were conducted. The study was conducted in accordance with the local ethics committee's rules. Doppler sonography, duplex imaging, and angiography all supported the diagnosis of carotid stenosis (computed tomography, magnetic resonance, or rarely selective angiography). Coronary angiography and echocardiography were used for cardiac diagnosis [5].

Clinical symptoms and the severity of underlying disorders, such as unstable or recurrent angina, acute myocardial infarction, dyspnea at rest, or mild exercise, were used to determine the need for heart surgery. Using the Intensive Care Delirium Screening Checklist, delirium was identified (ICDSC). Altered level of consciousness, inattention, disorientation, hallucination-delusion-psychosis, inappropriate speech or mood, psychomotor agitation/retardation, sleep-wake cycle disturbance, and fluctuating course of the aforementioned items are the eight fields on which the evaluation is based. Each field is worth one point. When the ICDSC score is four or higher, delirium is present. During the patients' stay in the ICU, delirium screening was initiated 24 hours after surgery and repeated every 8 hours. Because the goal of this study was to look into early delirium after cardiac surgery, the screening period was set at 5 days [6].

The heart treatment was preceded by carotid surgery. Transcranial Doppler, somatosensory evoked potentials, or electroencephalogram was all used as neuromonitoring methods, at least in part. The carotid arteries were isolated after an oblique cervical incision. The carotid arteries were constricted, for example, after 5,000 units of heparin were administered. The surgical procedure for the carotid surgery was chosen by the surgeon. In the case of patch surgery, a longitudinal incision was made in the common carotid artery that continued past the distal extent of the plaque to the internal carotid artery. When using the eversion technique, the internal carotid artery was severed at the bifurcation. Both times, the atherosclerotic plaque was eliminated according to protocol [7].

Cardiac surgery began following carotid artery surgery. When coronary artery bypass grafting (CABG) and planned use of venous grafts were included, saphenous vein harvesting was done concurrently with carotid surgery. Before the cardiopulmonary bypass (CPB) was set up, complete anticoagulation (300 units/kg heparin) had been accomplished. The order of the procedures was up to the surgeon in cases of valvar and coronary artery surgery. The valvar surgery was often done first, then the distal venous graft anastomoses, the left thoracic artery graft anastomoses, and finally the proximal anastomoses. Protamine sulphate was used to stop anticoagulation once the cardiac surgery was finished. After that, the wounds were stitched up and drainages were applied. Patients were given aspirin starting on the first postoperative day and heparin starting 6 to 8 hours after surgery if there was no bleeding [8].

## Discussion

One of the most dreaded side effects of heart surgery is stroke, whose avoidance is "of the highest importance." A number of factors can result in brain damage after cardiac surgery. The most common causes of stroke are thromboembolic material, air bubbles, or ruptured calcifications, although prolonged intraoperative and postoperative hypotension may further raise the risk of stroke due to a decrease in cerebral perfusion caused by carotid artery stenosis during CPB. However, the risk of neurologic problems following heart surgery is reduced when carotid stenosis is treated. But for that to happen, there must be no complications from the carotid operation. The difference between a carotid artery procedure's benefit and risk is minimal [9].

In symptomatic patients receiving coronary artery bypass graft surgery, current recommendations urge carotid revascularization (CABG). For patients following cardiac surgeries other than CABG and for patients who are asymptomatic, there is currently no agreement on the best care strategy. Regarding a preferable strategy, there is only observational evidence, not randomised data. A multicentre, randomised experiment (CABACS trial) comparing simultaneous carotid surgery and CABG with isolated CABG in patients with asymptomatic stenosis launched in December 2010 with the goal of enrolling 1160 patients using 1:1 block-stratified randomization. Only 129 patients (intention-to-treat) were enrolled in this study, which led to the early termination of the trial due to insufficient recruitment. Despite the modest size of the cohort, the treatment group did not appear to have any meaningful effects on the primary and secondary end goals [10].

Regardless of the strategy, previous studies revealed a mortality and morbidity rate (major cardiovascular adverse events) up to 10 to 12%. Carotid surgery may be followed by coronary bypass grafting (CABG) as part of the phased strategy, or vice versa (CABG first and then carotid surgery). Coyle et al. reported a high combined stroke and early death rate among patients undergoing simultaneous CEA and CABG, whereas the rate was decreased among patients with the staged approach (26.2% versus 6.6%), and a low early death and stroke rate of 2% with the simultaneous approach. However, reported results are still debatable. In 15 patients, they carried out the CEA when they were moderately hypothermic (nasopharyngeal temperature 32°C) and on cardiopulmonary bypass with pulsatile perfusion. The rate of neurological complications they saw was 6.7% [11].

Regarding the training of the operating surgeons, there is another crucial concern. In the current investigation, the carotid procedures were consistently carried out by a board-certified vascular surgeon with a wealth of carotid surgery experience. The majority of the time, the operating surgeons had dual certifications in cardiac/cardiothoracic surgery and vascular surgery. Thus, the same surgeon performed both the heart and carotid procedures. The treatment was carried out after the carotid surgery in the remaining instances by cardiac surgeons. The retrospective methodology and the limited cohort size are the primary limitations of the current investigation. There were not enough post-operative events to do a multivariate analysis [12].

## Conclusions

The combined surgical approach is a secure alternative for patients having open-heart surgery who have carotid artery stenosis. The underlying cardiac condition dictates the outcome.

### Conflict of Interest

None

### Acknowledgement

None

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