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**Cerebral complications after cardiac surgery**

A clinical study with special reference to cognitive function and driving performance

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**ABSTRACT**

Cerebral injury remains a major cause of morbidity and mortality after cardiac surgery. Previous studies have mainly focused on preoperative risk factors and intraoperative events but cerebral complications may also occur in the postoperative period. Cognitive decline is common after cardiac surgery but the consequences of this complication for daily activities is less common. Safe driving requires a set of complex skills including preserved cognitive function and a substantial number of patients with heart disease are probably active car drivers. The impact of postoperative cognitive decline on driving performance is not previously investigated in this large patient group.

In this thesis pre, intra and postoperative risk factors for focal cerebral complications were determined and the onset time of cerebral symptoms were evaluated in two cohorts of cardiac surgical patients, including 2480 and 3282 patients respectively. Data analysed were drafted from a clinical register and the surgical database of Linköping Hospital Heart Center.

In 27 patients cognitive function and driving performance was evaluated before and 4-6 weeks after coronary artery bypass grafting (CABG). The patients underwent neuropsychological testing, an on-road driving test and a driving test in an advanced driving simulator. Twenty patients scheduled for percutaneous coronary intervention (PCI) served as controls. Complete pre- and postoperative data were obtained in 23 CABG patient and 19 controls. Furthermore cognitive function and driving performance in on-road driving in the 44 patients with complete preoperative tests were compared with controls of similar age without heart symptoms. In our studies cerebral complications were delayed, i.e. occurred after a free interval, in about one third of the patients suggesting other causes than intraoperative events. Different risk factors were

found for early and delayed cerebral complications suggesting different pathophysiology of cerebral injury. Advanced age, hypertension, aortic surgery, prolonged cardiopulmonary bypass (CPB) time, intraoperative hypotension after CPB, and arrhythmia in the early postoperative period increased the risk for early cerebral complications. Female gender, diabetes, cerebrovascular disease, combined CABG and valve surgery and arrhythmia in the thoracic ward increased the risk for delayed cerebral complications.

Cognitive function and driving performance was impaired in patients with coronary artery disease already before surgery compared to controls. After surgery 48% of the patients showed a postoperative cognitive decline compared with 10% after PCI. These patients also deteriorated in the on-road driving test to a larger extent than did patients without a postoperative cognitive decline.