TITLE: PERSISTENCE OF NEUROPSYCHOLOGICAL DEFICITS FOLLOWING CABG

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Introduction: Short term changes in neurologic function following CABG surgery have been reported in a number of centers in both Europe (1) and USA (2). The extent to which these deficits endure in patients is an important question as it has a bearing on the nature of the CNS damage and consequent implications for these individuals return to premorbid activities. Two studies in the UK have reported deficits in approximately 30% of patients when assessed 6 to 12 months after surgery (3,4).

Methods: In order to examine this issue written informed consent was obtained from 27 CABG patients. The patients were assessed prior to surgery, at 7 days post surgery, and again six weeks following surgery on 8 neuropsychological tests (Trail Making Tests A and B, Grooved Pegboard - both hands, Finger Tapping - both hands, Symbol digit and a visual reaction time test). They also received a neurologic and neuro-ophthalmologic evaluation. Subjects postoperative scores were compared to their preoperative performances and a neuropsychological test was considered to be in deficit if performance dropped by 25% from the patients preoperative score.

RESULTS: Seven days after surgery 20 of 27 (74%) of patients showed a significant decline on at least one tests and of these, 15 of 27 (56%) showed a deficit in two or more tests.

The issue addressed in this study is whether the deficits observed shortly after surgery persist and therefore constitute a long term impairment for these patients. Nine (64%) of the 14 patients with deficits on two or more tests at 7 days still had a decline in at least one tests at follow up. Five patients (25%) still had deficits on two or more neuropsychological tests.

DISCUSSION: These findings indicate that in this sample of CABGs patients acute neuropsychological deficits are common (74%) and likely to persist for at least 6 weeks. For 20% of patients these deficits will be severe. In the total sample, 19% of patients were found to have persistent severe neuropsychological deficits as indicated by a deterioration of at least 25% on two or more tests. The absolute number of subjects found to be in deficit is related to the neuropsychological tests used and it is important that this battery did not include tests of memory which have been found in other studies to deteriorate in patients following CABG (1). In this series, tests requiring sustained fine motor coordination were most impaired.

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TITLE: HEPARIN MANAGEMENT PROTOCOL FOR CARDIOPULMONARY BYPASS (CPB) DOES NOT INFLUENCE POSTOPERATIVE BLEEDING

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INTRODUCTION: Bull et al (1) introduced Activated Coagulation Time (ACT)-based heparin management for CPB in 1975, but distortion of the ACT/blood heparin concentration relationship during hypothermia has caused some to recommend monitoring heparin concentration during CPB. Recent findings suggest that the higher heparin doses required to maintain a CPB blood heparin concentration (BHC) over 4.0 U/ml predisposed to increased postoperative bleeding (2). We prospectively compared 2 heparin management protocols for CPB.

METHODS: 61 adults undergoing their first cardiac surgical procedure requiring CPB were randomly assigned to 1 of 2 anticoagulation protocols. Group A (31 pts) received an initial heparin dose of 200 U/kg and additional heparin as required to maintain an ACT (Hemochron, Int. Technidyne, Inc) level of 400 sec during CPB. Group H (30 pts) received an initial heparin dose of 400 U/kg and additional heparin as required to maintain a whole BHC (Hepcon, HemoTec, Inc.) exceeding 4.0 U/ml. Protamine doses were determined by measuring BHC (Hepcon). Heparin neutralization was confirmed by measuring ACT and heparin concentration. Heparin rebound (Hep Reb) was diagnosed by measuring ACT every 2 hrs for the first 8 hrs, using a 10% rise as the diagnostic criterion. A coagulation profile including prothrombin time (PT), partial thromboplastin time (APTT), thrombin time (TT), fibrinogen (Fib), fibrin degradation products (FDP), and platelet count (Plt), was obtained at the end of surgery and 24 hours postoperatively. Mediastinal drainage (24 Hr Med. Dr) was measured hourly for 24 hours. Groups were compared with the Wilcoxon rank-sum test or with Fisher's exact test. $P<0.05$ was significant.

RESULTS: Demographic characteristics of the 2 groups were similar. Patients in Group H received significantly higher doses of heparin (57,020±10,695 (SD) v 28,045±4,751 U) and protamine (256±60 v 193±55 mg) and had higher mean ACTs (748±193 v 499±58 sec) and BHC (4.3±0.3 v 3.2±0.4 U/ml) during CPB. Table 1 compares heparin rebound incidence, postoperative blood loss, and selected coagulation tests taken at the end of surgery. None of the coagulation tests differed between groups 24 hours after surgery.

DISCUSSION: Despite higher early postoperative PT and APTT values and a higher incidence of heparin rebound in Group H, postoperative mediastinal drainage did not differ between groups. We conclude that the 2 protocols were functionally equivalent with respect to postoperative coagulation competence.

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Table 1. Group Comparisons

| | Group A | Group H | P-value |
|---|---|---|---|
| 24 Hr. Med. Dr. (ml) | 901±413 | 1035±501 | 0.24 |
| Hep. Reb. | 52% | 80% | 0.03* |
| PT (sec) | 14.5±0.9 | 15.2±1.3 | 0.02* |
| APTT (sec) | 29.8±5.0 | 43.6±31.2 | 0.0002* |
| Fibrinogen (mg/dl) | 185±48 | 192±73 | 0.61 |
| Median FDP (mcg/ml) | 8-32 | 8-32 | 0.92 |
| Plt (x $10^3$/mm$^3$) | 145±56 | 143±32 | 0.82 |