Reduced Middle Cerebral Artery Velocity during Cross-Clamp Predicts Cognitive Dysfunction after Carotid Endarterectomy

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INTRODUCTION

Transcranial Doppler (TCD) is a useful monitor during carotid endarterectomy (CEA). Cognitive dysfunction (CD) is a subtler form of neurologic injury than stroke exhibited in ~25% of patients within 24hr of CEA. CD is associated with elevations in markers of neuronal injury and early mortality.

OBJECTIVE

We aim to determine whether reduced middle cerebral artery (MCA) mean velocity during cross-clamp period predicts CD and if so, whether a cutoff can be identified below which the risk of CD is increased in order to improve safety of this commonly performed procedure.

METHODS

• N=124 CEA patients were neuropsychometrically evaluated with an extensive battery of tests preoperatively and 24hr postoperatively.
• TCD assessment of MCA velocity was performed during carotid endarterectomy (CEA). Cognitive dysfunction (CD) is a subtler form of neurologic injury than stroke exhibited in ~25% of patients within 24hr of CEA.
• MV during cross-clamp (MV_cx-clamp / MV_baseline).

RESULTS

• Patients with CD had significantly lower MV during cross-clamp than those without CD (33.1±13.7 cm/s vs. 39.6±16.0 cm/s, P=0.02) (Figure 2).

• In the final multivariate model, each percent reduction in MV was significantly associated with more CD (OR: 0.05 [0.01-0.23], P<0.001) while statin use was associated with less CD (OR: 0.33 [0.12-0.92], P=0.03) (Table 1).

• Using ROC analysis, the Youden index identified 72% of baseline MV during cross-clamp as the cutoff of maximum discrimination. Patients with MV <72% of baseline during cross-clamp exhibited significantly more CD than those with MV ≥72% of baseline (74.1% vs. 27.1% P<0.001) (Figure 3).

Figure 3. ROC Analysis: MCA-MV during Cross-Clamp

CONCLUSIONS

• Reduced MCA-MV during cross-clamp is a predictor of CD exhibited within 24hr of CEA.
• MCA-MV reduced to <72% of baseline during cross-clamp is the suggested cutoff below which the risk of CD is significantly increased.
• These observations should be considered by all clinicians that utilize intraoperative TCD monitoring for CEA.

References