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The role of Transcranial Doppler sonography for neuromonitoring in cardiac surgery with cardiopulmonary bypass

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Summary

- **Background.**

The use of TCD has been reported in intraoperative monitoring of cerebral blood flow and air emboli by providing instant visual feedback. Individualized mean arterial pressure (MAP) management targeted to optimize cerebral autoregulation by TCD might provide a more neuroprotective approach to patient care during CPB than standardized BP management.

- **Aim.**

The study aimed to analyse MAP excursions during non-pulsatile CPB effects on cerebral blood flow parameters and primary postoperative outcomes. [L] [SEP] As well as identify possible other factors affecting TCD.

- **Methods.**

50 elective cardiac surgeries with CBP performed in a University Clinical Hospital. The right and left middle cerebral artery blood flow velocity was assessed using TCD and analysed for spectrum. [L] [SEP]

Results and discussion

- A total of 50 patients were included. The mean age 64.76 (42–81) years; CPB 101.14 (54–184) minutes; Ejection fraction 52.50 (20–72); Body mass index 29.08 (19.48–44.41);
- Diabetes occurred in 38 patients;
- Pulmonary arterial hypertension (PAH) I occurred in 18 patients, 21 patients – PAH II;
- Blood transfusions were performed in 22 patients;
- Catecholamines was required in 21 patients;
- Patients who stayed longer in the ICU had more comorbidities – nine patients stayed in the ICU for 9–65 days (median 4.64).
- MAP during CPB was 66.18 (50–80).
- The blood transfusion rate showed no significant differences.

Results and discussion

- Hematocrit was decreased postoperatively (mean 29) compared to preoperative values (mean 37.7); during CPB 25.6.
- CPB during cardiac surgery has been demonstrated to cause alterations of the cerebral blood flow.
- RI was affected by gender ($p=0.08$), type of operation ($p=0.09$) and CHF ($p=0.08$);
- PI was affected by gender ($p=0.02$), diabetes ($p=0.06$) and PAH ($p=0.02$);
- PSV was affected by presence of diabetes ($p=0.04$), PAH ($p=0.006$), heart rate ($p=0.04$), TAPV ($p=0.05$);

Conclusion

- TCD method can be considered for multimodal neuromonitoring in cardiac surgery. [SEP]
- TCD can be a useful guiding instrument for adequate hemodynamic parameters, confirming the adequacy of cerebral perfusion strategy or the need for its optimization.
- Adequate cerebral perfusion can limit and postpone organ and brain dysfunction during cardiac surgery with cardiopulmonary bypass.

