

DBT – CLINICAL EFFICIENCY – DO WE NEED AN ARTERIAL FILTER ANYMORE?

Introduction: After open cardiac surgery using extracorporeal circulation, often neuropsychological disturbances occur. Both, macro- and micro-embolisms, take part in the etiology of negative cerebral consequences. There are other influence factors which must be considered as well but air is certainly a major one regarding this neuropsychological disturbances. Due to the current available data it seems very probable that a causal relation between this clinical symptomatic and the micro embolic impact of the affected patients exists. This study shows that the DBT is an innovative device to reduce and prevent micro air embolism.

Methods: More than 6,700 data records were analyzed to find dependences between miscellaneous parameters: the DBT efficiency depending on bubble size, blood flow and hematocrit. The main analysis includes 20 patients who were treated with a CABG-surgery. Instead of an arterial filter the DBT (Kardialgut, Munich) was placed into the ECC circuit. The number and size of micro bubbles were measured with a two-canal ultrasonic measuring instrument UBC1 (Convergenza, Vaduz, Liechtenstein). Micro bubbles and blood flow were measured online, the hematocrit was determined with blood gas analysis as necessary during the surgery (approx. 5-6 times). The statistical analysis was accomplished with the program R, Version 2.2.0 (Free Software Foundation).

Results: The size of the micro bubbles has the largest influence on the performance of the DBT. Though this refers to the DBT solely at its clinical efficiency (a standard curve of the dependant relationship between efficiency and bubble size), that is the “working point” where it is practically used. The clinical efficiency ranges between 65 to 68% with small sized micro vesicles (20 μm), 78 to 82% with larger ones (40 μm) and over 92% with big ones (>60 μm). Furthermore the haemodilution is a very important influence factor concerning the effectiveness of the DBT. A low hematocrit value is recommendable for an adequate elimination of gaseous microemboli in the arterial line.

Conclusion: Our experience shows that the DBT is an excellent device for air removal purposes. Assuming the arterial filter is solely used for air removal the DBT alone (without the arterial filter) seems to have sufficient performance to assure that virtually no air reaches the patient. Its efficiency is dependant on influence factors such as bubble size and heamodilution.