

**Comparison between conventional extracorporeal circulation (cECC) and extracorporeal circulation optimised (ECC.O) with respect to microbubble activity (MBB) in the circuit and Microembolic signals (MES) in the middle cerebral artery (MCA) of patients.**

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**Objective:**

The standard treatment of coronary artery disease is complete revascularization with Extracorporeal Circulation (ECC) and cardioplegic arrest. Microembolic signals (MES) detected by transcranial Doppler (TCD) have been described in virtually all patients undergoing cECC, and MBB is often detected at some level in the circuit of ECC. Both phenomena are linked to impairment of neuro-cognitive function after open-heart surgery with ECC, and play a critical role in post operative patient morbidity and mortality.

As the next step in the evolution of ECC, miniaturized bypass systems such as the Dideco ECC.O system were developed, the idea being to provide a stable, still heart but reducing the deleterious effects of the traditional bypass system. The goal of this study was to compare the MBB activity of conventional ECC to the ECC.O system in order to appropriately characterise the safety of mini bypass as compared to cECC in terms of MBB.

**Methods:**

In 2 groups of patients (20 each) coronary artery bypass grafting (CABG) was performed either with cECC (traditional open system) or the ECC.O. In both groups measurement of MES was performed with TCD in the MCA of the patients and number, size and calculated volume of MBB in the circuit was measured with the GAMPT-system. All patients were in sinus rhythm without history of cerebrovascular events and no stenosis in the carotid arteries.

**Results:**

There was no statistical significant difference between the groups with respect to age, gender, number of distal anastomoses and bypass time.

Parameter	cECC	ECC.O	p value
MES left	118 (38-198)	97 (29-233)	n.s.
MES right	125 (48-176)	84( 24-292)	n.s.
MBB volume venous inlet line	5,64 (3,21-11,12) µl	5,97 (1,55- 26,17) µl	n.s.
MBB volume arterial (after arterial filter)	5,23 (3,12- 9,83) µl	0,14 (0,02- 1,44)µl	P<0,001

**Conclusions :**

ECC.O allows complete revascularization equivalent to traditional bypass, as demonstrated by the number of peripheral anastomoses performed during this study. Microair in the ECC.O system can be adequately managed using a venous bubble trap and arterial filter, such that it is equivalent and in some cases better than a traditional open circuit. Newer technologies for microbubble measurement like the Gampt GME detection system should be incorporated into clinical routine use cECC and systems like ECC.O to further improve the quality of perfusion.