

MECHANICAL CHEST COMPRESSION DEVICES IMPROVE SURVIVAL OF LIVER GRAFTS FROM DONORS AFTER CARDIAC DEATH

To the Editor:

The use of mechanical devices to assist cardiopulmonary resuscitation (CPR) addressed to the return of spontaneous circulation (ROSC)^{1 2}, as well as a method of organ preservation in potential donors after cardiac death (DCD)^{3 4}, has been extensively studied. Although no clear benefit on ROSC has been reported, many Emergency Medical Services (EMS) worldwide still use them routinely because they clearly improve both safety and quality of chest compressions⁵. The aim of the present study was to assess mechanical chest compression (MeCC) devices as a method of organ preservation in kidney, lung and liver grafts from type IIA DCD. We analyzed the outcome of kidney grafts and 1-year survival of liver and lung grafts by comparing both out-of-hospital organ preservation methods: manual chest compressions (MaCC) versus mechanical chest compressions (MeCC).

The EMS SUMMA112, Madrid, Spain, created a database of potential DCD including the following variables: referral hospital, sex, age, time of arrival at the scene, transfer time (from alert to arrival to hospital), etiology of cardiac arrest, successful versus failed donation, number and type of retrieved organs, cause of donation failure (as reported by hospitals), use of MeCC devices and medicalized helicopter. Depending on their availability, LUCAS1® or Autopulse® devices were used randomly during data collection period.

From 2008 to 2011, 199 cases of potential DCD were reported (152 patients undergoing MeCC and 47 MaCC). No significant differences between both groups were observed in age, time of arrival at the scene or transfer time.

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At least one organ was retrieved from 93 (61.2%) patients in the MeCC group and from 37 (78.7%) in the MaCC group ($p=0.02$, OR 2.3, 95% CI 1-5)

A total of 259 (54%) kidney grafts were retrieved from potential DCD. At least one kidney was retrieved from 122 patients, 37 (30.3%) in the MaCC group and 85 (69.7%) in the MeCC group ($p=0.07$, OR 0.2, 95% CI 0.2-1). No significant differences in serum creatinine levels (mg/dL) were observed between MaCC and MeCC groups. Right kidney grafts showed serum creatinine levels at 1 year of 2.2 mg/dL in the MaCC group as compared to 1.9 mg/dL in the MeCC group ($t=0.60$, 95% CI 0.3-0.58). Levels for left kidney grafts were 1.7 versus 1.9 mg/dL respectively ($t=0.6$, 95% CI -0.15-0.33).

Eighteen recipients received a total of 30 lung grafts (4 unipulmonary and 1 bipulmonary in the MaCC group and 2 unipulmonary and 11 bipulmonary in the MeCC group). Only 2 patients died during 1-year follow-up, both of them in the MeCC group. Statistical analysis was not significant due to few cases reported.

Forty-one liver grafts were retrieved, 14 in the MaCC group and 27 in the MeCC group. One-year liver graft survival was 5 versus 9 in the MaCC group and 24 versus 3 in the MeCC group ($p=0.001$, OR 16.6, 95% CI 2.9-84.3)

According to our data, although the use of MeCC devices influences adversely organ retrieval from DCD, reported data may be influenced by multiple factors such as retrospective data collection, a lot of variables playing a role in DCD and several uncontrolled techniques, including learning curve from early to recent years of the protocol.

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Despite such limitations, a significant difference between groups was observed in liver graft survival. Although learning curve during the early years of the study period may play a significant role, the highly significant statistical difference favoring the use of MeCC devices must be emphasized.

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