

Manual versus mechanical chest compressions comparison by transesophageal echocardiography

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Introduction

In case of cardiac arrest (CA), the effectiveness of cardiopulmonary resuscitation (CPR) affects survival and neurological outcome

(Georgiou M. et al., Resuscitation 2014). Automated mechanical devices are not associated with a major survival and are not routinely recommended in guidelines. Despite this, they can perform chest compressions with optimal rate and depth without interruptions. (Wang PL et al., Cochrane Syst Rev 2018).

In this pilot study we analyze the kinetics of ventricles walls by transesophageal echocardiography (TEE) in manual versus mechanical chest compressions.

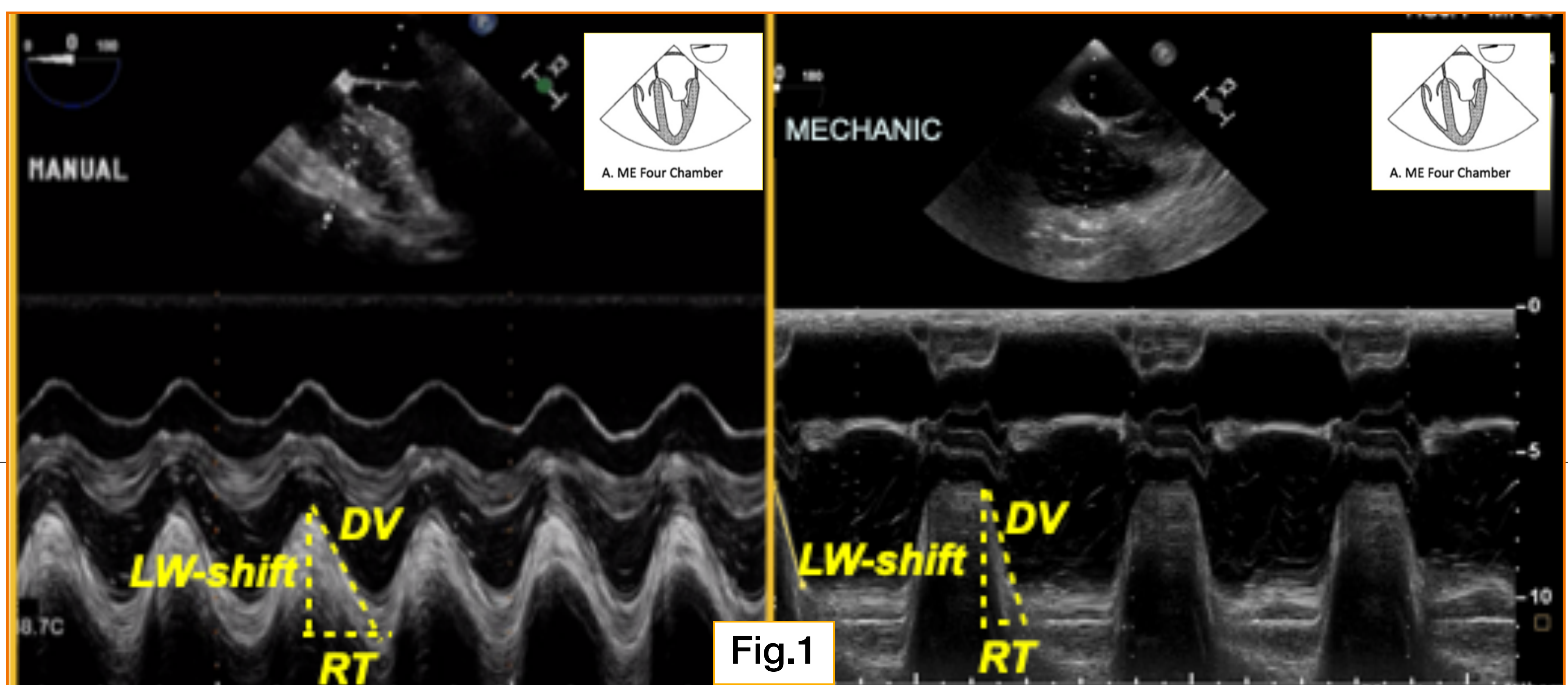
Materials and Methods

Between July 2015 and June 2018, 20 cases of out of hospital refractory CA arrived to L.Sacco Hospital of Milan eligible to veno-arterial ECMO were analyzed with TEE: Compression time (CT), decompression time (DT), right ventricular lateral wall shift (RV-LWS), compression velocity (CV), decompression velocity (DV), rising and relaxing times were measured off line with M-mode (fig. 1).

In 11 patients the external cardiac massage was mechanical, in 9 was manual.

Results

Mechanical chest compressions showed superior median values versus the manual for RV-LWS (3.7vs 2.53 cm $p<0,0001$), CV (25.1vs 14.8 cm/s $p\ 0,001$), DV (28.9vs 14.7 cm/s $p<0,0001$), CT (298 vs 208ms $p<0,0001$), DT (289 vs 258 ms $p\ 0,0001$); on the other side, rising time and relaxing time resulted higher for manual cardiac massage versus the mechanical (187 vs 123 ms $p\ 0,002$ and 211 vs 109 ms $p\ 0,0003$ respectively).



Discussion and Conclusion

Mechanical CPR can guarantee optimal rate and depth of thoracic compressions, with a rapid and complete recoil of the chest. Moreover, automated mechanical devices allow to obtain increased coronary perfusion, venous return and antegrade blood flow, according to the cardiac and thoracic pumps' theories. TEE ensures the accurate evaluation the effectiveness of chest compressions during CPR without the necessity of interruptions.