Reviewer's report

Title: Abdominal only CPR during cardiac arrest for a patient with an LVAD during resternotomy: a case report

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Reviewer: MYRON L WEISFELDT

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Review of Manuscript for J. Cardiothoracic Surgery by Rottenberg

This is a case in which hemodynamics are reported with the use of abdominal-only intermittent manual compression in a patient with cardiac arrest. In this patient, it was undesirable to perform chest compression because of the implantation of devices. The hemodynamic results are shown in Figure 2 of this paper and are very similar to the hemodynamics that have been described previously in experimental animals and in humans during chest compression cardiopulmonary resuscitation. Peak right atrial, pulmonary artery, and aortic pressures are similar when measured with fluid filled catheters. There is a significant pressure gradient of about 15 mmHg between the aortic diastolic pressure and the central venous pressure (which is likely similar to right atrial pressure) and provide the usual perfusion pressure for coronary blood flow during CPR. Although the patient did not survive, there was return of spontaneous circulation following the cardiac arrest suggesting that there was reasonable myocardial perfusion during cardiac arrest.

Abdominal compression only CPR has been described in experimental animals previously in the references sited within this case report. Based on animal studies, the suggestion is raised that blood moves because of compression of the aorta and central venous structures within the abdomen and that there is retrograde blood flow into the central aorta. This has not been proven in either animals or man. Another mechanism that may be contributing is a rise of intrathoracic pressure as defined by our group some years ago during manual chest compression (1-4). It may be that during abdominal compression, the diaphragm is pushed upward and as intra-abdominal pressure increases the pressure is transmitted to the intrathoracic space. In truth, both of these mechanisms may be operating. It would certainly be of considerable interest particularly in man to use Echo-Doppler imaging techniques to decipher the mechanism and consistency of blood flow with abdominal compression CPR. If compression of the aorta is important, this should be shown by retrograde blood flow in the aorta during compression, whereas if the principle mechanism is rise in intrathoracic pressure, this could be shown by measurement of a “wedged” bronchial pressure, and/or inferred by a reduction in the cross sectional area of the carotid system in the chest during compression as blood leaves the arterial structures. Another observation supporting the intrathoracic pressure hypothesis in man are the studies we performed a few years ago showing that compression...
of the back of the chest is just about as effective as compression of the sternum in producing arterial pressure changes during cardiac arrest (5).

The observation in this case report is unique (to my knowledge). There may be a growing number of patients in whom cardiac arrest occurs where it is undesirable to perform standard chest compression due to a wide variety of types of surgical intervention within the thorax. This is a very useful report.

References


Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

Declaration of competing interests:

Do you have any non-financial competing interests in relation to this paper?
YES - long history of interest in the theory of why CPR works hemodynamically