Summary

This randomized controlled non-inferiority safety study looked at the safety of two different mechanical chest compression devices; Stryker’s LUCAS 2 chest compression system and the ZOLL® AutoPulse Resuscitation System. The aim was to demonstrate that mechanical chest compression devices do not cause an excess of severe or lethal visceral damage such as pneumothorax, intracranial air emboli or hepatic injury compared with good quality manual chest compressions.

337 patients experiencing in-hospital or out-of-hospital cardiac arrest arriving with manual CPR at the Emergency Department were randomized to the LUCAS device, the AutoPulse device or continued manual chest compressions. Patients randomized to manual CPR received quality manual chest compressions with an accelerometer-based chest compression feedback device.

The results showed that the use of mechanical chest compressions with the LUCAS device did not cause more severe or life-threatening visceral damage than good quality manual chest compressions. The authors could not exclude that more severe or life-threatening damage was caused with the AutoPulse device compared with good quality manual chest compressions.

- Serious or life-threatening visceral resuscitation-related damage was seen in 11.6 percent of the AutoPulse device patients, 7.4 percent of LUCAS device patients and 6.4 percent in the manual group.

Key points

- During the study, there were no LUCAS device failures. AutoPulse device experienced a 16 percent failure rate caused by battery failure or a broken belt that resulted in imbalance in active treatment. However, this did not affect the interpretation of the outcome.

- Mean compression depth in the manual control group was 4.8 cm/1.9 inches and the provided rate was 110 compressions per minute. This is the first randomized safety study where the quality of manual chest compressions was measured with a feedback device. Measuring the quality of manual CPR is important because low quality, shallow chest compressions will result in fewer injuries, but decreased perfusion and circulation.

Life-threatening visceral resuscitation-related damage

- The secondary outcome (severe rib and/or sternum fractures) was observed in 45.6 percent of the AutoPulse device patients, 39.8 percent of LUCAS device patients and 41.3 percent in the manual group.
What is a randomized controlled trial?

The Koster study is a randomized controlled trial. This is a type of scientific experiment which aims to reduce bias when testing a new treatment. The participants of the trial are randomly allocated to either the group receiving the treatment under investigation or to a group receiving standard treatment (or placebo treatment) as the control.

### Prospective randomized controlled study

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<th>Advantages</th>
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<tr>
<td>Highest quality of evidence available(^3)</td>
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<td>Low potential of bias</td>
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References