April 2015 "Skeptic Edition" REBELCast – Show Notes

Topic: Active Compression Decompression CPR with Augmentation of Negative Intrathoracic Pressure

Question: Is active Compression Decompression CPR with Augmentation of Negative Intrathoracic Pressure for Treatment of Out-of-Hospital Cardiac Arrest superior to standard CPR?

Article: Aufderheide et al. Comparative Effectiveness of Standard CPR versus Active Compression Decompression CPR with Augmentation of Negative Intrathoracic Pressure for Treatment of Out-of-Hospital Cardiac Arrest: Results from a Randomized Prospective Study. Lancet. 2011 January 22; 377(9762): 301–311. PMCID: PMC3057398

Background: Sudden cardiac arrest is very common and in the United States, there are about ½ a million cardiac arrests every year. About half of these cardiac arrests are out-of-hospital cardiac arrest and the survival rate is pretty poor with recent survival estimates of 7 – 9.5%.

Details of the Study:

- **Population:** Adults with OHCA of presumed cardiac origin
  - **Excluded:** non-cardiac arrests, trauma, stroke, over dose, electrocution
- **Intervention:** Active Compression Decompression (ACD) CPR with Augmentation of Negative Intrathoracic Pressure
- **Comparison:** Standard CPR
- **Outcome:** Primary was survival to hospital discharge with good neurologic function (modified Rankin Scale of three or less)

Results:

- The survival to hospital discharge with a modified Rankin Score of three or less:
  - 75/840 (8.9%) vs. 47/813 (5.8%), p=0.019, OR 1.58 [CI= 1.07, 2.36].
  - They report this as 53% relative increase in survival (absolute was 3.1% NNT=33)
  - If you had used mRS of two or less the results are 6.2% vs. 4.6% (absolute difference 1.6% NNT=63) favoring the intervention.
  - The HARM: increase pulmonary edema in intervention group

Limitations:

- This was an industry-sponsored trial: This does not negate the results but should always make people a bit more skeptical. The sponsor helped in designing the study, data interpretation, writing and decision to submit the paper for publication.

- The study was terminated early due to lack of funding: The original study called for total of 1,400 patients. A pre-planned interim analysis recommended upping the sample size to 2,700 to have 80% power to detect a difference. At the time of termination they had only enrolled 1,653 patients. This means there were 1,000 patients (37%) short of required target size. This limits making any strong conclusions on the primary outcome and severely limits any comments that could be made about secondary outcomes and subgroup analyses.
- The two groups were not treated equally post randomization. The intervention group received much greater cardiac care:
  - Cardiac catheterization (33% vs. 42%)
  - Coronary stenting (13% vs. 16%)
  - Coronary bypass surgery (3% vs. 6%)
  - Cardio-defibrillators (14% vs. 17%)
- This trial was registered at ClinicalTrial.gov https://clinicaltrials.gov/ct2/show/record/NCT00189423?term=lurie+cpr&rank=2 While some of the secondary outcomes were reported others were not. This included the survival at 30 days and the neurological recovery at 30 days on mRS. There were three other neurologic scores collected but not reported. They only reported the Cognitive Abilities Screening Instrument (CASI) at 90 and 365d (not at 30d). They did not report the following outcomes at discharge, 30d, 90d or 1 year:
  - Cerebral Performance category (CPC)
  - Overall Performance Category (OPC)
  - Health Utilities Index Mark 3 (HUI3)
  - They present a Beck's Depression Index, which was not in their original 2005 study design or updated secondary outcomes in 2012.

What is the clinical bottom line for the above clinical question?

- It is not clear if this device works in improving survival with good neurologic outcomes for patients with OHCA, but this study does not prove that it does.
- The other take home point would be – Remember to be skeptical of anything you learn, even if you heard it on the Skeptics' Guide to Emergency Medicine or in this case REBELCast!!!

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