AUTOMATED COMPRESSION DEVICES

PURPOSE

To provide clinical guidance regarding the use of automated compression devices (ACD) used to provide mechanical CPR to a patient in cardiac arrest. Examples of such commercially available and FDA approved devices include the LUCAS and AutoPulse Devices. This clinical guideline is specific to the LUCAS device.

CLINICAL GUIDELINE

Indications

- Adult cardiac arrest
- Patient size amenable to device placement
  - Sternum Height of 7.5 – 11.9 inches
  - Chest Width of < 17 inches

Contraindications

- Traumatic injury except when transporting with CPR in progress
- Pregnancy

Device Placement

- All CPR by trained responders is manual for ***at least*** the first two cycles.
- All cycles are two minutes except for possible ROSC (rapid change $EtCO_2$, responsiveness).
- Manual compressions are expected at 100-110/min:
  - **All pauses are <6 seconds**.
  - Manual compressions should have metronome or CPR Feedback Device.
  - Quality compressions are essential: Depth 2+ inches with full release
- LUCAS placement should not impede clinical interventions.
  - Cardiac Monitor or AED ***must*** be applied before LUCAS.
  - When urgent airway management is indicated, an advanced airway (endotracheal tube or supraglottic device) should be applied before LUCAS as the ability to ramp is lost after LUCAS placement.
  - Two step application with longest pause 6 seconds or less over the course of two cycles of CPR. ***The LUCAS is an aid not a priority.***
- LUCAS Procedure:
  - Address clinical management priorities ***prior*** to placing the device (eg cardiac monitor placement, securing the airway, medication administration for possible reversible cause, etc).
  - Set up the device and turn it on to confirm the battery is charged. It will automatically start in **Adjustment Mode**.
  - After all clinical management priorities are complete, the team leader announces that LUCAS application will occur in the next cycle.
  - At the end of a cycle of manual CPR, and in a coordinated fashion, one member standing in front of the patient grabs both arms and elevates the patient's torso, while another provider

places the backplate high on the patient's back while the patient is lowered back to the ground. Careful attention is paid to preserving a humeral IO (if present).

- Immediately resume manual compressions. Goal of the transition: ≤ 3 seconds.
- Complete the cycle of manual CPR.
- During the subsequent cycle of CPR, attach the device tower by clicking the device tower's claw into the backplate opposite the compressor.
- At the end of the manual CPR cycle and in a coordinated fashion, the compressor takes the other claw and hooks it into the near side backplate.
  - Adjust the suction cup against the patient's chest.
  - Activate compressions. Goal of the transition: ≤6 seconds.
- Reconfirm good femoral pulses with LUCAS CPR: adjust suction cup position as required.
- Reconfirm $EtCO_2$ (if attached):
  - If decreased after LUCAS transition: adjust suction cup position.
  - If unresolved, return to manual CPR and recheck.

- Pulse Checks:
  - Use pause in last round of 2 min cycle to prepare for pulse check.
  - Lead paramedic or designee charges monitor.
  - **Audible charging is the signal for pulse check**: Carotid and femoral pulse check occurs with CPR ongoing.
  - 10 seconds out: lead paramedic prompts crew: "Are there pulses with CPR?" Crew confirms.
  - Compressor counts down from 5 seconds and stops CPR at 0.
  - Lead paramedic prompts for pulses without CPR.
  - Lead paramedic assesses rhythm: "Shock" or "No Shock" and directs personnel to resume mechanical CPR immediately if no pulses (<6 seconds).
  - For "Shock" crew clears – Lead paramedic confirms clear visually and shocks. LUCAS compressions can continue during shock.
- Ventilations:
  - Ventilations can be provided at 30:2 or interposed at 8-12/min with small gentle breaths if continuous compressions.
  - Compressions will not be paused during placement of airway devices: supraglottic or ETT.

Usage Guidelines

- The LUCAS shall be used in accordance with the manufacturer's recommendations.
  - The claw locks on the support legs must lock WITHOUT compressing the patient's chest.
  - The suction cup must completely compress when lowered against the patient's chest.
  - Do NOT attempt to lift the patient or the device by the arm straps.
- The tower must remain vertical relative to the patient's chest at all times. Reposition if the device goes off-axis.
- ***Monitor for movement of the device.*** The neck strap and wrist straps should be used and will help avoid this.

- Confirm manual pulse presence and quality as well as $EtCO_2$. Pulse during compressions are at least as good after LUCAS placement as with manual. If not, move device to the patient's left and slightly down and recheck.
- Use caution with securing the patient's arm if a humeral IO has been placed.
- Do not place the device low on the sternum or on the xiphoid. ***Constantly reassess to assure the device is not migrating towards the stomach.*** Compressing too low can cause major trauma to the patient.
- A scoop stretcher, if available and feasible, is the most effective and least disruptive method to move a patient with a LUCAS device in place. If using a backboard under the patient to facilitate movement, be careful to not dislodge the LUCAS nor interrupt compressions more than 6 seconds.
- If LUCAS is already applied when ROSC occurs, leave the LUCAS device in place for the transport should the patient re-arrest.

OPERATIONAL EXPECTATIONS

- The use of an ACD device must be authorized by the agency Medical Director prior to its being acquired and placed in-service.
- Prior to placing in-service, all personnel must be trained on its use and application through both didactic and practical (hands-on) training approved by the Agency Medical Director. Regular retraining is expected to occur to maintain proficiency with expedient application no less than once a year but encouraged to be more frequently at the time of deployment to develop proficiency.
- The Agency is expected to establish policy that, at a minimum identifies:
  - The process for charging and swapping of primary and secondary batteries on no less than a monthly basis.
  - Process for replacement of the LUCAS suction cup in case of discoloration or deterioration.
  - Expectation that anytime the LUCAS device is deployed by the Agency, there is always an individual trained in its use that accompanies the device. This does not require the Agency that provides the device to accompany the device to the hospital, however it does require the Agency to assure that the device is maintained by someone experienced in its use and how to trouble-shoot should the device become dislodged or fail.

TRAINING RESOURCES

A LUCAS Training Video is available at https://youtu.be/G98KJMYn5xo.

This clinical guideline and training resources, are derived with permission from Dr. Mike Levy, Medical Director of Anchorage Fire Department, Anchorage, AK.

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