



Total Artificial Heart

History

- SAMPLE
- Bridge to transplant
- Destination therapy
- Estimated downtime
- LVAD, RVAD, Bi-Vad, TAH
- DNR, MOST, or Living Will
- Contact with LVAD coordinator

Signs and Symptoms

- Unconsciousness
- Pulseless
- Apneic
- Poor capillary refill / skin color
- AMS or decreased mental status
- No electrical activity on ECG
- No heart tones on auscultation

Differential

- See Reversible Causes below
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

Rapid assessment
Check for signs of life
Assess for adequate perfusion

DO NOT USE ECG MONITOR

- Total Artificial Heart does not generate ECG

Contact transplant coordinator:

- As quickly as possible for troubleshooting and treatment advice, but do not delay emergency treatment
- Follow patient specific emergency plan if present

Criteria for Death / No Resuscitation
Review DNR / MOST Form

Decomposition, Rigor mortis, Dependent lividity, Blunt force trauma
Injury incompatible with life
Extended downtime
Do not begin resuscitation
Follow Deceased Subjects Policy

Pulse Present?

Go to Page 2

Airway Protocol(s) AR 1, 2, 3
if indicated

Respiratory Distress Protocol AR 4
if indicated

Altered Mental Status Protocol UP 4
if indicated

Check Blood Pressure

Systolic BP
≥ 150 mmHg

Systolic BP < 150 mmHg
And
≥ 90 mmHg

Systolic BP
< 90 mmHg

A
Nitroglycerin 0.3 / 0.4 mg SL
Repeat every 5 minutes
as needed

Maintain SBP ≥ 90 mmHg

P
Furosemide 40 mg IV / IO
if available

May assist patient taking their
antihypertensive medication

Maintain SBP ≥ 90 mmHg

DO NOT USE:

- Manual or mechanical chest compressions
- ECG/Defibrillation/Pacing/AED devices
- Vasopressor medications
- Antiarrhythmic medications

IV / IO Access Protocol
UP 6

A
Normal Saline Bolus 500 mL
IV / IO
May repeat as needed
Maximum 1 L

Notify Destination or
Contact Medical Control



Total Artificial Heart

Entering from Page 1
No Pulse Present

DO NOT USE ECG MONITOR
• Total Artificial Heart does not generate ECG

Attempt to restart Total Artificial Heart
Expose Total Artificial Heart control module
Expose Total Artificial Heart power source
Expose Total Artificial Heart driveline

Driveline:
• Ensure it is connected firmly to control module
• Ensure lines are not kinked or bent

Power source:
• Ensure all connections firmly to control module (batteries or main power source)

Battery charge:
• Check by pressing charge indicator
• Replace battery(s) if indicated

Back up Driver
• Change to back up driver *if available*

Pulse Present? — YES —> Go to Page 1

NO

A Normal Saline Bolus 500 mL IV / IO
May repeat as needed
Maximum 1 L

Pulse Present? — YES —> Go to Page 1

NO

Follow Deceased Subjects Policy



Total Artificial Heart

Pearls

- **Recommended exam: Mental status, skin color, capillary refill, peripheral pulses, blood pressure.**
- **Assessment of blood flow and perfusion status:**
Manual and automated BP devices can measure a BP.
Skin color, skin temperature, capillary refill
- **ECG and telemetry monitoring:**
The artificial heart does not produce an ECG wave form or tracing.
Do not use the 12-Lead ECG or ECG monitoring as it will only show asystole.
- **Total Artificial Heart:**
Different than Ventricular Assist Device (LVAD, RVAD, or Bi-VAD)
The patient's left and right ventricles are removed and the artificial heart is connected to the right and left atria.
The patient is totally dependent on the artificial heart for circulatory support – the native heart is removed.
There are both a right and left side pump, driven by air, and each side driven by a separate driveline.
The drivelines are not electric, they are driven by air, so kinking can disrupt the pumping action.
Artificial heart produces a pulsatile wave form so the patient will have a palpable pulse when operational.
- **Reasons for use:**
Bridge therapy – patients awaiting transplant or anticipated recovery.
Destination therapy – advanced heart failure, not candidate for transplant, and will live rest of life with device.
- **Common complications:**
Most common is kinking or bending of the driveline(s) which stops air from moving and stops pumping action.
Disconnection of power supply, either battery disconnect, or electrical cord to receptacle disconnection.
Driveline failure or disconnection from controller unit.
Controller failure
Blood clot formation, acute stroke, and bleeding (mucosal and gastrointestinal most common sites)
Infection
- **Blood pressure:**
Optimal SBP is < 130 mmHg and > 90 mmHg.
Hypertension puts great strain on the pump and can cause blood to back up into the lungs and cause pulmonary edema and respiratory failure.
Epinephrine and vasopressors are ineffective, can cause hypertension, and may worsen the patient's condition.
- **Manual or mechanical chest compressions:**
Do not use
- **End Tidal CO₂ (EtCO₂):**
Helpful in monitoring adequate perfusion status.
- **Defibrillation/Cardioversion:**
Do not use.
- **Transcutaneous Pacing:**
Do not use.