Electrical Therapy/EKG Monitoring Procedure

Purpose: This procedure is to allow for the performance of appropriate electrical therapy (defibrillation, synchronized cardioversion, external pacing, automatic external defibrillation, and cardiac monitoring) according to Marquette County EMS Medical Control protocols.

1. Defibrillation - Manual

Note: This procedure is to be used in conjunction with the appropriate protocol by Paramedics only.

1. Indications: Ventricular fibrillation, pulseless ventricular tachycardia
2. Technique:
    1. Confirm unresponsiveness and absence of pulse and respirations.
    2. Initiate CPR
    3. Turn defibrillator on.
    4. Place "hands-off" electrodes in appropriate position on patient's chest to determine patient's cardiac rhythm.
        1. one pad to right of upper sternum below clavicle and other pad just to left of heart apex.
    5. Confirm that synchronizer switch is "off".
    6. Charge defibrillator to energy level specified in appropriate protocol.
    7. Recheck rhythm.
    8. "Clear" the area.
    9. Discharge the electrical charge by simultaneously pressing defibrillator buttons.
    10. Watch for evidence of muscle contraction when shock delivered.
    11. Immediately change to next energy level and charge defibrillator
    12. Recheck rhythm.
    13. Confirm presence or absence of pulse.
    14. If VF or pulseless VT persist re-shock as outlined in appropriate protocol.
    15. Continue to treat the patient according to the appropriate protocol.
3. Precautions
    1. Do not treat the monitor alone. Confirm presence or absence of pulse and respiration after each defibrillation shock. Initial stacked 3 shocks is fine.
    2. Dry the chest wall if wet or diaphoretic.
    3. Nitroglycerin paste should be removed; pads should not be placed over nitroglycerin patches.
    4. Avoid placing the pads over a pacemaker generator.
    5. If visible muscle contraction of the patient did not occur, defibrillation did not occur; check equipment.
    6. Ensure that no other individuals are in contact with the patient or the defibrillator prior to delivering the electrical shock.
    7. Defibrillation may not be successful in hypothermic patients; refer to hypothermia protocol.
4. Complications
    1. Accidental shock of adjacent individual.

2. Skin burns resulting from inadequate contact between paddles and skin or due to inadequate conducting gel or dry conductive pads.

2. Cardioversion

Note: This procedure is to be used in conjunction with the appropriate protocol by Paramedics.

1. Indications: Pulsed, unstable ventricular tachycardia; unstable supraventricular tachycardia
   Must never be undertaken without direct order from base physician.
2. Technique:
   1. Initiate IV prior to procedure if time permits.
   2. Sedate the patient, if appropriate, according to the appropriate protocol.
   3. Select a lead which gives upright QRS complex.
   4. Turn synchronizer switch "on". Ensure that synchronizer "light" coincides with QRS complex. It should blink with each QRS complex.
   5. Place conductive pads on patient's chest.
      1. one paddle to right of upper sternum below clavicle and other paddle just to left of heart apex.
   6. Charge defibrillator to energy level as specified in appropriate protocol.
   7. Recheck rhythm.
   8. “Clear" the area.
   9. Discharge the electrical charge by simultaneously pressing and holding the defibrillator buttons until the charge is delivered; it may take several seconds for the charge to be delivered.
   10. Watch for evidence of muscle contraction when shock delivered.
   11. If no shock is delivered and the patient is in a wide complex tachycardia, turn off the "synch" switch and defibrillate the patient.
   12. If shock is delivered, but the rhythm does not convert, re-cardiovert according to the appropriate protocol.
   13. If the patient is cardioverted into or progresses into ventricular fibrillation, turn off the "synch" switch and defibrillate (unsynchronized) the patient at 200 joules.
3. Precautions
   1. May be contraindicated in patients with digitalis toxicity.
   2. The same precautions as for defibrillation occur.
   3. If the defibrillator does not discharge on "synch" with the tachycardia, turn off the "synch" switch and defibrillate the patient.
   4. If a sinus rhythm is achieved by cardioversion, even briefly, and then reverts to previous rhythm, repeat the cardioversion at the same setting as was initially successful.
      1. If conversion only occurs for a brief period, going to higher energy levels will be of no additional value. After a couple of short

duration conversions, consider alternate treatments for presenting problem. (IE. Lidocaine or adenosine, etc.)

5. Beware of patients with chronic atrial fibrillation. (often present with Atrial fib with rapid ventricular response) They will not cardiovert easily and may even get worse from cardioversion. Ask for a history of an irregular heartbeat.

4. Complications
   1. Same as for defibrillation.

3. Pacing - External Transcutaneous

Note: This procedure is to be used in conjunction with appropriate protocol by Paramedics only.

1. Indications:(See Special Notes) Asystolic Cardiac Arrest; Symptomatic Heart blocks & Bradycardias
2. Technique:
   1. Ensure continuous ECG monitoring during procedure.
      1. Utilizing 4 lead EKG cables along with pacing pads.
   2. Consider sedation, if time permits.
   3. Prep patient skin:
      1. Clip/shave hair (if pads won't adhere).
      2. Dry skin if diaphoretic.
   4. Apply Pacing Electrodes
      1. Anterior - Posterior Preferred
         (1) Negative: L Anterior chest, halfway between Xiphoid process and L nipple, with upper edge of electrode below nipple line.
         (2) Positive: L Posterior beneath scapula and lateral to spine
      2. Secondary position - pads in same place as for defibrillation.
   5. Push Pacer button.
   6. If QRS complexes are present, make sure QRS or EKG are in most positive, upright position (so machine can sense their presence).
      1. "sense" marker should appear on each QRS. If not adjust EKG size until "sensing" occurs. If still unable to obtain "sense" switch to another lead.
   7. Set External Pacemaker Rate to 70 BPM to begin.
   8. Set Milliamp (MA) at zero.
   9. Slowly dial up MA until evidence of electrical capture has occurred.
      1. Dial up at increments of 20 MA for unconscious/arrest patients and 5 MA for conscious patients.
      2. Use only minimal MA needed for capture.
   10. Run EKG strip and save.
   11. Ensure adequate capture including electrical and mechanical capture.

1. Electrical: Visible pacer spike immediately followed by wide QRS and Broad T waves.
2. Mechanical: Palpable Pulses; LOC; BP

12. If mechanical capture is not obtained, return immediately to CPR and contact medical control.

3. Precautions
   1. Use of external transcutaneous pacemakers can cause painful muscle contractions. Consider the use of sedation in awake patients.
4. Contraindications
   1. Wet environment
   2. Burns to the chest (relative)
5. Special Notes:
   1. Do not delay pacing while awaiting IV access or atropine to take effect if patient is symptomatic.
   2. Pacing is indicated in asystole primarily when the patient goes into asystole in front of you, or something you do puts the patient in asystole (IE. defibrillation). If the initial presenting rhythm is asystole in a patient who been down for a number of minutes, defer pacing as an initial intervention.
   3. The critical detail related to the effectiveness of external pacing clearly evolves around the element of time. The sooner external pacing is applied, the better the patient outcome.

4. AED - Automatic External Defibrillation

Note: This procedure is to be used in conjunction with the appropriate protocol by Medical First Responders, EMTs, EMT-S's, & Paramedics.

1. Indications: Unresponsive patient without pulse or respirations

2. Technique:

    1. Establish that the patient is apneic and pulseless.
    2. Begin CPR. (NOTE: ALS or LAS may intubate at any time after this giving priority to the provision of good CPR and the use of the AED.)
    3. All units will be required to call for ALS intercept.
    4. Connect the patient as per training to AED.
    5. Stop CPR. Press analyze. Check for pulses. Allow AED to analyze the patient's rhythm. If indicated by the AED and there is no pulse, push the press to shock button. Repeat this step three consecutive times using energy levels 200, then 300[1], then 360J, checking pulses after each shock.
    6. If the patient has not converted continue CPR and hyperventilate for one minute.
    7. Press analyze. Check pulses. Allow AED to analyze patient's rhythm. If indicated by the AED and there is no pulse, repeat series of three shocks at 360J, checking for pulse after each shock.
    8. If the patient has not converted continue CPR and hyperventilate for one minute.
    9. Press analyze. Check pulses. Allow AED to analyze patients rhythm. If indicated by the AED and there is no pulse, repeat series of three shocks at 360J, checking for pulse after each shock.
    10. If the patient has not converted, continue CPR, keep AED attached, prepare for transport and transport to the ALS intercept. Advise the receiving hospital of the actions taken and results achieved by radio as soon as possible, as well as an update on patients condition. Request further orders from Medical Control as needed.
    ****(First Responders should continue the series of shocks and CPR until the ambulance arrives or the patient converts.)****
    11. While enroute if the AED gives check patient prompt the EMT/ADT must assess the patient. If the patient is pulseless and V-Fib or V-Tach is on the monitor, the ambulance must stop. Press analyze. Check for pulse. Allow AED to analyze patients rhythm. If indicated by the AED and there is no pulse, repeat series of three shocks at 360J, checking for pulse after

[1]Heartstart 2000 must use 200 joules.

each shock. If still not converted, continue CPR, transport and advise medical control.

12. In the event a patient who has been successfully defibrillated in the field refibrillates, as diagnosed and confirmed by the AED and rescuer, the EMT/ADT should proceed back to step #5 of this protocol except initially use the lowest energy level which was successful in converting the patient.

5. EKG Monitoring:

    1. Indications: All patients presenting with Cardiac related symptoms, neuroglial deficits, unconsciousness, cardiac arrest, shortness of breath, abnormal vital signs, any other signs or symptoms deemed significant.
    2. Precautions:
        1. Cardiac monitoring is not a primary consideration in the trauma setting.

    3. Special Notes:
        1. Code summary or rhythm strips documenting initial EKG and all significant changes must be attached the original run report. A code summary should also be left in the emergency dept..
        2. AED level EMS providers that have not had formal training in ECG interpretation should not interpret rhythms either over radio or on run report.

6. 12 Lead EKG:

    1. Indications: All patients presenting with Cardiac related symptoms, neurological deficits, unconsciousness, shortness of breath, abnormal vital signs, any other signs or symptoms deemed significant.

    2. When to use: Running a 12 lead should not further delay transport to the hospital. If the hospital is within close proximity. 12 lead is to be deferred for hospital to acquire. If transport time is more than 10 minutes a 12 lead should be run. Ideally send the 12 lead via cellular capabilities. In addition leave a code summary with the receiving hospital.

    3. Patients refusing transport: If a patient presenting with symptoms outlined under indications is refusing to go to the hospital, acquire a 12 lead EKG prior to obtaining signed refusal. Send the 12 lead to the appropriate hospital prior to leaving patient. If 12 lead shows a problem and patient is still refusing to go to hospital. EMS personnel must make sure patient is specifically told of findings on 12 lead interpretation. Ideally put the medical control physician on the phone with the patient.

AUTHENTICATION AND APPROVAL

Marquette County EMS Medical Director Date

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