12 lead EKG Monitoring

Procedure

Douglas County KS EMS System **March 2022**

Approved Provider: EMR, EMT, AEMT, (application) Paramedic (interpretation)

Reference protocols: Breathing Difficulty, Chest pain, CHF, Dysrhythmias

Indications

- A pre-hospital 12-lead EKG should specifically be considered during the assessment of patients being treated as per the following protocols:
  - Suspected myocardial infarction.
  - Chest Pain.
  - Respiratory Distress (possible congestive heart failure /pulmonary edema).
  - Syncope in patients > 35 y/o with positive orthostatics.
  - Dysrhythmia diagnosis.
  - Cardiac Dysrhythmia (may be particularly helpful in pediatric patients).

Contraindications

- Do not delay treatment/transport of unstable pt's to obtain 12 lead EKG.

Precautions

- Do not prolong scene time to obtain 12-lead EKG (should take less than 5 minutes).
- A normal (or nonspecific) 12-lead EKG does not rule out myocardial infarction or ischemia, therefore do not base prehospital treatment on the results of the EKG.

Technique (Fig. 1)

- The patient should be in the supine position. If the patient cannot tolerate that position, place them in the semi-reclining or sitting position.
- Prep the skin and shave hair as needed.
- Apply electrodes as described:
- **Limb Leads**
  - Right arm (RA) – Right Wrist
  - Left arm (LA) – Left Wrist
  - Right leg (RL) – Right Ankle
  - Left leg (LL) – Left Ankle

- **Precordial Leads**
  - V1 – 4th intercostal space to the right of the sternum
  - V2 – 4th intercostal space to the left of the sternum
  - V3 – Directly between leads V 2 and V 4
  - V4 – 5th intercostal space at midclavicular line
  - V5 – Level with V4 at left anterior axillary line
  - V6 – Level with V5 at left midaxillary line

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General Guidelines

- Do not use nipples as reference points as locations vary widely.
- Attach 12-lead cable to electrodes and machine. Avoid patient, cable or vehicle movement and 60 cycle interference.
- Enter appropriate patient information.
- Transmit 12 lead if suspected STEMI, Unclear of interpretation, or provider discretion. Providers do not need to transmit every 12 lead.
- If the 12-lead EKG shows evidence of an acute myocardial infarction, Triage "Code STEMI" on radio and once enroute, contact medical control at the destination emergency department as early as possible to allow them time to prepare appropriately for the patient.
- Upon request of either the ER or Cath lab, print off a copy of the 12-lead

STEMI Criteria (Fig. 2&3)

Evidence of myocardial infarction is defined as elevation above baseline at J point. If any of the below criteria are met STEMI alert should be communicated to the ER as soon as possible.

- ST segment elevation of > 1mm in two contiguous leads except
  - V2 and V3 require ST segment elevation of > 2mm
- The 12-Lead interpretation reports "acute MI", "STEMI", or "possible acute myocardial infarction" WITH clinical presentation consistent with Acute MI.
- ST segment depression with same criteria as above (1mm STD in 2 contiguous leads except in V2/V3 which require 2mm) can be considered STEMI activation if clinical presentation is consistent with Acute MI.

STEMI Mimics

- Pericarditis
  - (widespread ST changes across most of the leads and usually PR depression)
- Ventricular/Paced rhythms
  - (widespread ST segment elevation and depression)
- Bundle branch blocks
  - (Wide QRSD > .12 sec in any rhythm other than ventricular or paced, V1 upward QRS = right, V1 downward QRS = Left)
- Ventricular Hypertrophy
  - (Add the S wave in V1 plus the R wave in V5 or V6. If the sum is greater than 35 mm, LVH is present.)

Sgarbossa Criteria (Fig. 4)

Utilized to determine STEMI in presence of BBB, Paced, or ventricular rhythm's. If any of the below criteria are met in presence of above rhythms it is a STEMI activation.

1. Concordant ST Elevation ≥ 1mm in 1 or more leads
2. Concordant ST Depression ≥ 1mm in 1 or more leads
3. ***Proportionally* excessive discordant STE** in ≥ 1 lead anywhere with ≥ 1 mm STE, as defined by ≥ 25% of the depth of the preceding S-wave

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Complications

- Delay in treatment or transport to obtain 12-lead EKG may result in pt deterioration

Documentation

- Upload 12-Lead EKG into EPCR
- Scan copies of all EKG strips and 12-leads into EPCR if not uploaded.
- Interpretation including
  - Premature complexes
  - Runs of another rhythm
  - Escape beats
  - Pauses/ arrests
  - Blocks
  - Bundle branch blocks
  - Elevation/ Depression found and in what lead.

Fig. 1

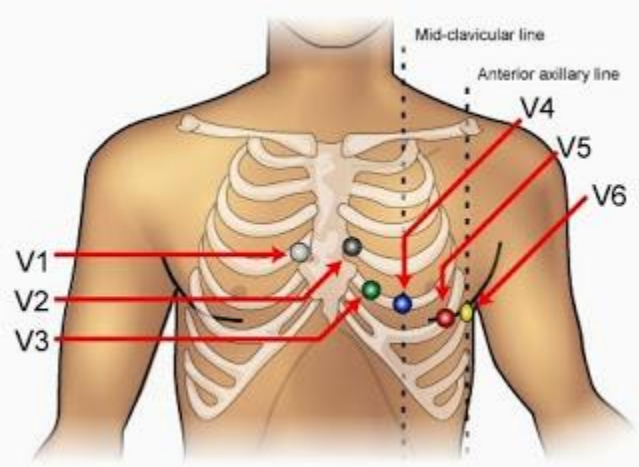
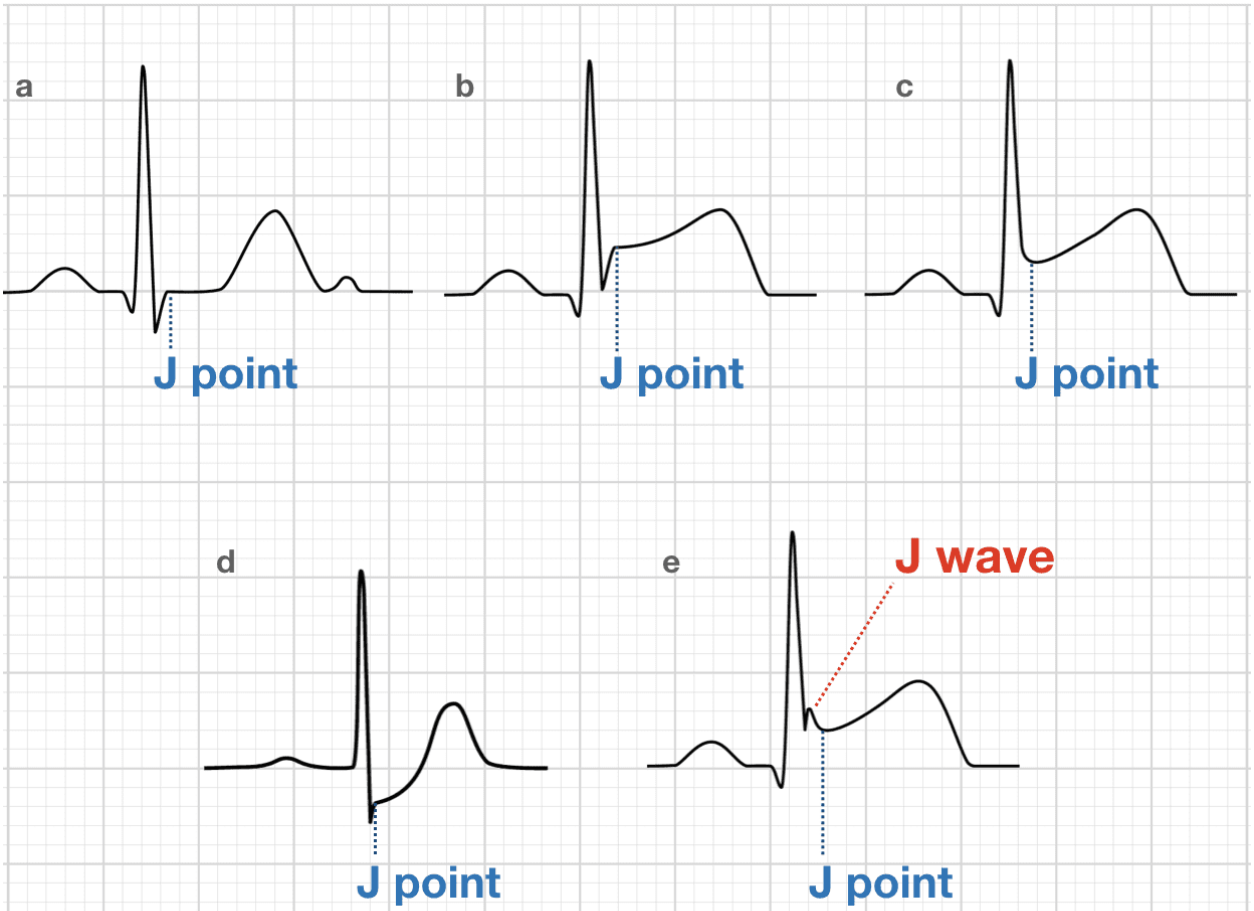


Fig. 2



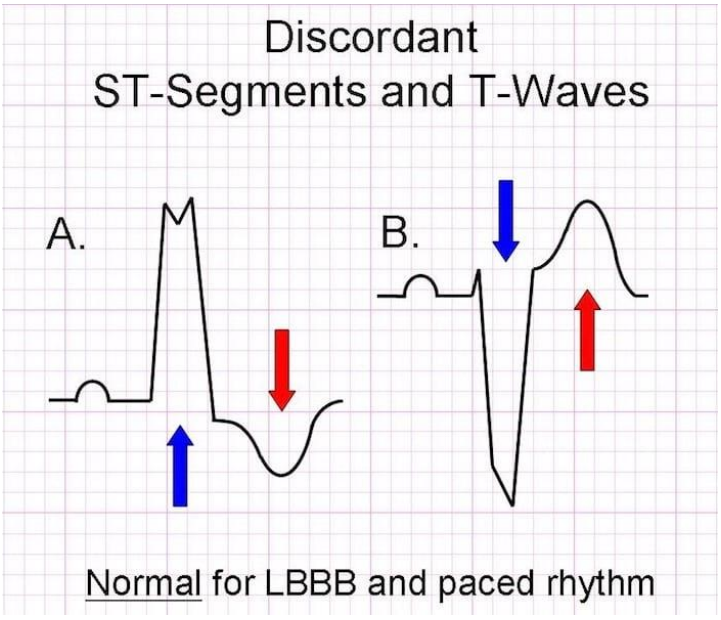
J Point is defined as the junction of the QRS complex and the ST Segment. Think of when the slope of the QRS levels off.

Fig. 3

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

Groups of contiguous leads for STEMI determination.
V2 and V3 are considered contiguous.

Fig. 4



Discordant ST Segment is shown above
Concordant St segment would be in the direction of the QRS deflection