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ECG Recording and Interpretation

Experiment 15 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To observe a standard 12-lead ECG recording, identify the principal waves and calculate a teaching heart rate.

Principle

An ECG records electrical potential differences associated with cardiac activity. Ten electrodes provide twelve standard leads: I, II, III, aVR, aVL, aVF and V1-V6. P reflects atrial depolarisation, QRS ventricular depolarisation and T ventricular repolarisation. An ECG is not a direct measurement of pumping strength.

Requirements

- ECG machine and instructions, electrodes and approved skin-preparation supplies.
- Consenting supervised volunteer, manikin or supplied anonymised trace.
- Ruler and calculation sheet.

Procedure

1. Prepare

Explain the recording, obtain consent and maintain privacy. Position the person comfortably as required and check identity and recording details.

2. Place electrodes

The trained demonstrator identifies anatomical landmarks. Use the machine's limb-electrode labels rather than relying on colour codes, which differ between systems.

3. Record

Ask the person to remain still. Check contact quality and interference before recording at the stated speed and gain.

4. Check the trace

Record calibration, lead labels and artefacts. Reversed or misplaced electrodes can alter the tracing.

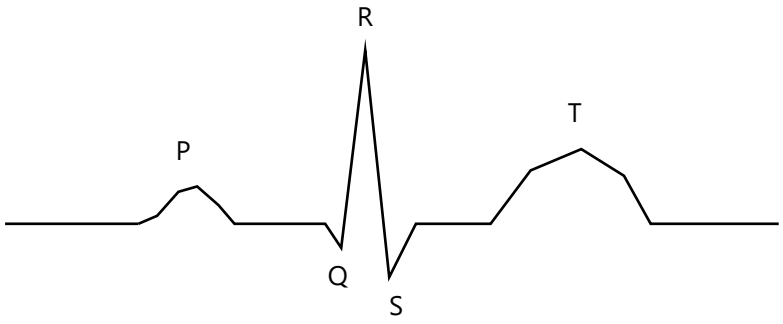
5. Read systematically

Assess rate and regularity; identify P, QRS and T; measure intervals where instructed. Relate observations to the supervising clinician's interpretation, not an independent diagnosis.

Chest Electrode Positions

Electrode	Standard position	Check
V1 / V2	Fourth intercostal space at right / left sternal border	Identify the space anatomically
V4	Fifth intercostal space, left midclavicular line	Place before locating V3
V3	Midway between V2 and V4	Do not guess a fixed rib space
V5 / V6	Left anterior / midaxillary line, level with V4	Keep the same horizontal level

Wave Identification



P: atrial depolarisation QRS: ventricular depolarisation T: ventricular repolarisation

Schematic; not a diagnostic tracing and not to scale.

Intervals to Locate

PR is measured from the start of P to the start of QRS. QRS duration is measured across the ventricular complex. QT extends from QRS onset to T-wave end and varies with rate; any corrected QT uses a stated validated formula.

Observations and Record

Feature	Measurement / observation	Record
Calibration	Speed and gain	____ mm/s; ____ mm/mV
Rate / rhythm	R-R spacing and regularity	_____
Waves / intervals	P, QRS, T and measured interval	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- At 25 mm/s: one 1 mm small square = 0.04 s; one 5 mm large square = 0.20 s. At 10 mm/mV, 1 mm vertically = 0.1 mV.
- For a regular rhythm with four large squares between R waves: rate = 300 ÷ 4 = 75 beats/min.
- For an irregular rhythm on a complete 10-second trace, 12 QRS complexes give 12 × 6 = 72/min as an approximate average.
- Do not use these shortcuts when the speed or trace duration differs from the assumptions.

Result

Recording speed: ____ mm/s; gain: ____ mm/mV. Calculated rate: ____ beats/min. Waves and artefacts were identified and reviewed with the instructor.

Precautions

- Preserve consent, privacy and appropriate electrode placement during volunteer recording.
- Check speed and gain before measuring; do not use a 25 mm/s factor on a 50 mm/s trace.
- Clinical concerns or symptoms are referred to the supervising clinician; a classroom interpretation does not exclude heart disease.

Viva Questions and Answers

1. Why are there twelve leads but ten electrodes?

Leads are calculated electrical views; several are derived from the limb electrodes.

2. What does QRS represent?

Ventricular depolarisation.

3. How does artefact affect interpretation?

Movement or poor contact can mimic or obscure electrical patterns.

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