

Original Paper

Common errors in connection and placement of lead in standard electrocardiogram

Elaheh Tari Najjar Kolahi (M.D)¹, Mansour Mirza Ali (M.D)², S.Mehran Hosseini (Ph.D)^{*3}

¹General Physician. ²Assistant Professor, Department of Internal Medicine, Ischemic Disorders Research Center, Golestan University of Medical Sciences, Gorgan, Iran. ³Associate Professor, Department of Physiology, Neuroscience Research Center, Faculty of Medicine, Golestan University of Medical Sciences, Gorgan, Iran.

Abstract

Background and Objective: ECG is one of the most common diagnostic procedures. Errors related to incorrect placement of electrodes and/or inaccurate connection of them in their standard anatomical location will cause some changes in the ECG waves. These errors may cause therapeutic or diagnostic mismanagements. This study was done to determine the common errors in connection or placement of leads in standard electrocardiograms.

Methods: This descriptive-analytical study was performed on 315 patients admitted to an educational and therapeutic hospital in Gorgan, Iran during 2014. The recorded variables included the distance between the positions of the V1, V2, V5 and V6 leads from the standard location, the displacement of the left and right electrodes in bipolar limb lead I and the incorrect right and left connectivity of V1 and V2, the admission section, the urgency of ECGs and the patient's gender. The gender of ECG operator, the standard ECG voltage, staff shift, the average number of ECGs taken by the personnel, and the precise bonding of wires were observed. In the precordial leads, the distance of more than 2 centimetres from the standard leads location was considered as error threshold.

Results: The misplacement errors were observed in 149 cases (47.3%). In 20 cases (13.42%) of ECGs, the standard voltage was not observed. The highest number of misplacement errors was observed in the V5 (30.2%). Misplacement errors showed a significant differences ($P < 0.05$) for the patient gender (61.77%), the type of department (emergency department 61.67%), the non-urgent application (68.12%), and the average number of ECGs taken by personnel of 5 or less in each shift (11.67%).

Conclusion: Patient's gender and emergency department are the most important factors in misplacement of precordial leads.

Keywords: Electrocardiogram, Misplacement, Misconnection

* **Corresponding Author:** Hosseini SM (Ph.D), E-mail: hosseini@goums.ac.ir

Received 12 Nov 2016

Revised 24 Apr 2017

Accepted 29 Apr 2017