

INTRODUCTION

In February 2020, the World Health Organization designated the name COVID-19 for a clinical condition caused by a virus identified as a cluster cause in the case of pneumonia in Wuhan, China. Shortly thereafter, the virus then spread around the world, wreaking havoc on the medical system and paralyzing the global economy. There have been concerns that specific experimental therapies might cause QTc prolongation in COVID-19 patients and therefore may predispose to arrhythmic complications. Yet, it remains unknown whether specific electrocardiographic predictors recorded on admission can be used to identify patients who are more likely to develop adverse outcomes.

OBJECTIVES

To assay the relationship between admission electrocardiogram parameters and clinical outcomes (death, duration of hospitalization and mechanical ventilation) in hospitalized COVID-19 patients.

CONCLUSIONS

High baseline values of ECG-derived 10-sec QRS durations, a marker of intraventricular conduction defect, are associated with high mortality rate in COVID-19 patients. Further prospective large-scale trials should be performed to corroborate these results and determine the role of other clinical modifier.

METHOD

A retrospective cohort study was designed. The study included all COVID-19 verified patients who were hospitalized between March and May 2020 in a dedicated ward. Inclusion criteria included the availability of admission-electrocardiogram and proper documentation of clinical outcomes. Death, duration of hospitalization and mechanical ventilation were defined as dependent indicators. ECGs were imported using a high resolution scanner, and intervals were measured in a blinded manner using an on-screen digital caliper. The ECG parameters were computed with a designated algorithm from the bipolar and unipolar limb leads. Average RR interval, standard deviation of normal to normal R-R intervals (SDNN), root mean square of successive differences between normal heartbeats (RMSSD), average QT, QT-peak, Tpeak-end, QTc, Tp-end/QT and QRS durations were computed. Bivariate regression analyses between ECG parameters and clinical data were estimated with the Pearson correlation coefficient (r).

RESULTS

The cohort included 111 corona patients, from whom ECG tests were located in only 51 files. Ten of the included patients died. Significant positive correlations were found between mortality and mean QRS. There was a positive trend between mean QRS and QTc durations and the need for mechanical ventilation. None of the other parameters reached statistical significance.

Table 1. Correlation analysis between ECG parameters on admission and duration of hospitalization

ECG parameters	r*	P Value
Mean RR (ms)	0.146	0.30
SDNN (ms)	0.131	0.35
RMSSD (ms)	0.145	0.30
Mean QT (ms)	0.212	0.13
Mean QT-peak (ms)	0.239	0.09
Mean T peak-end (ms)	0.0931	0.52
Mean QRS (ms)	0.0751	0.6
QTc (ms)	0.1707	0.23
Mean T peak-end/QT (ms)	0.0925	0.51

*Pearson correlation coefficient.

Figure 1. correlation between average QRS and mortality.

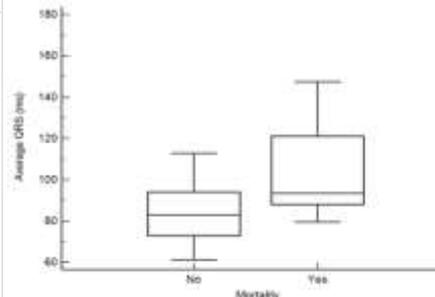


Table 2. correlation analysis between ECG parameters on admission and mortality

ECG parameters	COVID 19 survivors (n=41)	COVID 19 related Mortality (Yes, n=10)	P value
Mean RR (ms)	767.3076±20.287	767.7366±2.827	0.9495
SDNN (ms)	18.3662±5.918	23.7793±18.463	0.6520
RMSSD (ms)	28.5418±8.967	45.3186±22.776	0.9244
Mean QT (ms)	374.162±4.205	374.841±13.490	0.9231
Mean QT peak (ms)	384.847±7.915	384.426±12.027	0.4914
Mean T peak-end (ms)	90.714±4.1853	82.7066±6.9115	0.6985
Mean QRS (ms)	88.742±4.0600	103.824±6.8746	0.0209
QTc (ms)	423.386±7.121	428.366±11.507	0.3190
Mean T peak-end/QT (ms)	0.23542±0.00245	0.21162±0.01448	0.4282

Table 3. correlation analysis between ECG parameters on admission and need for respiratory support

ECG parameters	Non invasive respiratory support (n=51)	Mechanical ventilation (Yes, n=10)	P value
Mean RR (ms)	778.25±26.94*	803.04±55.8	0.68
SDNN (ms)	22.37±6.81	17.34±7.03	0.77
RMSSD (ms)	31.2±10.65	26.19±12.11	0.53
Mean QT (ms)	365.77±7.26	396.94±25.095	0.25
Mean QT-peak (ms)	280.43±6.35	304.30±18.31	0.26
Mean T peak-end (ms)	83.67±3.95	94.63±9.28	0.21
Mean QRS (ms)	91.11±3.69	102.31±10.15	0.13
QTc (ms)	420.56±6.63	442.45±15.20	0.09
Mean T peak-end/QT (ms)	0.266±0.007	0.268±0.014	0.94

*Results by Mean±SEM