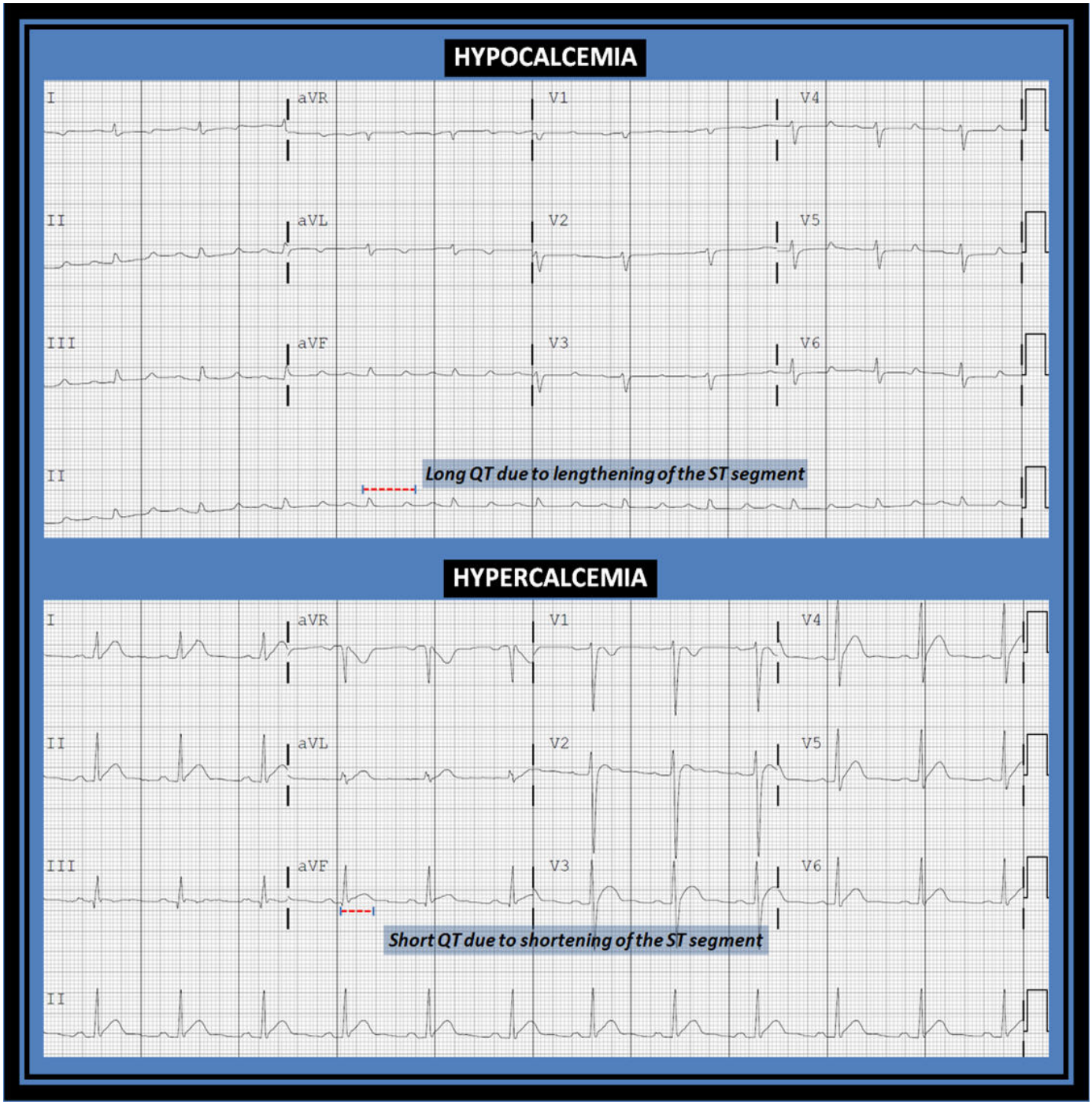
The Long & Short Of Calcium Abnormalities By ECG!

Nikky Bardia, M.D.[a], Maulikkumar Patel, M.D.[a], Usman Sarwar M.D.[a], Nupur Shah, M.D.[a], Rajasekhar Mulyala, M.D.[a], Mariam Riad, M.D.[a], Mustafeez Rahman, M.D.[a], G. Mustafa Awan, M.D.[a], Bassam Omar, M.D., Ph.D.[a, b], Christopher Malozzi, D.O.[a]



ISSN 2689-291X https://doi.org/10.13140/RG.2.2.30438.70722

Description

The above ECG shows the effect of hypocalcemia on the electrocardiogram (upper panel), resulting in QT prolongation predominantly due to lengthening of the ST segment. The effect of hypercalcemia on the ECG seen in the lower panel is shortening of the QT interval primarily due to shortening and near obliteration of the ST segment.

Discussion

Electrolyte abnormalities result in variable ECG abnormalities, some life-threatening, and should be promptly recognized and treated to avoid arrhythmias [1, 2].

Hypocalcemia results in a characteristic prolongation of the ST segment on the ECG proportional to the extent of low calcium level [3]. It increases phase 2 of the action potential duration which, in addition to prolonging the ST segment, can result in ST elevations suggestive of myocardial injury [4, 5]. Hypocalcemia usually does not alter the QRS complex or T wave [5].

Hypercalcemia results predominantly in shortening of the QT interval due to ST segment shortening [6]. Severe cases, however, may result in ECG changes mimicking myocardial injury [7, 8].

Manuscript submitted June 20, accepted June 24, 2022

a Division of Cardiology. University of South Alabama, Mobile, AL 36617

b Corresponding Author: Bassam Omar, Division of Cardiology, University of South Alabama, 2451 USA Medical Center Dr., Mobile, AL 36617, USA.

Email: bomar@health.southalabama.edu

http://cardiofellows.com/newsletter-june-2022.html

References

1. Diercks DB, Shumaik GM, Harrigan RA. Electrocardiographic manifestations: electrolyte abnormalities. J Emerg Med. 2004 Aug;27(2):153-60.
2. El-Sherif N, Turitto G. Electrolyte disorders and arrhythmogenesis. Cardiol J. 2011;18(3):233-45.
3. RuDusky BM. ECG abnormalities associated with hypocalcemia. Chest. 2001 Feb;119(2):668-9.
4. Kukla P, Kulik M, Jastrzębski M. Severe hypocalcemia mimicking ST-segment elevation acute myocardial infarction. Ann Noninvasive Electrocardiol. 2017 Mar;22(2):e12401.
5. Adeel MY, Clarke JD, Shetty S. Severe hypocalcemia mimicking acute inferior ST-segment elevation myocardial infarction. Oxf Med Case Reports. 2018 Nov 21;2018(12):omy103.
6. Liu Y, Pérez-Riera AR, Barbosa-Barros R. Severe hypercalcemia from multiple myeloma as an acquired cause of short QT. J Electrocardiol. 2018 Nov-Dec;51(6):939-940.
7. Nahass M, Sharma R, Penn J. Hypercalcemia-induced pancreatitis presenting with acute ST-elevations mimicking a myocardial infarction. Am J Emerg Med. 2016 Jun;34(6):1187.e1-2.
8. Abugroun A, Tyle A, Faizan F. Hypercalcemia-Induced ST-Segment Elevation Mimicking Acute Myocardial Injury: A Case Report and Review of the Literature. Case Rep Emerg Med. 2020 Mar 16;2020:4159526.

KEYWORDS: Hypocalcemia; Hypercalcemia; Electrocardiography.

Reference this article as:

Bardia N, Patel M, Sarwar U, Shah N, Mulyala R**,** Riad M, Rahman M, Awan GM, Omar B, Malozzi C**.** The Long & Short Of Calcium Abnormalities By ECG! Cardiofel Newslet 2022. June; 5(6):19 – 20.