

# COVID Pneumonia, Non-ST Elevation Myocardial Infarction, QRS Fragmentation, and Electrocardiographic Wavy Triple or Yasser's Sign in Hodgkin Lymphoma-Prognostic Influence and Serious Outcome

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**Received date:** August 24, 2023, **Accepted date:** November 09, 2023

**Citation:** Elsayed YMH. COVID Pneumonia, Non-ST Elevation Myocardial Infarction, QRS Fragmentation, and Electrocardiographic Wavy Triple or Yasser's Sign in Hodgkin Lymphoma-Prognostic Influence and Serious Outcome. J Clin Cardiol. 2023;4(2):58-62.

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## Abstract

**Rationale:** The COVID-19 virus with severe acute respiratory syndrome (SARS) has a remarkable effect on morbidity and mortality. Non-ST elevation myocardial infarction (NSTEMI) is a category of acute coronary syndrome (ACS) that may represent a primary cardiac manifestation of COVID-19 disease. The QRS-complex fragmentation had been considered a hallmark of structural heart disease. Wavy triple, an electrocardiographic sign (Yasser's sign) is a new specific diagnostic sign and therapeutic guide for hypocalcemia. Immunosuppression is a shared criterion for both cancers such as lymphomas and COVID-19 virus infection. **Objectives:** This case study aimed to clarify the role of COVID-19 viral pneumonia, chemotherapy, and Hodgkin lymphoma in the probability of the current case deterioration. **Patient concerns:** A 70-year-old, housewife, widow female, Egyptian patient was presented to the emergency department with COVID-19 pneumonia with Non-ST elevation myocardial infarction recently diagnosed as Hodgkin lymphoma. **Methods:** This is a retrospective-observational case study. **Diagnosis:** COVID pneumonia with Non-ST elevation myocardial infarction, QRS-complex fragmentation, and Wavy triple electrocardiographic sign (Yasser's sign) in Hodgkin lymphoma disease. **Interventions:** CT pulmonary angiography, electrocardiography, and oxygenation. **Outcomes:** Bad response and poor outcomes in the presence of numerous remarkable serious risk factors were the results. **Lessons:** Hypocalcemia with Wavy triple electrocardiographic sign (Yasser's sign) and not hypercalcemia is a new description association that may be present in a malignancy. The association of COVID pneumonia with the recent use of chemotherapy in Hodgkin lymphoma is highly interesting in case of deterioration and away to death. An elderly age, female sex, COVID-19 pneumonia, Non-ST elevation myocardial infarction, sinus tachycardia, QRS-complex fragmentation, Wavy triple electrocardiographic signs (Yasser's sign), and Hodgkin lymphoma disease are constellation serious risk factors.

**Keywords:** COVID-19 pneumonia, Ischemic heart disease, QRS-complex fragmentation, Lymphoma, Wavy triple sign (Yasser's sign), Hypocalcemia

**Abbreviations:** ACS: Acute coronary syndrome; COVID-19: Coronavirus Disease 2019; CV: Cardiovascular; ECG: Electrocardiogram; ED: Emergency Department; fQRS: QRS-complex fragmentation; ICU: Intensive Care Unit; IHD: Ischemic Heart Disease; NSTEMI: Non-ST Elevation Myocardial Infarction; O<sub>2</sub>: Oxygen; SGOT: Serum Glutamic-oxaloacetic Transaminase; SGPT: Serum Glutamic-pyruvic Transaminase; SHD: Structural Heart Disease; STEMI: ST-elevation Myocardial Infarction; VR: Ventricular Rate

## Introduction

COVID-19 virus is still invading the world and continues to expand [1] causing a severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) or lethal COVID-19 viral

pneumonia [2].

Acute coronary syndrome (ACS) is a group of cardiovascular disorders that include ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI),

and unstable angina [3-5]. The primary cardiovascular (CV) manifestations of COVID-19 disease are accompanied by ACS with a wide spectrum of CV presentations [6] including ST-segment elevation myocardial infarction (STEMI) and STEMI-mimickers [7]. There is a relatively high proportion of COVID-19 patients with ST-segment elevation have a non-obstructive ischemic heart disease (IHD) [7]. The ECG represents the choice tool that can differentiate between STEMI, NSTEMI, and unstable angina. Cardiac enzymes, especially troponin, CK-MB/CK ratio are important in assessing the NSTEMI versus myocardial ischemia without tissue destruction [3-5]. NSTEMI in a COVID-19 patient with ARDS is a lethal combination [6]. Elevated cardiac biomarkers indicate an unfavorable prognosis [8]. QRS-complex fragmentation (fQRS) is the existence of high-frequency potentials or spikes in the QRS-complex [9]. The expression was first described in 1973 in the reporting of an experimental study on canine hearts where coronary artery obstruction motivated the occurrence of fragmented ECG as a source of reentrant activity [10]. Previously, fQRS had been considered a hallmark for structural heart disease (SHD) triggering biventricular hypertrophy [11]. The presence of fQRS can be elicited by any condition interrupting the normally homogeneous depolarization status in the myocardium and causing regional conduction decelerating such as ischemia, scar, fibrosis, myofiber disarray, inflammation, and microvascular abnormality [9]. Das et al. revealed that there was a strong correlation between fQRS and the occurrence of myocardial scar in patients with ischemic heart disease (IHD) in single-photon emission tomography [12]. The wavy triple electrocardiographic sign (Yasser's sign) is a new specific diagnostic sign seen in 97.3% of the cases of hypocalcemia. Wavy triple electrocardiographic sign can be used as a therapeutic guide in the cases of hypocalcemia [13]. Lymphoma patients present an interesting subgroup as they typically receive immunosuppressive and chemotherapy drugs during their treatment [14]. Currently, the data regarding the risk and outcome of infection by SARS-CoV-2 in lymphoma patients is scarce and variable [14]. It is recommended that reducing the dose of chemotherapy should be considered in patients receiving immunochemotherapy in COVID-19 epidemic areas. In addition, the effect of immunotherapy with monoclonal antibodies e.g., rituximab on COVID-19 should also be considered [15].

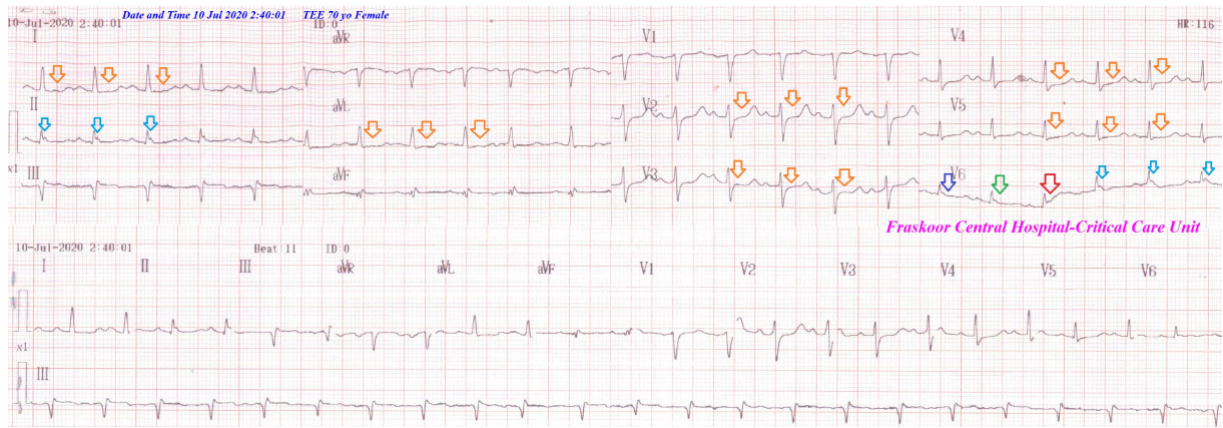
## Case Presentation

A 70-year-old, housewife, widow, and Egyptian female patient was presented to the emergency department (ED) with tachypnea and chest pain. Generalized body aches, fatigue, anorexia, and loss of smell were associated symptoms. The chest pain is angina. The patient started to complain of fever 7 days ago. The relatives gave a recent history of chemotherapy sets after the patient was diagnosed with Hodgkin lymphoma. She had direct contact with a confirmed case of COVID-19 pneumonia 17 days ago. The patient denied a history of other relevant diseases, drugs, or other special habits. Informed

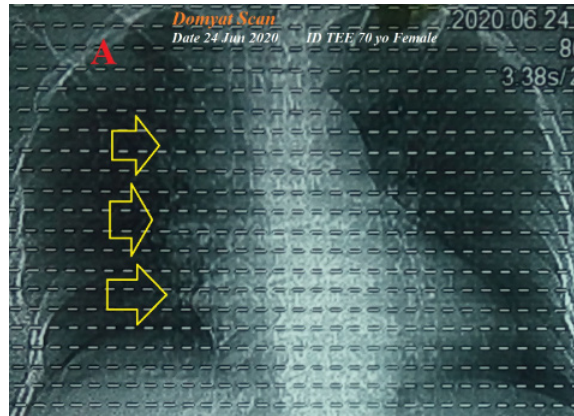
consent was taken. A submandibular scar of lymph node biopsy was seen. Upon general physical examination, generally, the patient appeared irritable, tachypneic, and distressed with a regular rapid pulse rate of VR; 116 bpm, blood pressure (BP) of 100/80 mmHg, respiratory rate of 26 bpm, a temperature of 37.6°C, and pulse oximeter of oxygen (O<sub>2</sub>) saturation of 89%. Bilateral painless firm swelling of lymph nodes in the neck, sub-axillary, and groin area was palpated. The spleen is also palpable in the left upper abdomen. Currently, the patient was admitted to ICU for COVID pneumonia with unstable angina, and QRS-complex fragmentation. Initially, the patient was treated with O<sub>2</sub> inhalation by O<sub>2</sub> cylinder (100%, by nasal cannula, 5 L/min; as needed). The patient was maintained and treated with cefotaxime; (1000 mg, IV, TDS), azithromycin tablets (500 mg, OD), oseltamivir capsules (75 mg, BID only for 5 days), and paracetamol (500 mg IV every 8 hours as needed), SC enoxaparin 80 mg, BID), aspirin tablet (75 mg, OD), clopidogrel tablets (75 mg, OD), and hydrocortisone sodium succinate (100 mg IV every 12 hours). Bisoprolol tablets (2.5 mg, OD) and atorvastatin tablets (20 mg, OD) were added. The patient was daily monitored for temperature, pulse, blood pressure, ECG, and O<sub>2</sub> saturation. The initial ECG tracing was done on the day of the presentation to the ICU showing sinus tachycardia of VR; 116. There is horizontal ST-segment depression in I, aVL, and V2-6 leads (orange arrows), QRS fragmentation in II and V6 leads (light blue arrows), and Wavy triple sign (Yasser's sign) of hypocalcemia in V6 lead (**Figure 1**). The plain chest-XR film was done within 7 days before ICU admission showing right perihilar irregular shadows which were mostly lymphadenopathy (**Figure 2A**). Submandibular lymph node biopsy showed probable lymphocyte-rich classic Hodgkin Lymphoma. The CT pulmonary angiography (CTPA) was done within 7 days before ICU admission showing multiple bilateral variable-sized ground-glass opacities in posterior, basal, pleural, and sub-pleural segments (**Figure 2B**). The initial complete blood count (CBC); Hb was 9.8 g/dl, RBCs; 3.77\*10<sup>3</sup>/mm<sup>3</sup>, WBCs; 12.04\*10<sup>3</sup>/mm<sup>3</sup> (Neutrophils: 87.1%, Lymphocytes: 7.6%, Monocytes: 3.3%, Eosinophils: 2%, and Basophils: 0%), and Platelets; 152\*10<sup>3</sup>/mm<sup>3</sup>. S. ferritin was high (1105 ng/ml). D-dimer was high (2.4 ng/ml). CRP was high (93 g/dl). LDH was high (633/L). SGPT was slightly high (54 U/L) and SGOT was slightly high (47 U/L). The serum albumen was normal (3.7 gm/dl). Serum creatinine was normal (1.10 mg/dl) and blood urea was normal (36 mg/dl). RBS was high (198 mg/dl). Plasma sodium was normal (136 mmol/L). Serum potassium was normal (4.1 mmol/L). Ionized calcium was slightly low (0.9 mmol/L). The troponin test was positive (49 U/L). COVID pneumonia with non-ST elevation myocardial infarction, QRS-complex fragmentation, and Wavy triple electrocardiographic sign (Yasser's sign) in Hodgkin lymphoma disease was the most probable diagnosis. Unfortunately, the patient died within 12 hours of management.

## Discussion

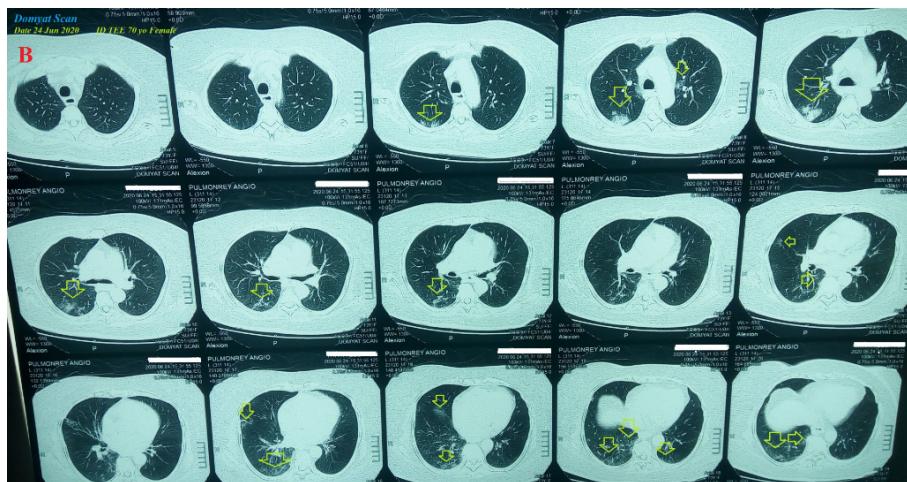
A 70-year-old, housewife, widow female, Egyptian patient



**Figure 1.** ECG tracing was done on the day of the presentation to the ICU showing sinus tachycardia of VR; 116. There is horizontal ST-segment depression in I, aVL, and V2-6 leads (orange arrows), QRS fragmentation in II and V6 leads (light blue arrows), and Wavy triple sign (Yasser's sign) of hypocalcemia in V6 lead (dark blue, green, and red arrows).



**Figure 2A.** Chest x-ray was done within 7 days before ICU admission showing right perihilar irregular shadows which are mostly lymphadenopathy (orange arrows).



**Figure 2B.** CT pulmonary angiography was done within 7 days before ICU admission showing multiple bilateral variable-sized ground-glass opacities in posterior, basal, pleural, and sub-pleural segments (lime arrows).

was presented to the ED with COVID-19 pneumonia with non-STEMI in a recently diagnosed Hodgkin lymphoma. The primary objective for this case study was the presence of COVID pneumonia with non-STEMI, QRS-complex fragmentation, and Wavy triple electrocardiographic sign (Yasser's sign) in the Hodgkin lymphoma disease in the ICU. The secondary objective for this case study was the question of how would you manage this case in the ICU.

Interestingly, the presence of a positive history of contact with a confirmed COVID-19 case, bilateral ground-glass consolidation, and laboratory COVID-19 suspicion on top of clinical COVID-19 presentation with fever, dry cough, generalized body aches, anorexia, and loss of smell will strengthen the higher suspicion of COVID-19 diagnosis.

History of diagnosis, treatment using chemotherapies regimen, and radiological evidence of perihilar lymphadenopathy supporting the presence of Hodgkin lymphoma. Perihilar lymphadenopathy may suggest thymus infiltration in Hodgkin lymphoma. The presence of typical angina with horizontal ST-segment depression in anterolateral (I, aVL, and V2-6) leads and elevated troponin suggesting the diagnosis of Non-ST segment elevated myocardial infarction. Elevated cardiac biomarkers mostly having an unfavorable prognosis. In 8%–25% of overall COVID-19 patients with associated CV conditions have a higher proportion of mortality [6]. Troponin elevation in patients with COVID-19 infection has been reported to be lower than most patients of ACS [6]. The presence of fragmentation of the QRS complex added another risk for the case. The existence of respiratory alkalosis is the indicator for the current Wavy triple sign or Yasser's sign of hypocalcemia. Cancer of solid tumor is commonly associated with hypercalcemia in the late stages and carries a poor prognosis [16].

Coronary artery affection and cardiac injury represent a serious association with both Hodgkin lymphoma and COVID-19 pneumonia. Acute pulmonary embolism was the most probable differential diagnosis for the current case study. But the history and clinical status are against it. The author cannot compare the current case with similar conditions. There are no similar or known cases with the same management for near comparison. The only limitation of the current study was the unavailability of echocardiography.

## Conclusion and Recommendations

Hypocalcemia with Wavy triple electrocardiographic sign (Yasser's sign) and not hypercalcemia is a new description association that may be present in a malignancy. The association of COVID pneumonia with the recent use of chemotherapy in Hodgkin lymphoma is highly interesting in case of deterioration and away to death. An elderly age, female sex, COVID-19 pneumonia, Non-ST elevation myocardial infarction, sinus tachycardia, QRS-complex fragmentation, Wavy triple electrocardiographic sign (Yasser's sign), and

Hodgkin lymphoma disease are constellation serious risk factors.

## Conflicts of Interest

There are no conflicts of interest.

## Acknowledgment

I wish to thank the team nurses of the critical care unit in Fraskor Central Hospital who made extra ECG copies to help me. I want to thank my wife for saving time and improving the conditions for supporting me.

## References

1. Fakharian A, Ebrahimbagha H, Mirenayat MS, Farahmandi F. COVID-19 Reinfection in a Patient with Hodgkin Lymphoma: a Case Report. *Tanaffos.* 2021 Jan;20(1):71-4.
2. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *Int J Antimicrob Agents.* 2020 Mar;55(3):105924.
3. Singh A, Museedi AS, Grossman SA. Acute Coronary Syndrome. [Updated 2023 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan.
4. Byrne RA, Rossello X, Coughlan JJ, Barbato E, Berry C, Chieffo A, et al. 2023 ESC Guidelines for the management of acute coronary syndromes: Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC). *European Heart Journal.* 2023; ehad191.
5. Zègre-Hemsey JK, Asafu-Adjei J, Fernandez A, Brice J. Characteristics of Prehospital Electrocardiogram Use in North Carolina Using a Novel Linkage of Emergency Medical Services and Emergency Department Data. *Prehosp Emerg Care.* 2019 Nov-Dec;23(6):772-79.
6. Othman F, Abid AR, Alibrahim M, Abdulkarim S, Abdelaty MA, Aboukamar M, et al. Non-ST Segment Elevation Myocardial Infarction in a Patient with COVID-19. *Heart Views.* 2020 Jul-Sep;21(3):215-19.
7. Diaz-Arocutipá C, Torres-Valencia J, Saucedo-Chinchay J, Cuevas C. ST-segment elevation in patients with COVID-19: a systematic review. *J Thromb Thrombolysis.* 2021 Oct;52(3):738-45.
8. Mahmud E, Dauerman HL, Welt FGP, Messenger JC, Rao SV, Grines C, et al. Management of Acute Myocardial Infarction During the COVID-19 Pandemic: A Position Statement From the Society for Cardiovascular Angiography and Interventions (SCAI), the American College of Cardiology (ACC), and the American College of Emergency Physicians (ACEP). *J Am Coll Cardiol.* 2020 Sep 15;76(11):1375-84.
9. Brohet C. Fragmentation of the QRS complex: the latest electrocardiographic craze?. Editorial, *Acta Cardiologica.* 2019;74(3):185-87.
10. Boineau JP, Cox JL. Slow ventricular activation in acute myocardial infarction. A source of re-entrant premature ventricular contractions.

Circulation. 1973;48:702-13.

11. Flowers NC, Horan LG, Thomas JR, et al. The anatomic basis for high-frequency components in the electrocardiogram. *Circulation*. 1969;39:531-9.

12. Das MK, Khan B, Jacob S, et al. Significance of a fragmented QRS complex versus a Q wave in patients with coronary artery disease. *Circulation*. 2006;113:2495-501.

13. Elsayed YMH. Wavy Triple an Electrocardiographic Sign (Yasser Sign) in Hypocalcemia. A Novel Diagnostic Sign; Retrospective Observational Study. *EC Emergency Medicine and Critical Care*

(ECEC). 2019;3(2):1-2.

14. Eilami O, Lopes MIBF, Gryscek RCB, Taghipour K. A case report of COVID-19 in a patient with non-Hodgkin's lymphoma. *BMC Infect Dis*. 2021;21(1):809.

15. Li Q, Zhu F, Xiao Y, Liu T, Liu X, Wu G, et al. A Primary Mediastinal Large B-Cell Lymphoma Patient With COVID-19 Infection After Intensive Immunochemotherapy: A Case Report. *Front Oncol*. 2020 May 22;10:924.

16. Theresa A, Guise MD, Wysolmerski JJ. Cancer-Associated Hypercalcemia. *N Engl J Med*. 2022; 386:1443-51.