Open Access Library Journal
2024, Volume 11, e12164
ISSN Online: 2333-9721
ISSN Print: 2333-9705

MINOCA-Induced Ventricular Tachycardia Case Report: A Challenging Diagnosis

Ali Abdin, Alex Kamougeros, Efstratios Trogkanis

Department of Cardiology, Limassol General Hospital, Limassol, Cyprus
Email: s.trogkanis@sa.aegean.gr

How to cite this paper: Abdin, A., Kamougeros, A. and Trogkanis, E. (2024) MINOCA-Induced Ventricular Tachycardia Case Report: A Challenging Diagnosis. *Open Access Library Journal*, **11**: e12164.
https://doi.org/10.4236/oalib.1112164

Received: August 26, 2024
Accepted: December 14, 2024
Published: December 17, 2024

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Abstract

A 62-year-old patient, with no prior medical history, was presented with ventricular tachycardia and was ultimately diagnosed with MINOCA after extensive investigation. The underlying cause of her condition remains unclear, leading to an ad hoc management approach involving anti-platelet therapy and statins. This case underscores the imperative for future research to concentrate on tailored interventional and diagnostic approaches for MINOCA patients, enabling their universal application through a concise and comprehensive protocol.

Subject Areas

Cardiology

Keywords

MINOCA, Ventricular Tachycardia, Diagnosis, Case Report

1. Learning Objective

To highlight the difficulties in diagnosing MINOCA in a unique clinical case absent of past medical history, stemming from the absence of a standardized protocol and limited research addressing MINOCA's.

2. Introduction

Myocardial infarction with nonobstructive coronary arteries (MINOCA), characterized by acute myocardial infarction (MI) in the absence of significant coronary artery stenosis (≤ 50%), presents a perplexing and challenging clinical entity [1] [2]. MINOCA patients exhibit clinical symptoms akin to those of a typical heart attack, yet coronary angiography reveals no significant blockages in their coronary

arteries. This diagnostic uncertainty often leads to delays in administering appropriate treatments, highlighting the urgent need for more accurate diagnostic modalities [1]. Moreover, the absence of tailored therapeutic guidelines for MINOCA patients underscores a critical gap in our approach to managing this condition [3]. The current treatment strategies primarily focus on addressing underlying causes or risk factors. MINOCA is not a monolithic entity; it encompasses a spectrum of distinct subgroups, each with its unique etiology and pathophysiological mechanisms. These subgroups include but are not limited to, conditions such as coronary artery spasms, microvascular dysfunction, and spontaneous coronary artery dissection [4]. Recognizing and characterizing these subgroups is vital for precise diagnosis and the development of individualized treatment approaches. This scientific paper aims to delve into the intricacies of MINOCA, providing insights into the complexities surrounding its diagnosis and management plan.

3. Case Presentation

Our patient, a 62-year-old woman with an excellent functional status and with a past medical history notable only for an appendectomy [5], had been residing on a cruise ship, performing her daily treadmill exercise, when she reported a constellation of symptoms that included nausea, vomiting, dizziness, and excruciating abdominal pain, with a blood pressure of 80/40 mmHg, mean arterial pressure (MAP) of 53 mmHg, and a heart rate of 120 beats per minute (bpm). Her oxygen saturation was 96%, and her respiratory rate was 20 breaths per minute. Importantly, there were no reports of loss of consciousness during the episode, but slight confusion was noted. The patient's husband mentioned that his wife had experienced common cold symptoms two months prior to this event and diarrhea on the day before the transfer [6].

Upon her arrival at our hospital, the patient presented with a wide-complex tachycardia on the surface 12-lead EKG, with RBBB and anterior axis of QRS complexes, with positive criteria for ventricular tachycardia, which necessitated cardioversion [6].

Serial Troponin levels were within normal range. Transthoracic echocardiography (TTE) on admission showed diffuse hypokinesia of all segments of LV but more prominent of the inferior and inferolateral wall, with preserved wall thickness, an ejection fraction (EF) of 25% and good chamber dimensions. Subsequent coronary angiography revealed no macrovascular coronary artery disease [5]. A repeat transthoracic echocardiogram conducted the next day after her admission, exhibited improvements in EF (40%), but hypokinesia persisted in the inferior and inferolateral walls [5] [6].

Further investigation included a CT pulmonary angiography for pulmonary embolism, which was negative and cardiac magnetic tomography, which revealed akinesia of the basal and mid inferolateral LV segment, with subendocardial inferolateral Late Gadolinium Enhancement and no regional myocardial oedema. The distribution of fibrosis was compatible with the possible origin of the wide

complex tachycardia as noted by the RBBB and anterior axis recorded to the 12-lead surface ECG, thus when combining all the aforementioned data, the final diagnosis made was hemodynamically intolerable ventricular tachycardia due to a previous MINOCA. Due to the limited understanding of the pathophysiology behind the presence of fibrotic tissue in her heart, the patient's long-term management involved the placement of an ICD device as secondary prevention, along with long-term statin and aspirin use.

4. Discussion

The identification of MINOCA primarily relies on the absence of obstructive coronary artery disease (CAD) on angiography. While this criterion is essential, it offers a limited perspective, potentially leading to missed diagnoses. MINOCA encompasses a spectrum of pathophysiological mechanisms, therefore, a comprehensive diagnostic framework must extend beyond traditional coronary angiography, incorporating advanced imaging techniques such as cardiac MRI and CT to capture these subtler etiologies [5] [7].

The absence of standardized diagnostic criteria further exacerbates the challenge of identifying MINOCA cases. Clinical presentations may vary widely, ranging from mild symptoms to overt myocardial injury. Establishing clear, multimodal diagnostic criteria that integrate clinical, biochemical, and imaging parameters is crucial for accurate and timely diagnosis [8].

In terms of prevention, the current guidelines predominantly focus on secondary prevention measures akin to those employed for obstructive CAD. However, MINOCA patients often present with distinct pathophysiological underpinnings, necessitating tailored strategies. Microvascular dysfunction and endothelial dysfunction, which play pivotal roles in MINOCA, are not adequately addressed by current approaches [9]. There are very few cohort studies aimed towards understanding MINOCA. The MINOCA-BAT study focuses on the long-term management strategy of MINOCA and may yield insightful results; However, it remains underway [10]. There is a pressing need for more future research targeting the underlying mechanisms of MINOCA.

5. Conclusions

This case vividly illustrates the complex decision-making process physicians encounter when confronted with MINOCA patients. After stabilizing our patient, who initially presented with ventricular tachycardia, thorough investigations were conducted to systematically rule out potential causes, ultimately leading to the diagnosis of MINOCA through the process of elimination. Nevertheless, the absence of a precise understanding of the underlying physiological mechanism driving the patient's clinical manifestation presents a significant challenge in devising an effective long-term management strategy.

A noteworthy limitation of our case lies in the unavailability of CT angiography for the patient, attributable to logistical hurdles. This underscores the critical need

for a standardized and universally applicable protocol for MINOCA diagnosis. Such a protocol should prioritize a comprehensive understanding of the physiological basis behind patients' clinical signs and symptoms rather than solely relying on the exclusion of alternative conditions as the primary diagnostic approach for MINOCA cases. Attaining this ideal is challenging; MINOCA patients often present critically, hindering comprehensive investigations. Once stabilized, the inciting mechanism may be elusive and beyond detection until and if the event reoccurs.

Ethical Approval

The patient's and hospital's consent was obtained in the form of writing, to share the aforementioned data in this case report.

Conflicts of Interest

The authors declare that they have no known competing financial or personal interests that could influence the contents of this paper.

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