

Crimean-Congo Hemorrhagic Fever Associated with Consumption of Under-Cooked Meat: A Case Report

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Article Info



Received: 2026/04/17;

Accepted: 2026/06/22;

Published Online: 2026/08/23;

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How to Cite This Article:

Jeddi F, Mohammadi-Ghalehbin B, Gholizadeh P, Jafarzadeh M, Soozangar N. Crimean-Congo Hemorrhagic Fever Associated with Consumption of Under-Cooked Meat: A Case Report. J Adv Med Biomed Res 2026; 34(4):416-419.

ABSTRACT

Crimean-Congo hemorrhagic fever (CCHF) virus, typically transmitted via infected tick bites or direct contact with infected tissues or blood of humans or livestock, presents a significant public health concern. Here, we report an unusual case of CCHF from northwest Iran, considering foodborne transmission through raw or undercooked meat as a possible source of infection. We also describe a rare CCHF-associated clinical presentation noted in the literature.

The patient, a 24-year-old urban resident of Ardabil, presented with a 2-day history of nausea, bloody vomiting, abrupt fever ($> 38^{\circ}\text{C}$), severe headache, myalgia, petechiae, and ecchymosis.

Despite reporting kebab consumption before symptom onset, foodborne transmission remained a possible, unconfirmed source. The patient had no history of insect bites or contact with infected animals. With a total risk score of 14, the case was deemed high-risk for CCHF, confirmed by PCR. Treatment included supportive care and ribavirin therapy. This case underscores that consumption of undercooked meat may be a rare cause of CCHF in endemic regions, and supportive care with ribavirin is suggested for management.

Keywords: *Crimean-Congo Hemorrhagic Fever; Zoonoses; Tick-Borne Diseases; Meat*



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1. Introduction

Crimean-Congo hemorrhagic fever (CCHF) is one of the most severe tick-borne viral zoonotic infections. It causes an acute and potentially fatal disease in humans and is endemic across a wide geographical area (1). The case-fatality rate is estimated at approximately 10–40%, although mortality rates as high as 80% have been reported during some outbreaks (2). CCHF occurs in many countries across the Middle East, Africa, southwestern Europe, and Asia (1). During the past decade, the highest numbers of cases have been reported in Middle Eastern countries, including Turkey, Iraq, Pakistan, Iran, and Afghanistan (3). CCHF typically has a short incubation period, ranging from 1 to 13 days after exposure, depending on the route and intensity of exposure (4). CCHF is primarily transmitted to humans through *Hyalomma* tick bites or contact with the blood or tissues of infected animals. Other risk factors include travel to endemic areas and high-risk activities such as working in forested or rural areas, milking, livestock

transportation, slaughtering, exposure to animal secretions, hunting, and animal husbandry (2).

Another rare but possible route of transmission is the consumption of raw or undercooked meat (5). Although less common than tick bites or direct contact with infected animals, inadequate cooking of infected animal tissues may pose a potential risk of human infection.

Furthermore, human-to-human transmission can occur through direct contact with the blood or bodily fluids of an infected individual, particularly during the viraemic phase. Nosocomial infections among healthcare workers caring for patients with CCHF represent a significant concern and highlight the importance of strict infection-control measures (6, 7).

Prevention plays a crucial role in controlling CCHF outbreaks. Measures such as using insect repellents, wearing protective clothing in high-risk areas, and avoiding contact with the blood or tissues of infected animals are essential for reducing transmission.

Additionally, early detection and isolation of suspected cases can help prevent further spread of the virus (2). Patients with CCHF may experience a range of symptoms, including the sudden onset of fever, myalgia, dizziness, neck pain, and photophobia. As the disease progresses, more severe manifestations, such as bruising, epistaxis, and hematemesis, may develop. In severe cases, CCHF can lead to liver failure and hemorrhage (8). There is currently no specific antiviral treatment for CCHF. Supportive care, including the maintenance of fluid balance and management of bleeding disorders and other symptoms, remains vital in-patient management. Research continues to explore potential antiviral and immune-based therapies to improve patient outcomes (1, 9). Early diagnosis of CCHF is essential for improving patient outcomes and preventing community transmission and potential nosocomial infections (9, 10). Here, we describe an unusual case of CCHF from northwest Iran, in which the consumption of undercooked meat was considered a possible source of infection.

2. Case presentation

On 25 November 2023, a 24-year-old man from an urban area of Ardabil was referred to Imam Khomeini Hospital in Ardabil with a 2-day history of nausea, hematemesis, sudden-onset fever ($>38^{\circ}\text{C}$), worsening headache, myalgia, petechiae, and ecchymosis. The patient reported consuming kebab before symptom onset; however, the interval between consumption and the onset of symptoms was not considered sufficient to establish a definite incubation period. His fever and myalgia did not improve with analgesics, including paracetamol (acetaminophen). Regarding his occupational history and recent travel within the previous two weeks, the patient was employed as a staff member and reported no recent travel. He also denied any history of insect bites or contact with infected animals. The patient had no known underlying medical conditions, including cardiovascular disease, hypertension, or diabetes.

The patient's blood pressure was 110/70 mmHg. His pulse rate, respiratory rate, and blood oxygen saturation (SpO_2) were 56 beats/min, 18 breaths/min, and 90%, respectively. No bacterial growth was detected after 72 hours of blood culture. Abdominal and pelvic ultrasonography revealed a diffuse increase in hepatic parenchymal echogenicity, suggestive of grade I fatty liver. Notably, the spleen was enlarged, while no evidence of ascites was observed in the abdominal or pelvic cavities. Initial laboratory findings revealed marked leukopenia (WBC , $2,000/\text{mm}^3$) and thrombocytopenia (platelet count, $15,000/\mu\text{L}$). Coagulation tests showed a prothrombin time (PT) of 13 seconds and a partial thromboplastin time (PTT) of 63 seconds. Liver function tests were markedly elevated, including aspartate aminotransferase (AST, 988 U/L), alanine aminotransferase (ALT, 999 U/L), and alkaline phosphatase (ALP, 354 U/L). Total bilirubin was also elevated (3.83 mg/dL). Serological tests for hepatitis C virus (HCV), hepatitis B surface antigen (HBsAg), and human immunodeficiency virus (HIV) were negative. The results of other biochemical tests and urinalysis were

within normal ranges. The clinical features and laboratory investigations were evaluated using the major criteria for CCHF created by Swanepoel et al (11). The total risk score of this case was 14 and was considered a high risk for CCHF infection. Based on the above findings, the final diagnosis of CCHF infection should be confirmed with a positive serology test and molecular method. Viral RNA extraction was performed from a serum sample using the RNJia Virus extraction kit (Roje Technologies, Iran). The partial S segment (536 bp) was amplified by a one-step RT-PCR kit according to the manufacturer's instructions (Biotechrabbit, Germany), and CCHF infection was confirmed. The patient was provided with supportive care, and he completed ribavirin at a dose of 4 grams as a loading dose, followed by 1.2 grams every 8 hours for 5 days. Following the initiation of supportive care and ribavirin treatment, the patient showed significant clinical improvement. His fever decreased within 48 hours, and the hematological parameters began to normalize. The patient completed the course of ribavirin therapy and was discharged from the hospital in a stable condition.

3. Discussion

CCHF infections have been endemic in the Middle Eastern region, including Turkey, Iraq, Pakistan, Iran, and Afghanistan (4). Early signs of CCHF infection may initiate with fever and blanching macular rash, hypotension, conjunctival hyperemia, and hemorrhage and may lead to shock and death in severe cases (12). Fibrinolysis and Coagulation in CCHF manifest clinically as ecchymosis, petechiae, uncontrollable hemorrhage, and mucosal bleeding at sites of venipuncture (13). The main targets of the CCHF virus are hepatocytes, endothelial cells, and monocytes. The increased endothelial permeability and clotting dysfunction are induced by vascular damage, leading to hemorrhagic diathesis. Inflammatory mediators play a major role in fatal cases. Deranged liver enzymes are regarded as one of the most significant factors in hemorrhagic viral diseases. The degree of liver damage is generally dependent on the level of ALT increase (14). Platelet function and thrombocytopenia could be used as another poor prognostic factor in CCHF (15). On initial laboratory results, there was marked leukopenia, thrombocytopenia, and elevated Liver Function Tests: AST, ALT, ALP, and Total Bilirubin. On the other hand, according to the criteria proposed by Swanepoel et al (11), the total risk score of this case was 14 and was considered a high risk for CCHF infection. In endemic areas, an efficient surveillance system and effective monitoring are critical to decreasing the burden of CCHF. In this case, the patient presented to the hospital after a reported interval of 20 days following kebab consumption, and Ribavirin treatment was initiated immediately after the initial diagnosis. The most common routes of CCHF transmission are through direct contact with tissues, blood, and secretions of infected human or domestic animals. Therefore, most infections are observed among occupational groups dealing with animals (such as shepherds, butchers, animal dealers, and farmers) and healthcare workers involved with patients (16-18).

Atypical transmission routes of CCHF have also been described, including consumption of infected fresh meat and aerosol inhalation (19-22). The incubation period of CCHF is typically short, ranging from 1 to 3 days after exposure to infected blood or tissues, though it can extend up to 14 days depending on the route and intensity of exposure (4, 12, 23). Transmission occurs mainly through contact with infected blood, tissues, or bodily fluids of animals or humans (16-18), while ingestion of contaminated or undercooked meat has also been reported as a less common but possible route of infection (19-22). In this case, the patient lived in an endemic area for CCHF infection and had no history of insect bites or contact with infected animals. However, Subsequent investigations showed that the patient had consumed raw kebab two days before the onset of symptoms. Taken together, although direct virological confirmation of the food source was not available, the temporal association between symptom onset and meat consumption, along with the absence of other recognized risk factors, suggests a possible foodborne transmission.

4. Conclusion

Consumption of undercooked meat should be considered a rare potential route of CCHF transmission in endemic regions. However, supportive and conservative management remains the cornerstone of CCHF treatment. Management may include supportive care, with ribavirin considered in selected cases.

5. Declarations

5.1 Acknowledgments

The authors would like to express their sincere gratitude to all the staff of Imam Khomeini Hospital in Ardabil, Iran, for their valuable assistance and support.

5.2 Ethical Considerations

This study was approved by the Ethics Committee of Ardabil University of Medical Sciences (Ethics Code: IR.ARUMS.REC.1402.149).

5.3 Authors' Contributions

FJ: Conceptualization, investigation, data collection, and writing—original draft. BMG: Investigation, data collection, and clinical evaluation. PG: Investigation, data collection, and clinical evaluation. MJ: Investigation, data collection, and manuscript review. NS: Conceptualization, supervision, writing—review and editing, and project administration. All authors contributed to the interpretation of the case, critically reviewed the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

5.4 Conflict of Interest

All authors declare agreement and consent for publication. The authors declare that they have no competing interests.

5.5 Fund or Financial Support

The Zoonosis Research Center, Ardabil University of Medical Sciences, Ardabil, Iran supported this study.

5.6 Using Artificial Intelligence Tools (AI Tools)

The authors were not utilized AI Tools. (Please review and complete it.)

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