Brief Communication

Critical care medicine for emerging Middle East respiratory syndrome: Which point to be considered?

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Abstract

The Middle East respiratory syndrome (MERS) is a new emerging respiratory tract infection. This coronavirus infection is firstly reported from the Middle East, and it becomes threat for the global public health at present due to its existence in a remote area such as USA and Korea. The concern on the management of the patients is very important. Since most of the patients can develop severe respiratory illness and critical care management is needed, the issue on critical care for MERS is the topic to be discussed in critical medicine.

Keywords: Critical care medicine, emerging, Middle East respiratory syndrome

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Introduction

There are several new emerging infections at present. The Middle East respiratory syndrome (MERS) is a new emerging respiratory tract infection cause by a coronavirus. This infection was firstly reported from Saudi Arabia in the Middle East in 2012, and the spreading of infection occurred in several countries.[1,2] At present, these infections exist in the remote countries away from the middle and raise the concern for the global public health. The recent outbreak in USA[3] and current outbreak in East Asia (Korea)[4,5] becomes a present hot issue. Focusing on the infection, the patient usually presents with acute respiratory illness and end up with severe respiratory tract infection requiring critical care management. The topic for critical care management for MERS is very interesting in critical care medicine and discussed in the present invited article.

Respiratory Distress in Middle East Respiratory Syndrome

As noted, MERS is a viral infection that mainly attack respiratory tract. It can start with acute respiratory illness and rapid progress to severe lower respiratory tract illness.[2] The imaging investigation can show the lung involvement which cannot be differential from other acute viral respiratory illness.[6] Organizing pneumonia and respiratory failure is common, and the diagnosis is usually derived from molecular diagnosis of the pathogenic virus.[7,8] Mackay and Arden noted that "compared to severe acute respiratory syndrome (SARS), MERS progresses more rapidly to respiratory failure and

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acute kidney injury, is more often observed as severe disease in patients with underlying illnesses and is more often fatal."[9] Yang *et al*. studied in animal model and concluded that the pathology "is associated with dramatical elevation of tissue inducible protein-10 and interferon-γ (IFN-γ) and moderate increase of tumor necrosis factor-α and interleukin-1β, but inability of anti-viral type I IFN response."[10] Focusing on respiratory distress due to MERS, Arabi *et al*. noted that "severe acute hypoxemic respiratory failure and considerable extrapulmonary organ dysfunction" are common, and these pathologies are associated with high mortality.[11] For sure, the case with respiratory distress requires intensive care in Intensive Care Unit (ICU) and ventilation support is indicated.[12] It is shown that the patient with respiratory distress has a high chance of mortality and one with underlying disease has a very high risk.[12]

Ventilation Management for Cases with Severe Middle East Respiratory Syndrome

As noted, ventilation is usually required for those patients with severe MERS. Mechanical ventilation and extracorporeal membrane oxygenation are usually required.[13,14] Adjunctive corticosteroid, ribavirin, and IFN therapy are also proved for the usefulness.[15-17] Omrani *et al*. reported that "ribavirin and IFN-α-2a therapy is associated with significantly improved survival at 14 days."[16] Shalhoub *et al*. also recently reported using ribavirin and IFN-α-2a as an effective treatment for the patients with severe MERS.[18] Nevertheless, the important determinant for successful management is the early recognition and diagnosis.[15-17] It can be seen that the management of severe MERS is not different from other severe acute viral respiratory illness. Early diagnosis, treatment with a proper antiagent viral agent and good ventilation support should be considered.

Consideration of Practitioner Who Provides Critical Care to a Patient with Severe Middle East Respiratory Syndrome

The practitioner who provides critical care to a patient with severe MERS should get a good education on the disease. It should be noted that MERS is contagious, and nosocomial infection is reported.[13] It is no doubt that critical care physician who takes care the patient can get an infection. The good example is the imported case to the USA.[3] Al-Tawfiq *et al*. noted that "nosocomial transmission of MERS-*Coronavirus* (MERS-CoV) has occurred because of poor infection control measures"[19] and also mentioned that all physicians should be "aware of the new threat caused by MERS-CoV and follow Centers for Disease Control and WHO guidelines."[19] In fact, the special designed respiratory protector is required for working with a case with MERS.[20] However, the equipment is usually not available in the many settings where the present emerging disease occurs.

Common Aspects and Differences between Middle East Respiratory Syndrome and other Respiratory Viral Illness

As a new epidemic disease, diagnosis, and management of MERS is important. It should be noted that there are many respiratory illnesses that can end up with severe respiratory problem. In addition, those diseases can have similar clinical manifestations to MERS. Of several diseases, SARS is another *Coronavirus* infection that can result in respiratory distress and high mortality.[21] Comparing to SARS, MERS has a higher mortality rate.[22] In contrast to SARS, MERS has a more rapid progression to respiratory failure and acute kidney injury is more common.[23] The critical diagnostic point to differentiate between SARS and MERS is the imaging findings. van den Brand *et al*. found that "imaging results of patients with MERS show features that resemble the findings of organizing pneumonia, different from the lesions in SARS patients, which show fibrocellular intra-alveolar organization with a bronchiolitis obliterans organizing pneumonia-like pattern."[24] Nevertheless, focusing on managing of critical illness patients, the common basic respiratory support can be used for both diseases.[25] Ribavirin is also recommended as antiviral drugs for both diseases. Another important respiratory illness that might mimic MERS is influenza.[26] In severe influenza infection, the respiratory failure can also be seen, and this is an actual challenge in the disease control at present.[26,27] In the early phase of disease, it is usually difficult to make a differential diagnosis, but the standard rapid flu detection system can effectively help rule out of influenza.[26]

Experience from Recent 2015 Asian Epidemic

In 2015, an epidemic of MERS occurs in Asia. The main epidemic site is Korea.[4,5] The disease is also reported from China[4] and Thailand. Focusing on the infected cases in Korea, many severe infections can be seen[28] and there are also many deaths despite good respiratory critical care (up to 27 cases, June 23, 2015). The spreading of disease within Korea is still under disease control process. For the latest case, in the newest epidemic setting, Thailand, the patient is an Oman male and presently gets the ventilation care at ICU. It seems that the cases in recent 2015 Asian epidemic are usually severe and require critical care in ICU.

Conclusion

MERS is the present problematic emerging respiratory illness that can result in severe respiratory distress. Intensive care is needed for the patients with severe MERS. Proper ventilation support and antiviral drug management are required. For the practitioners, infection control and prevention is very important.

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Conflicts of interest

There are no conflicts of interest.

References

1. Joob B, Wiwanitkit V. MERS-CoV. Oman Med J 2014;29:381.
2. Wiwanitkit V. Novel Middle East respiratory syndrome *Coronavirus*. J Formos Med Assoc 2014;113:65.
3. Kapoor M, Pringle K, Kumar A, Dearth S, Liu L, Lovchik J, *et al.* Clinical and laboratory findings of the first imported case of Middle East respiratory syndrome *Coronavirus* to the United States. Clin Infect Dis 2014;59:1511-8.
4. Hui DS, Perlman S, Zumla A. Spread of MERS to South Korea and China. Lancet Respir Med 2015;3:509-10.
5. Dyer O. South Korea scrambles to contain MERS virus. BMJ 2015;350:h3095.
6. Wiwanitkit V. Chest CT findings in MERS. AJR Am J Roentgenol 2015;204:W111.
7. Khalid M, Khan B, Al Rabiah F, Alismaili R, Saleemi S, Rehan-Khaliq AM, *et al.* Middle Eastern respiratory syndrome *Coronavirus* (MERS CoV): Case reports from a tertiary care hospital in Saudi Arabia. Ann Saudi Med 2014;34:396-400.
8. Ajlan AM, Ahyad RA, Jamjoom LG, Alharthy A, Madani TA. Middle East respiratory syndrome *Coronavirus* (MERS-CoV) infection: Chest CT findings. AJR Am J Roentgenol 2014;203:782-7.
9. Mackay IM, Arden KE. Middle East respiratory syndrome: An emerging *Coronavirus* infection tracked by the crowd. Virus Res 2015;202:60-88.
10. Yang Z, Du J, Chen G, Zhao J, Yang X, Su L, *et al. Coronavirus* MHV-A59 infects the lung and causes severe pneumonia in C57BL/6 mice. Virol Sin 2014;29:393-402.
11. Arabi YM, Arifi AA, Balkhy HH, Najm H, Aldawood AS, Ghabashi A, *et al.* Clinical course and outcomes of critically ill patients with Middle East respiratory syndrome *Coronavirus* infection. Ann Intern Med 2014;160:389-97.
12. Al-Hameed F, Wahla AS, Siddiqui S, Ghabashi A, Al-Shomrani M, Al-Thaqafi A, *et al.* Characteristics and outcomes of Middle East respiratory syndrome *Coronavirus* patients admitted to an Intensive Care Unit in Jeddah, Saudi Arabia. J Intensive Care Med 2015. pii: 0885066615579858.
13. Guery B, Poissy J, el Mansouf L, Séjourné C, Ettahar N, Lemaire X, *et al.* Clinical features and viral diagnosis of two cases of infection with Middle East respiratory syndrome *Coronavirus*: A report of nosocomial transmission. Lancet 2013;381:2265-72.
14. Chan JF, Lau SK, To KK, Cheng VC, Woo PC, Yuen KY. Middle East respiratory syndrome *Coronavirus*: Another zoonotic *Betacoronavirus* causing SARS-like disease. Clin Microbiol Rev 2015;28:465-522.
15. Al-Tawfiq JA, Momattin H, Dib J, Memish ZA. Ribavirin and interferon therapy in patients infected with the Middle East respiratory syndrome *Coronavirus*: An observational study. Int J Infect Dis 2014;20:42-6.
16. Omrani AS, Saad MM, Baig K, Bahloul A, Abdul-Matin M, Alaidaroos AY, *et al.* Ribavirin and interferon alfa-2a for severe Middle East respiratory syndrome *Coronavirus* infection: A retrospective cohort study. Lancet Infect Dis 2014;14:1090-5.
17. Coleman CM, Frieman MB. Treating MERS-CoV during an outbreak. Lancet Infect Dis 2014;14:1030-1.
18. Shalhoub S, Farahat F, Al-Jiffri A, Simhairi R, Shamma O, Siddiqi N, *et al.* IFN-α2a or IFN-β1a in combination with ribavirin to treat Middle East respiratory syndrome *Coronavirus* pneumonia: A retrospective study. J Antimicrob Chemother 2015;70:2129-32.
19. Al-Tawfiq JA, Zumla A, Memish ZA. Coronaviruses: Severe acute respiratory syndrome *Coronavirus* and Middle East respiratory syndrome *Coronavirus* in travelers. Curr Opin Infect Dis 2014;27:411-7.
20. Wiwanitkit V. MERS-CoV, surgical mask and N95 respirators. Singapore Med J 2014;55:507.
21. Gillissen A, Ruf BR. Severe acute respiratory syndrome (SARS). Med Klin (Munich) 2003;98:319-25.
22. Banik GR, Khandaker G, Rashid H. Middle East respiratory syndrome *Coronavirus* "MERS-CoV": Current knowledge gaps. Paediatr Respir Rev 2015. pii: S1526-0542(15)00031-7.
23. Mackay IM, Arden KE. Middle East respiratory syndrome: An emerging *Coronavirus* infection tracked by the crowd. Virus Res 2015;202:60-88.
24. van den Brand JM, Smits SL, Haagmans BL. Pathogenesis of Middle East respiratory syndrome *Coronavirus*. J Pathol 2015;235:175-84.
25. Hui DS. Severe acute respiratory syndrome (SARS): Lessons learnt in Hong Kong. J Thorac Dis 2013;5 Suppl 2:S122-6.
26. Cunha BA, Dumont M, Abruzzo E. An adult returned traveler from Dubai hospitalized with an influenza-like illness (ILI): Middle East respiratory syndrome (MERS) or influenza? Infection control implications from a near MERS case. Infect Control Hosp Epidemiol 2015;36:858-60.
27. Bialek SR, Allen D, Alvarado-Ramy F, Arthur R, Balajee A, Bell D, *et al.* First confirmed cases of Middle East respiratory syndrome *Coronavirus* (MERS-CoV) infection in the United States, updated information on the epidemiology of MERS-CoV infection, and guidance for the public, clinicians, and public health authorities – May 2014. MMWR Morb Mortal Wkly Rep 2014;63:431-6.
28. Petersen E, Hui DS, Perlman S, Zumla A. Middle East respiratory syndrome – Advancing the public health and research agenda on MERS – Lessons from the South Korea outbreak. Int J Infect Dis 2015;36:54-5.