

Article type

COVID-19 manifestation in a child with lung metastases of osteosarcoma: a case report

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Abstract

Background During COVID-19 pandemic, we discovered that comorbidities might increase the mortality rate of infection. Although less affected, infection in children has been proven difficult to treat. In addition, malignancy and pre-existing lung diseases might complicate the diagnosis and treatment of COVID-19. Osteosarcoma is a common childhood malignancy with high-rsk of COVID-19 related mortality.

Objective To describe COVID-19 infection affecting a child with osteosarcoma and metastatic lung lesion treated at Bethesda Hospital Yogyakarta.

Case description A 9-year-old female presented to the emergency with fever, cough, severe chest pain, and shortness of breath 3 weeks before. The patient had a history of osteosarcoma, and related amputation of her right arm. Further assessment discovered metastatic lung lesion with positive results of SARS CoV-2 infection.

Conclusion With a suspicion of coexisting lung diseases, CT-scan are mandatory to make distinction with SARS CoV-2 lesion

Keywords: COVID-19, osteosarcoma, lung metastases, X-ray computed tomography

INTRODUCTION

COVID-19 (Corona virus disease-19) is an infectious disease caused by a new type of corona virus which is a group with the virus that causes severe acute respiratory syndrome (SARS), the incubation period is 1-14 days or can reach 24 days and is accompanied by symptoms respiratory tract infection and other organ systems. The number of cases in November 2020 was 59.8 million worldwide. Elderly patients and patients with comorbid diseases have high risk of developing severe manifestations of this viral infection. Diagnosis is made based on clinical, physical examination and supporting examinations in the form of laboratory, real time polymerase chain reaction (RT-PCR), and radio imaging. Management of COVID-19 is in the form of supportive therapy according to the degree of disease. Osteosarcoma is a malignant bone tumor with a risk of metastasis to the lung. The main therapy in osteosarcoma is surgery. The purpose of this writing is to report cases of Covid-19 in children aged 9 years with a history of osteosarcoma. So that in COVID-19 patients with osteosarcoma, pulmonary metastases will show severe clinical manifestations or death.^{1,2,3}

CASE DESCRIPTION

Patient information

A 9 year old girl came to the emergency room of Bethesda Hospital Yogyakarta with fever, cough, severe chest pain, and shortness of breath. The symptoms have been going on since 3 weeks before being admitted to the hospital. In this patient, there was a history of previous disease, osteosarcoma since 1.5 years before entering the hospital and an amputation procedure was carried out on her right arm. Osteosarcoma was initially known because of complaints of swelling and severe pain several months before the amputation procedure. No specific family history was found.

Clinical findings

The general condition of the patient appears to be moderate with delirium consciousness (E4V6M1). On the examination of vital signs, the results showed a temperature of 38.5, a pulse rate of 130 beats per minute, an oxygen saturation of 85% and the breath rate 30 times per minute. On physical examination of the head and neck within normal limits, chest examination gave the results of vesicular pulmonary sounds, ronkhi of the entire left lung field, normal heart sounds, examination of the abdominal region



Figure 1. Chest radiographi showed rough bronchovascular streak, massive left lung homogeneous junction with right lateralization and suspected massive left pleural effusion with tracheal distortion and right heart contour. Cast size could not be assessed, pleura, soft tissue and bone appeared normal.

within normal limits, at the extremities found amputation of the right arm.

Diagnostic assessments

In laboratory investigations, normal results were obtained but there were results that indicated the presence of leukocytosis, the results of the RT-PCR examination stated positive results for SARS CoV-2, the plain chest radiograph showed the results of rough bronchovascular marks, homogeneous massive junction of the left lung with right lateralization, suspected left pleural effusion, massive with tracheal distortion and right heart contour, CT scan without contrast material showed massive malignant / metastatic mass left pleural effusion in the left lung, with pneumonia opacity in the right lung. The patient was diagnosed with COVID-19 and suspected pulmonary metastases of osteosarcoma based on clinical and examination in the patient.

Therapeutic intervention and Follow-up

Patients were initially given supportive therapy, paracetamol 250 mg per 6 hours and morphine sulphate 5 mg per 12 hours. She was also treated with intravenous ceftriaxone 1 gram per 12 hours. She was eventually put on ventilator and passed away less than 48 hours since admission.

DISCUSSION

Literature review

Coronavirus which is the etiology of COVID-19 belongs to the genus betacoronavirus. The results of phylogenetic analysis show that this virus is included in the same subgenus as the coronavirus that caused the Severe Acute Respiratory Illness (SARS) outbreak in 2002-2004, namely Sarbecovirus. On this basis, the International Committee on Taxonomy of Viruses proposed the name SARS CoV-2. The pathogenesis of SARS CoV-2 is still not widely known, but it is thought that it is not much different from SARS CoV. In humans, SARS CoV-2 infects cells in the airways that line the alveoli. SARS CoV-2 will

bind to the receptors and make entry into the cell. The glycoprotein contained in the envelope spike of the virus binds to the cellular receptor in the form of ACE2 on SARS-CoV-2. Inside cells, SARS-CoV-2 duplicates genetic material and synthesizes the required proteins, then forms new virions that appear on the surface of the cell. In SARS-CoV, Protein S was reported as a significant determinant of virus entry into host cells. Viral and host factors play a role in SARS-CoV infection. The cytopathic effect of the virus and its ability to overpower the immune response determine the severity of the infection. Immune system dysregulation then plays a role in tissue damage. On the other hand, an excessive immune response can cause tissue damage.^{1,4,5}

The exact cause of osteosarcoma is unknown. However, a number of risk factors that can affect it are rapid bone growth, radiation, and genetic predisposition to bone dysplasia, including Paget's disease, fibrous dysplasia, enchondromatosis, and some exotosic and retinoblastoma (germ-line form) heredity. This disease can have metastases to other organs including the lungs which can cause death.⁵

The clinical manifestations of COVID-19 patients have a wide spectrum, ranging from asymptomatic, mild symptoms, pneumonia, severe pneumonia, ARDS, sepsis, to septic shock. The proportion of asymptomatic infections is unknown. Viremia and high viral load from nasopharyngeal swabs in asymptomatic patients have been reported. Although there have been reports of severe symptoms in pediatric patients with COVID 19 virus infection, most have mild symptoms and chest CT can show characteristic changes of subpleural ground glass opacities and consolidation with surrounding halo sign. Mild symptoms are defined as patients with acute upper respiratory tract infection, without complications, may be accompanied by fever, fatigue, cough (with or without sputum), anorexia, malaise, sore throat, nasal congestion, or headache. In some cases the patient also complained of diarrhea and vomiting. COVID-19 patients with severe pneumonia are characterized by fever, plus one of the following symptoms: (1) respiratory rate more than 30 times per minute (2) severe respiratory distress, or (3) 93% oxygen saturation without oxygen assistance. Tumors that spread to the lungs rarely show typical respiratory symptoms and if inhalation symptoms occur they usually indicate extensive lung tissue damage.^{2,4,5}

Currently there are no specific management recommendations for COVID-19 patients, but it is recommended that antivirals (Remdesivir, Favipiravir), Azithromycin, vitamin C and vitamin D. In addition, things that can be done are symptomatic and oxygen therapy. In patients with respiratory failure, mechanical ventilation can be performed.⁵

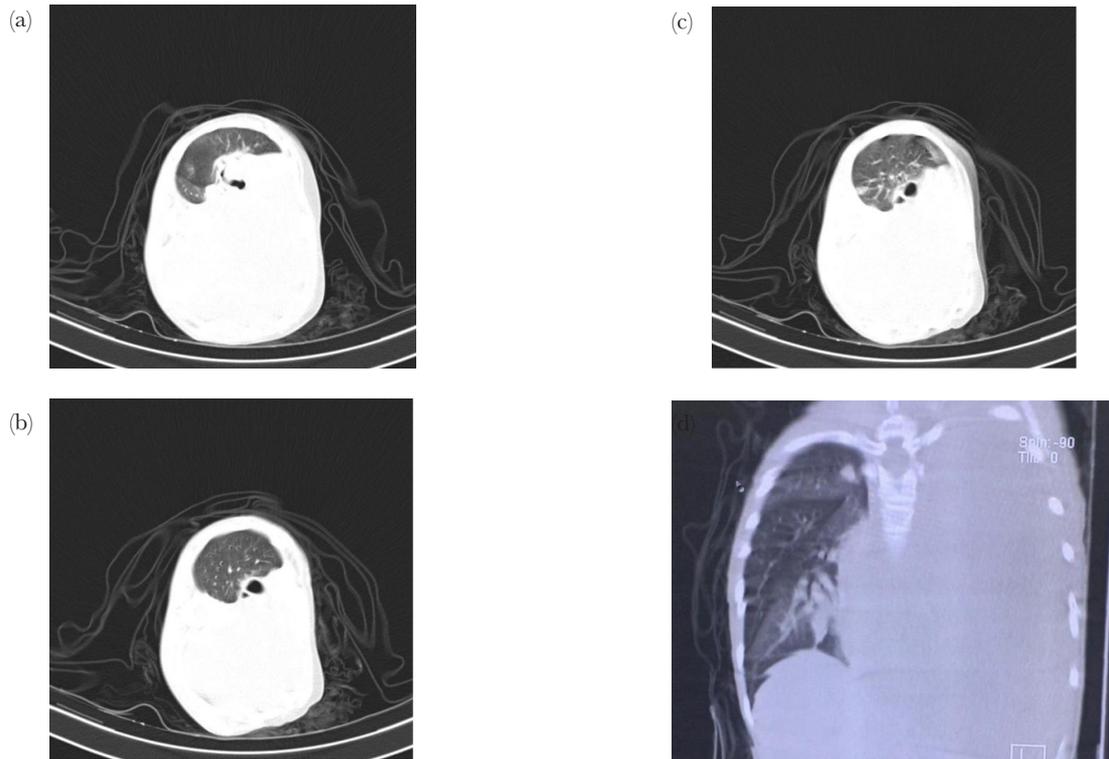


Figure 2. CT-Scan. (a) Taken on the same day as Ro-Thorax. The picture shows, massive opacities in the left lung, subpleural ground-glass opacities in the posterior inferior lobe of the right lung, the right pleura looks normal, the right lung and the heart cannot be assessed. (b) The photo shows, massive opacities in the left lung, rough bronchovascular streak and there is bronchogram in the right lung, the left pleura looks normal, the right lung and the heart cannot be assessed, tracheal distortion to the right. (c) The photo shows, massive opacities in the left lung, rough bronchovascular streak, there is a consolidation of the subpleural area on the posterior and a bronchogram in the right lung, the left pleura appears normal, the right lung and the heart cannot be assessed, tracheal distortion to the right. (d) Massive homogeneous opacities appear from the apex to the basal of the left lung

The main procedures performed by surgeons in patients with osteosarcoma are biopsy and extensive resection. A biopsy from a malignant bone tumor is not a significant procedure. An incorrect biopsy can actually result in an unnecessary limb amputation error. Extensive resection means that all malignant tumors are removed, and in the rest of the resection there are no more tumor cells. The procedure for wide resection is only performed after complete tumor staging is complete before surgery. Limb-sparing technique is an alternative form of the amputation surgical technique. There are various types of limb-sparing techniques, including arthrodesis, arthroplasty, alloprosthetic composites, prosthetic implants, and rotationplasty.^{4,5}

Clinical approach in this case

A 9-year old girl patient came to the hospital emergency room with complaints of fever, cough, severe chest pain, and shortness of breath. In this patient, a history of osteosarcoma was found. The general condition of the patient appears to be moderate with delirium consciousness (E4V6M1). Examination of vital signs showed a pulse rate of 130 beats per minute, an oxygen saturation of 85% and a breath rate of 30 beats per minute. Performed a CT scan without contrast material showed a massive left pleural effusion with malignant / metastatic observations of the left

lung, with pneumonia opacities in the right lung.

From the imaging examination above in the form of a plain chest radiograph, it is found that rough bronchovascular streaks, massive homogeneous junction of the left lung with right lateralization, suspected massive left pleural effusion with tracheal distortion and right heart contour with suspicion of tumor metastases in the lung. Whereas the CT-Scan of the Thorax showed a ground-glass opacities in the right subpleural lung accompanied by a bronchogram and a rough bronchovascular image, there was also massive opacity in the left lung from apex to basal and a picture of tumor metastasis in the lung that was not visualized with Obviously because of the left pleural effusion, this is in accordance with the theory that the patient may be in the absorption stage where the examination is carried out at week 3 of the appearance of symptoms. So that the picture of pneumonia in children has begun to decrease. Clinically, the complaints in this patient are also in accordance with the theory, namely that the patient presents with fever, chest pain, and shortness of breath. The CT-Scan examination is the best examination to assist in diagnosing Covid-19 patients in the early stages of infection besides using the RT-PCR examination.^{6,7}

CONCLUSION

COVID-19 is an infectious disease caused by SARS-CoV-2 and causes severe manifestations in patients with comorbid diseases including malignancies with pulmonary metastases. Apart from RT-PCR, another modality that can be used as a basis for diagnosis is CT-Scan. Management that can be given to COVID-19 is in the form of supportive therapy based on the severity of the disease. However, more attention and accuracy of diagnosis is needed in patients with comorbid, especially malignancies who have metastatic pulmonary metastases to achieve maximum treatment.

CONFLICT OF INTEREST

The authors have no conflict of interest.

REFERENCES

1. Cui X, Zhang T, Zheng J, Zhang J, Si P, Xu Y, Guo W, et al. Children with coronavirus disease 2019 (COVID-19): A review of demographic, clinical, laboratory and imaging features in pediatric patients. *J Med Virol.* 2020; 10.1002/jmv.26023.
2. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, et al. Epidemiology of COVID-19 among children in China. *Pediatrics.* 2020;145(6):e20200702
3. Songa W, Lib J, Zoua N, Guana W, Pana J, Xua W. Clinical features of pediatric patients with coronavirus disease (COVID-19). *J Clin Virol.* 2020;127:104377. <https://doi.org/10.1016/j.jcv.2020.104377>.
4. World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report–51 [Internet]. 2020 Mar 11 [cited 2020 June 17]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10
5. World Health Organization. Novel Coronavirus (COVID-19) Situation Report - 25. [Internet]. 2020 [cited 14 February 2020] Available from: https://www.who.int/docs/defaultsource/coronaviruse/situation-reports/20200214-sitrep-25-covid19.pdf?sfvrsn=61dda7d_2
6. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med.* 2020; 382:727-33.
7. Zimmermann P, Curtis N. Coronavirus infections in children including COVID-19 an overview of the epidemiology, clinical features, diagnosis, treatment and prevention options in children. *Pediatr Infect Dis J.* 2020;39:355–68.