

World Journal of *Clinical Cases*

World J Clin Cases 2021 June 6; 9(16): 3796-4115



REVIEW

- 3796** COVID-19 and the digestive system: A comprehensive review
Wang MK, Yue HY, Cai J, Zhai YJ, Peng JH, Hui JF, Hou DY, Li WP, Yang JS

MINIREVIEWS

- 3814** COVID-19 impact on the liver
Baroiu L, Dumitru C, Iancu A, Leşe AC, Drăgănescu M, Baroiu N, Anghel L
- 3826** Xenogeneic stem cell transplantation: Research progress and clinical prospects
Jiang LL, Li H, Liu L

ORIGINAL ARTICLE

Case Control Study

- 3838** Histopathological classification and follow-up analysis of chronic atrophic gastritis
Wang YK, Shen L, Yun T, Yang BF, Zhu CY, Wang SN

Retrospective Study

- 3848** Effectiveness of sharp recanalization of superior vena cava-right atrium junction occlusion
Wu XW, Zhao XY, Li X, Li JX, Liu ZY, Huang Z, Zhang L, Sima CY, Huang Y, Chen L, Zhou S
- 3858** Management and outcomes of surgical patients with intestinal Behçet's disease and Crohn's disease in southwest China
Zeng L, Meng WJ, Wen ZH, Chen YL, Wang YF, Tang CW
- 3869** Clinical and radiological outcomes of dynamic cervical implant arthroplasty: A 5-year follow-up
Zou L, Rong X, Liu XJ, Liu H

Observational Study

- 3880** Differential analysis revealing APOC1 to be a diagnostic and prognostic marker for liver metastases of colorectal cancer
Shen HY, Wei FZ, Liu Q

Randomized Clinical Trial

- 3895** Comparison of white-light endoscopy, optical-enhanced and acetic-acid magnifying endoscopy for detecting gastric intestinal metaplasia: A randomized trial
Song YH, Xu LD, Xing MX, Li KK, Xiao XG, Zhang Y, Li L, Xiao YJ, Qu YL, Wu HL

CASE REPORT

- 3908** Snapping wrist due to bony prominence and tenosynovitis of the first extensor compartment: A case report
Hu CJ, Chow PC, Tzeng IS
- 3914** Massive retroperitoneal hematoma as an acute complication of retrograde intrarenal surgery: A case report
Choi T, Choi J, Min GE, Lee DG
- 3919** Internal fixation and unicompartmental knee arthroplasty for an elderly patient with patellar fracture and anteromedial osteoarthritis: A case report
Nan SK, Li HF, Zhang D, Lin JN, Hou LS
- 3927** Haemangiomas in the urinary bladder: Two case reports
Zhao GC, Ke CX
- 3936** Endoscopic diagnosis and treatment of an appendiceal mucocele: A case report
Wang TT, He JJ, Zhou PH, Chen WW, Chen CW, Liu J
- 3943** Diagnosis and spontaneous healing of asymptomatic renal allograft extra-renal pseudo-aneurysm: A case report
Xu RF, He EH, Yi ZX, Li L, Lin J, Qian LX
- 3951** Rehabilitation and pharmacotherapy of neuromyelitis optica spectrum disorder: A case report
Wang XJ, Xia P, Yang T, Cheng K, Chen AL, Li XP
- 3960** Undifferentiated intimal sarcoma of the pulmonary artery: A case report
Li X, Hong L, Huo XY
- 3966** Chest pain in a heart transplant recipient: A case report
Chen YJ, Tsai CS, Huang TW
- 3971** Successful management of therapy-refractory pseudoachalasia after Ivor Lewis esophagectomy by bypassing colonic pull-up: A case report
Flemming S, Lock JF, Hankir M, Reimer S, Petritsch B, Germer CT, Seyfried F
- 3979** Old unreduced obturator dislocation of the hip: A case report
Li WZ, Wang JJ, Ni JD, Song DY, Ding ML, Huang J, He GX
- 3988** Laterally spreading tumor-like primary rectal mucosa-associated lymphoid tissue lymphoma: A case report
Wei YL, Min CC, Ren LL, Xu S, Chen YQ, Zhang Q, Zhao WJ, Zhang CP, Yin XY
- 3996** Coronary artery aneurysm combined with myocardial bridge: A case report
Ye Z, Dong XF, Yan YM, Luo YK
- 4001** Thoracoscopic diagnosis of traumatic pericardial rupture with cardiac hernia: A case report
Wu YY, He ZL, Lu ZY

- 4007** Delayed diagnosis and comprehensive treatment of cutaneous tuberculosis: A case report
Gao LJ, Huang ZH, Jin QY, Zhang GY, Gao MX, Qian JY, Zhu SX, Yu Y
- 4016** Rapidly progressing primary pulmonary lymphoma masquerading as lung infectious disease: A case report and review of the literature
Jiang JH, Zhang CL, Wu QL, Liu YH, Wang XQ, Wang XL, Fang BM
- 4024** Asymptomatic carbon dioxide embolism during transoral vestibular thyroidectomy: A case report
Tang JX, Wang L, Nian WQ, Tang WY, Xiao JY, Tang XX, Liu HL
- 4032** Transient immune hepatitis as post-coronavirus disease complication: A case report
Drăgănescu AC, Săndulescu O, Bilașco A, Kouris C, Streinu-Cercel A, Luminos M, Streinu-Cercel A
- 4040** Acute inferior myocardial infarction in a young man with testicular seminoma: A case report
Scafa-Udriste A, Popa-Fotea NM, Bataila V, Calmac L, Dorobantu M
- 4046** Asymptomatic traumatic rupture of an intracranial dermoid cyst: A case report
Zhang MH, Feng Q, Zhu HL, Lu H, Ding ZX, Feng B
- 4052** Parotid mammary analogue secretory carcinoma: A case report and review of literature
Min FH, Li J, Tao BQ, Liu HM, Yang ZJ, Chang L, Li YY, Liu YK, Qin YW, Liu WW
- 4062** Liver injury associated with the use of selective androgen receptor modulators and post-cycle therapy: Two case reports and literature review
Koller T, Vrbova P, Meciarova I, Molcan P, Smitka M, Adamcova Selcanova S, Skladany L
- 4072** Spinal epidural abscess due to coinfection of bacteria and tuberculosis: A case report
Kim C, Lee S, Kim J
- 4081** Rare complication of inflammatory bowel disease-like colitis from glycogen storage disease type 1b and its surgical management: A case report
Lui FCW, Lo OSH
- 4090** Thymosin as a possible therapeutic drug for COVID-19: A case report
Zheng QN, Xu MY, Gan FM, Ye SS, Zhao H
- 4095** Arrhythmogenic right ventricular cardiomyopathy characterized by recurrent syncope during exercise: A case report
Wu HY, Cao YW, Gao TJ, Fu JL, Liang L
- 4104** Delayed pseudoaneurysm formation of the carotid artery following the oral cavity injury in a child: A case report
Chung BH, Lee MR, Yang JD, Yu HC, Hong YT, Hwang HP
- 4110** Atezolizumab-induced anaphylactic shock in a patient with hepatocellular carcinoma undergoing immunotherapy: A case report
Bian LF, Zheng C, Shi XL

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Gwo-Ping Jong, FCCP, MD, MHSc, PhD, Associate Professor, Department of Public Health, Chung Shan Medical University, Taichung 40201, Taiwan. cgp8009@yahoo.com.tw

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for WJCC as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2019 is 0.3 and Scopus CiteScore rank 2019: General Medicine is 394/529.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yan-Xia Xing, Production Department Director: Yun-Xiaoqian Wu, Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

June 6, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Thymosin as a possible therapeutic drug for COVID-19: A case report

Qiong Na Zheng, Mei Yan Xu, Fang Min Gan, Sha Sha Ye, Hui Zhao

ORCID number: Qiong Na Zheng 0000-0003-3397-6133; Mei Yan Xu 0000-0002-9665-1179; Fang Min Gan 0000-0002-6633-851X; Sha Sha Ye 0000-0002-3526-4343; Hui Zhao 0000-0002-6232-0777.

Author contributions: Zheng QN and Zhao H reviewed the literature and drafted the manuscript; Ye SS drafted all figures; Zheng QN, Xu MY, and Gan FM treated the patient and participated in collecting the data; Zhao H guided the treatment; all authors read and approved the final manuscript.

Supported by The Project for Science and Technology of Wenzhou, No. Y2020278.

Informed consent statement: The patient provided written informed consent for his medical information to be stored and used in the hospital database at the first visit to our center.

Conflict-of-interest statement: The authors declare that they have no competing interests to report.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Open-Access: This article is an

Qiong Na Zheng, Mei Yan Xu, Fang Min Gan, Sha Sha Ye, Hui Zhao, Department of Infectious Diseases, The Affiliated Yueqing Hospital, Wenzhou Medical University, Yueqing 325600, Zhejiang Province, China

Corresponding author: Hui Zhao, MD, Chief Doctor, Department of Infectious Diseases, The Affiliated Yueqing Hospital, Wenzhou Medical University, No. 338 Qingyuan Street, Yueqing 325600, Zhejiang Province, China. 304764851@qq.com

Abstract

BACKGROUND

There are no effective antiviral therapies for coronavirus disease 2019 (COVID-19) at present. Although most patients with COVID-19 have a mild or moderate course of disease, up to 5%-10% of patients may have a serious and potentially life-threatening condition, indicating an urgent need for effective therapeutic drugs. The therapeutic effect of thymosin on COVID-19 has not been previously studied. In this paper, for the first time we report a case of thymosin treatment of COVID-19.

CASE SUMMARY

A 51-year-old man with imported COVID-19 was admitted with definite symptoms of chest tightness, chest pain, and fatigue. The polymerase chain reaction results for severe acute respiratory syndrome coronavirus 2 were negative. The antibody test was positive, confirming the diagnosis of COVID-19. As many orally administered drugs were not well tolerated due to gastrointestinal symptoms, an emergency use of thymosin, a polypeptide consisting of 28 amino acids, was administered by injection. Finally, after the implementation of the treatment program, symptoms and lung imaging improved significantly.

CONCLUSION

In this case report, it is confirmed that thymosin may help alleviate the severity of COVID-19 symptoms.

Key Words: COVID-19; Thymosin; SARS-CoV-2; Treatment; Therapeutic drug; Case report

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Specialty type: Infectious diseases

Country/Territory of origin: China

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

Received: January 22, 2021

Peer-review started: January 22, 2021

First decision: March 25, 2021

Revised: March 28, 2021

Accepted: April 6, 2021

Article in press: April 6, 2021

Published online: June 6, 2021

P-Reviewer: Aktas S, Shayestehpour M

S-Editor: Zhang H

L-Editor: Wang TQ

P-Editor: Xing YX



Core Tip: A 51-year-old Chinese man returned from Russia to Yueqing Hospital Affiliated to Wenzhou Medical University on April 27, 2020. He had 2-wk symptoms of chest pain, chest tightness, fatigue, and conscious fever. Oxygen inhalation was given and thymosin was injected twice a week, at 1.6 mg per injection. The patient was successfully treated and discharged after 15 d in the hospital.

Citation: Zheng QN, Xu MY, Gan FM, Ye SS, Zhao H. Thymosin as a possible therapeutic drug for COVID-19: A case report. *World J Clin Cases* 2021; 9(16): 4090-4094

URL: <https://www.wjgnet.com/2307-8960/full/v9/i16/4090.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v9.i16.4090>

INTRODUCTION

Since the outbreak in China in December 2019, coronavirus disease 2019 (COVID-19) has spread worldwide[1]. The numbers of infections and deaths have increased significantly[2]. Although there are many reports on the treatment of COVID-19, it is clear that currently no specific drugs are available to treat COVID-19 infection[3]. Thus, new treatment strategies for COVID-19 are urgently needed to be developed. Research confirms that COVID-19 is a human-to-human transmission caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[4]. Similar to other virally infectious diseases, the immune function plays a decisive role in the consequences of viral infection. The prognosis of the elderly and immunocompromised patients is therefore often poor[5]. Thymosin, a polypeptide consisting of 28 amino acids, can effectively regulate the body's immunity by inducing the differentiation and maturation of T cells and enhancing the production of cytokines and B cell antibody responses, resulting in enhanced immunity in patients[6]. At the time of this writing, no thymosin-like treatment of COVID-19 has been reported. Herein, we report a clinical case of COVID-19, and introduce the effect of thymosin on the symptoms, imaging, and prognosis of a COVID-19 patient. It is hoped that this report can enrich our understanding of the current treatments for COVID-19 and explore the therapeutic potential of thymosin for patients with COVID-19.

CASE PRESENTATION

Chief complaints

A 51-year-old male patient had 2-wk symptoms of chest pain, chest tightness, fatigue, and conscious fever.

History of present illness

On April 13, 2020, the patient developed chest pain, chest tightness, fatigue, and conscious fever, and was not treated in Russia. On April 27, 2020, he was admitted to Yueqing Hospital Affiliated to Wenzhou Medical University for treatment.

History of past illness

The patient had no history of hypertension, diabetes, or other systemic diseases.

Personal and family history

The patient had no history of smoking or underlying lung disease or any other risk factors. His family members were healthy.

Physical examination

Physical examination showed that a body temperature of 37.9 °C, blood pressure of 132/87 mmHg, pulse of 94 beats per minute, respiration of 20 breaths per minute, and SPO₂ of 94%. Moist rales were heard in the right lung.

Laboratory examinations

The results showed a white blood cell count of 4.6×10^9 cells/L (reference range: 4.0-

10.0×10^9 cells/L). Reverse transcription polymerase chain reaction (RT-PCR) for SARS-CoV-2 was negative. The IgM antibodies for common pathogens such as influenza A, influenza B, adenovirus, respiratory syncytial virus, parainfluenza, *Mycoplasma pneumoniae*, and *Chlamydia pneumoniae* were all negative. SARS-CoV-2-specific IgM and IgG antibodies (the results of the kit produced by Xiamen Innodx Biotech Co., Ltd., China) were immediately detected and the results were all positive.

Imaging examinations

On April 28, chest computed tomography (CT) showed multiple patchy shadows and ground glass shadows in both lungs (Figure 1A). On May 1, chest CT showed obvious absorption of both lungs lesions (Figure 1B). On May 11, reexamination of chest CT showed that the lesions in both lungs were absorbed (Figure 1C).

FINAL DIAGNOSIS

The final diagnosis was COVID-19.

TREATMENT

The patient was then sent to the air isolation ward for clinical observation and immediately given an oxygen therapy. The patient was also treated with arbidol and lopinavir-ritonavir, but due to obvious nausea, vomiting, and diarrhea, the drug treatments were halted. On April 28, thymosin was subcutaneously injected twice a week, at 1.6 mg per injection.

OUTCOME AND FOLLOW-UP

At the follow-up one month after discharge, the patient showed no discomfort, and the chest CT lesions were completely absorbed.

DISCUSSION

In this case, although the RT-PCR results were negative for SARS-CoV-2, the specific IgM and IgG antibodies for SARS-CoV-2 were all positive, indicating a clear diagnosis of COVID-19[7]. The patient was initially treated with arbidol and lopinavir-ritonavir, but because of severe nausea, vomiting, and diarrhea, the treatment was switched to thymosin injection, which was the only medicine. To date, the pathogenesis of COVID-19 is not clearly understood and there are no effective drug treatments available for the disease. Although various therapeutic drugs have been reported, their biological effects are non-specific. Thymosin, as an immune enhancer, has a therapeutic potential for the treatment of infections and immunocompromised diseases such as cancer[6,8,9]. Thymosin is a hormone with 28 amino acids naturally secreted by the thymus. It has a variety of immunomodulatory activities. It can activate Toll-like receptors in dendritic cells and other immune cells, thus enhancing the function of T-helper 1 cells, natural killer cell activity, and antibody response to T-cell-dependent antigen[10,11]. Thymosin has been used in China for the treatment of viral hepatitis for more than two decades[12]. The reason may be that thymosin can promote T lymphocyte responses and function involved in the host antiviral defenses. We report here an effective case of thymosin injection for the treatment of COVID-19 when other available antiviral drugs could not be tolerated. However, further studies are still needed to explain the exact efficacy and mechanism of thymosin on COVID-19. We summarize the patient's course of therapy schedule (Figure 2). The symptoms of chest tightness, chest pain, and fatigue gradually improved under the action of thymosin alone. Thymosin therapy may also increase the survival rate of sepsis and reduce the bacterial load in a sepsis model as reported by King and Tuthill[13]. Although there are no large-scale studies, considering the encouraging result and the proven safety for human use, we believe that thymosin may be a feasible therapeutic drug against COVID-19 and warrants further investigation. Clinical trials can verify the role of thymosin in alleviating the symptoms of COVID-19 and shortening the course of

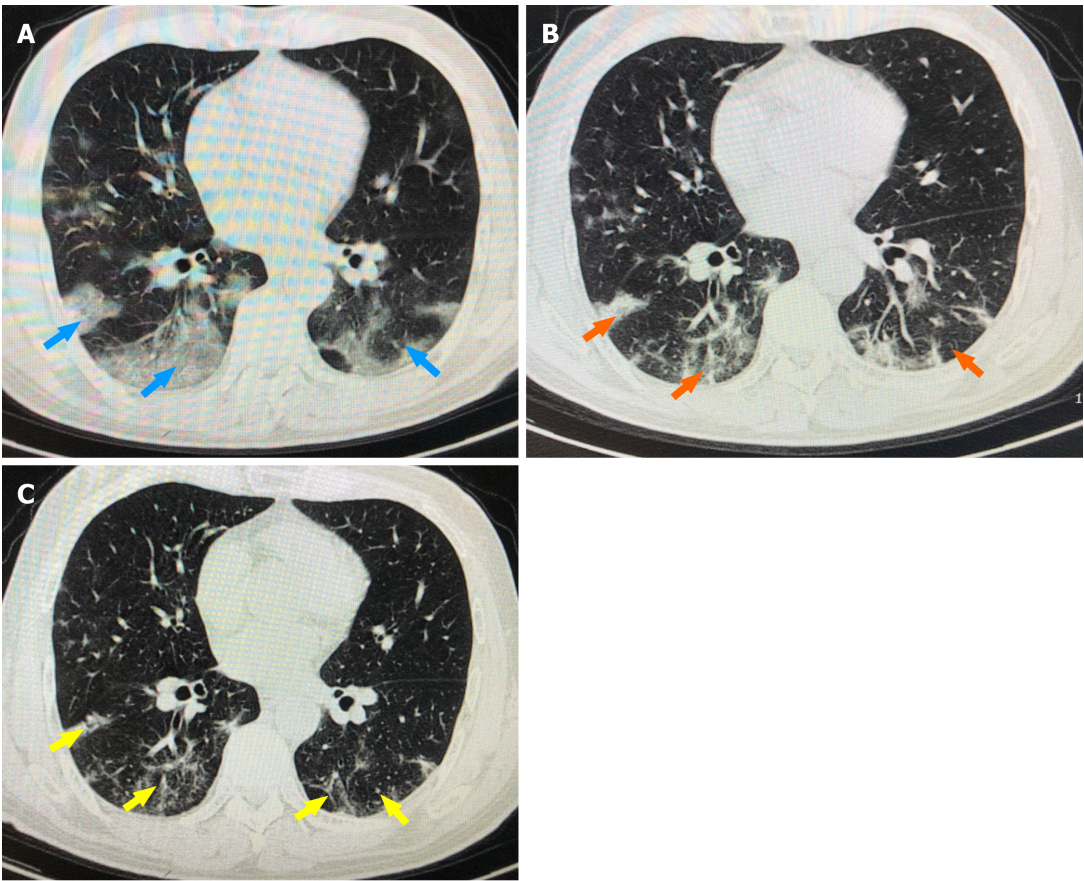


Figure 1 Chest computed tomography results of the coronavirus disease 2019 patient. A: Computed tomography (CT) of the chest on April 28. Blue arrows show multiple patchy shadows and ground glass shadows in both lungs; B: CT of the chest on May 1. Orange arrows show obvious absorption of the lesions in both lungs; C: CT of the chest on May 11. Yellow arrows show that the lesions in both lungs were absorbed.

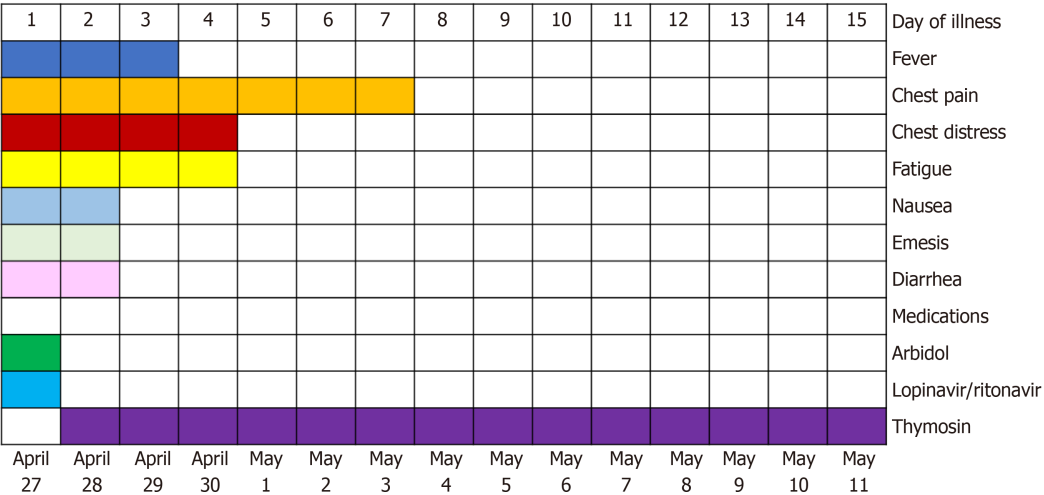


Figure 2 Symptoms and treatments of the patient outlined accordingly to days post symptom onset since April 27, 2020.

treatment in a large cohort.

CONCLUSION

Relieving symptoms, safeness, and effectiveness make thymosin a potentially ideal choice for the treatment of COVID-19. Although we had only one case, as described here, the significant effect in alleviating symptoms of COVID-19 demonstrates the

potential therapeutic effect of this naturally derived compound.

REFERENCES

- Zu ZY**, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, Zhang LJ. Coronavirus Disease 2019 (COVID-19): A Perspective from China. *Radiology* 2020; **296**: E15-E25 [PMID: [32083985](#) DOI: [10.1148/radiol.2020200490](#)]
- Dong E**, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020; **20**: 533-534 [PMID: [32087114](#) DOI: [10.1016/S1473-3099\(20\)30120-1](#)]
- Sanders JM**, Monogue ML, Jodlowski TZ, Cutrell JB. Pharmacologic Treatments for Coronavirus Disease 2019 (COVID-19): A Review. *JAMA* 2020; **323**: 1824-1836 [PMID: [32282022](#) DOI: [10.1001/jama.2020.6019](#)]
- Phan T**. Genetic diversity and evolution of SARS-CoV-2. *Infect Genet Evol* 2020; **81**: 104260 [PMID: [32092483](#) DOI: [10.1016/j.meegid.2020.104260](#)]
- Márquez EJ**, Trowbridge J, Kuchel GA, Banchereau J, Ucar D. The lethal sex gap: COVID-19. *Immun Ageing* 2020; **17**: 13 [PMID: [32457811](#) DOI: [10.1186/s12979-020-00183-z](#)]
- Ciancio A**, Rizzetto M. Thymalfasin in the treatment of hepatitis B and C. *Ann N Y Acad Sci* 2010; **1194**: 141-146 [PMID: [20536462](#) DOI: [10.1111/j.1749-6632.2010.05487.x](#)]
- National Health Commission of the People's Republic of China**. Diagnosis and treatment protocol for COVID-19 (Trial Version 7). [cited 20 March 2020]. Available from: http://en.nhc.gov.cn/2020-03/29/c_78469.htm
- Xue XC**, Yan Z, Li WN, Li M, Qin X, Zhang C, Hao Q, Wang ZL, Zhao N, Zhang W, Zhang YQ. Construction, expression, and characterization of thymosin alpha 1 tandem repeats in Escherichia coli. *Biomed Res Int* 2013; **2013**: 720285 [PMID: [23555093](#) DOI: [10.1155/2013/720285](#)]
- Morton B**, Pennington SH, Gordon SB. Immunomodulatory adjuvant therapy in severe community-acquired pneumonia. *Expert Rev Respir Med* 2014; **8**: 587-596 [PMID: [24898699](#) DOI: [10.1586/17476348.2014.927736](#)]
- Romani L**, Bistoni F, Gaziano R, Bozza S, Montagnoli C, Perruccio K, Pitzurra L, Bellocchio S, Velardi A, Rasi G, Di Francesco P, Garaci E. Thymosin alpha 1 activates dendritic cells for antifungal Th1 resistance through toll-like receptor signaling. *Blood* 2004; **103**: 4232-4239 [PMID: [14982877](#) DOI: [10.1182/blood-2003-11-4036](#)]
- Romani L**, Bistoni F, Perruccio K, Montagnoli C, Gaziano R, Bozza S, Bonifazi P, Bistoni G, Rasi G, Velardi A, Fallarino F, Garaci E, Puccetti P. Thymosin alpha1 activates dendritic cell tryptophan catabolism and establishes a regulatory environment for balance of inflammation and tolerance. *Blood* 2006; **108**: 2265-2274 [PMID: [16741252](#) DOI: [10.1182/blood-2006-02-004762](#)]
- Gramenzi A**, Cursaro C, Andreone P, Bernardi M. Thymalfasin: clinical pharmacology and antiviral applications. *BioDrugs* 1998; **9**: 477-486 [PMID: [18020580](#) DOI: [10.2165/00063030-199809060-00005](#)]
- King RS**, Tuthill C. Evaluation of thymosin α 1 in nonclinical models of the immune-suppressing indications melanoma and sepsis. *Expert Opin Biol Ther* 2015; **15** Suppl 1: S41-S49 [PMID: [25643200](#) DOI: [10.1517/14712598.2015.1008446](#)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

