## Contents

**EDITORIAL**

1247  Interactive platform for peer review: A proposal to improve the current peer review system  
*Emile SH*

**MINIREVIEWS**

1251  Animal models of cathartic colon  
*Meng YY, Li QD, Feng Y, Liu J, Wang EK, Zhong L, Sun QL, Yuan JY*

**ORIGINAL ARTICLE**

**Case Control Study**

1259  New indicators in evaluation of hemolysis, elevated liver enzymes, and low platelet syndrome: A case-control study  
*Kang SY, Wang Y, Zhou LP, Zhang H*

**Retrospective Study**

1271  Analysis of hospitalization costs related to fall injuries in elderly patients  
*Su FY, Fu ML, Zhao QH, Huang HH, Luo D, Xiao MZ*

1284  Effect of alprostadil in the treatment of intensive care unit patients with acute renal injury  
*Jia Y, Liu LL, Su JL, Meng XH, Wang WX, Tian C*

**Clinical Trials Study**

1293  Etomidate vs propofol in coronary heart disease patients undergoing major noncardiac surgery: A randomized clinical trial  
*Dai ZL, Cai XT, Guo WL, Lin M, Lin J, Jiang YX, Jiang X*

**Observational Study**

1304  Healthy individuals vs patients with bipolar or unipolar depression in gray matter volume  
*Zhang YN, Li H, Shen ZW, Xu C, Huang YJ, Wu RH*

1318  Impact of metabolism-related mutations on the heart rate of gastric cancer patients after peritoneal lavage  
*Yuan Y, Yao S, Luo GH, Zhang XY*

**CASE REPORT**

1329  Efficacy of afatinib in a patient with rare EGFR (G724S/R776H) mutations and amplification in lung adenocarcinoma: A case report  
*He SY, Lin QF, Chen J, Yu GP, Zhang JL, Shen D*
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1336</td>
<td>Esophageal superficial adenosquamous carcinoma resected by endoscopic submucosal dissection: A rare case report</td>
<td>Liu GY, Zhang JX, Rong L, Nian WD, Nian BX, Tian Y</td>
</tr>
<tr>
<td>1343</td>
<td>Do medullary thyroid carcinoma patients with high calcitonin require bilateral neck lymph node clearance? A case report</td>
<td>Gan FJ, Zhou T, Wu S, Xu MX, Sun SH</td>
</tr>
<tr>
<td>1353</td>
<td>Femoral epithelioid hemangioendothelioma detected with magnetic resonance imaging and positron emission tomography/computed tomography: A case report</td>
<td>Zhao HG, Zhang KW, Hou S, Dai YY, Xu SB</td>
</tr>
<tr>
<td>1359</td>
<td>Noninvasive tools based on immune biomarkers for the diagnosis of central nervous system graft-vs-host disease: Two case reports and a review of the literature</td>
<td>Lyu HR, He XY, Hao HJ, Lu WY, Jin X, Zhao YJ, Zhao MF</td>
</tr>
<tr>
<td>1367</td>
<td>Periodontally accelerated osteogenic orthodontics with platelet-rich fibrin in an adult patient with periodontal disease: A case report and review of literature</td>
<td>Xu M, Sun XY, Xu JG</td>
</tr>
<tr>
<td>1379</td>
<td>Subtalar joint pigmented villonodular synovitis misdiagnosed at the first visit: A case report</td>
<td>Zhao WQ, Zhao B, Li WS, Assan I</td>
</tr>
<tr>
<td>1394</td>
<td>Unexplained elevation of erythrocyte sedimentation rate in a patient recovering from COVID-19: A case report</td>
<td>Pu SL, Zhang XY, Liu DS, Ye BN, Li JQ</td>
</tr>
<tr>
<td>1402</td>
<td>Thoracic pyogenic infectious spondylitis presented as pneumothorax: A case report</td>
<td>Cho MK, Lee BJ, Chang JH, Kim YM</td>
</tr>
<tr>
<td>1408</td>
<td>Unilateral pulmonary hemorrhage caused by negative pressure pulmonary edema: A case report</td>
<td>Park HJ, Park SH, Woo UT, Cho SY, Jeon WJ, Shin WJ</td>
</tr>
<tr>
<td>1433</td>
<td>Unusual presentation of granulomatosis with polyangiitis causing periaortitis and consequent subclavian steal syndrome: A case report</td>
<td>Cho U, Kim SK, Ko JM, Yoo J</td>
</tr>
<tr>
<td>1439</td>
<td>Postoperative discal pseudocyst and its similarities to discal cyst: A case report</td>
<td>Fu CF, Tian ZS, Yao LY, Yao JH, Jin YZ, Liu Y, Wang YY</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>1446</td>
<td>Treatment of oral lichen planus by surgical excision and acellular dermal matrix grafting: Eleven case reports and review of literature</td>
<td>Fu ZZ, Chen LQ, Xu YX, Yue J, Ding Q, Xiao WL</td>
</tr>
<tr>
<td>1455</td>
<td>Nonalcoholic fatty liver disease as a risk factor for cytomegalovirus hepatitis in an immunocompetent patient: A case report</td>
<td>Khiatah B, Nasrollah L, Covington S, Carlson D</td>
</tr>
<tr>
<td>1469</td>
<td>Intrahepatic cholangiocarcinoma is more complex than we thought: A case report</td>
<td>Zeng JT, Zhang JF, Wang Y, Qing Z, Luo ZH, Zhang YL, Zhang Y, Luo XZ</td>
</tr>
<tr>
<td>1475</td>
<td>Congenital hepatic fibrosis in a young boy with congenital hypothyroidism: A case report</td>
<td>Xiao FF, Wang YZ, Dong F, Li XL, Zhang T</td>
</tr>
<tr>
<td>1483</td>
<td>Polidocanol sclerotherapy for multiple gastrointestinal hemangiomas: A case report</td>
<td>Yao H, Xie YX, Guo JY, Wu HC, Xie R, Shi GQ</td>
</tr>
<tr>
<td>1490</td>
<td>Gastrointestinal stromal tumor with multisegmental spinal metastases as first presentation: A case report and review of the literature</td>
<td>Kong Y, Ma XW, Zhang QQ, Zhao Y, Feng HL</td>
</tr>
</tbody>
</table>
ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Dr. Quach is an Associate Professor of Gastroenterology at the University of Medicine and Pharmacy at Hochiminh City, Viet Nam, where he received his MD in 1997 and his PhD in 2011. Dr. Quach has published more than 100 reviews and original papers in local and international journals. He has received several awards, including Outstanding Presentation at the Biannual Scientific Congress of Vietnamese Nationwide Medical Schools, Medal of Creativeness from the Vietnamese Central Youth League, etc. Currently, he serves as a Vice President of the Vietnam Association of Gastroenterology and Secretary General of the Vietnam Federation for Digestive Endoscopy. (L-Editor: Filipodia)

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: Ji-Hong Liu; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.
Unexplained elevation of erythrocyte sedimentation rate in a patient recovering from COVID-19: A case report

Sheng-Lan Pu, Xiang-Yan Zhang, Dai-Shun Liu, Ba-Ning Ye, Jian-Quan Li

BACKGROUND
A disease caused by a novel coronavirus virus, named coronavirus disease 2019 (COVID-19), broke out in Wuhan, China in December 2019, and spread around the word. As of March 4, 2020, 93090 confirmed cases and 2984 deaths have been reported in more than 80 countries and territories. It has triggered global public health security. However, the features and prognosis of COVID-19 are incompletely understood.

CASE SUMMARY
We here report that the erythrocyte sedimentation rate (ESR) increased in a confirmed COVID patient. The high level of ESR sustained for a long time even after the patient recovered from COVID-19, while all results related to tumor, tuberculosis, rheumatic diseases, anemia, etc. cannot explain the abnormal elevation of ESR presented in this case.
confirm that the manuscript has been read and approved by all named authors, and the order of authors listed in the manuscript has been approved by all of us. All authors declare that they have no competing interests to disclose.

CARE Checklist (2016) statement: We 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 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: Medicine, research and experimental

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: November 7, 2020
Peer-review started: November 7, 2020
First decision: December 13, 2020
Accepted: January 5, 2021
Article in press: January 5, 2021
Published online: February 26, 2021

P-Reviewer: Byeon H, Velikova TV
S-Editor: Zhang L
L-Editor: Wang TQ
P-Editor: Wang LL

CONCLUSION
Although the increased ESR cannot be explained by all existing evidence, it possibly links the abnormal pathologic change in some COVID-19 patients and negative prognosis, and provides the clue to dissect the mechanism of illness progressing in COVID-19 and its prognosis.

Key Words: COVID-19; Erythrocyte sedimentation rate; Prognosis; SARS-CoV-2; Joint damage; Case report

Core Tip: So far, there have been many reports on the coronavirus disease 2019 (COVID-19) around the world that present different epidemiological and clinical features. Here we report a case that had a sustaining high level of erythrocyte sedimentation rate in a patient recovering from COVID-19. The high level of erythrocyte sedimentation rate was not from the tumor, inflammation, tuberculosis, rheumatic diseases, or autoimmune diseases. Therefore, we suspected that COVID-19 possibly damaged the blood or immune system. The abnormal erythrocyte sedimentation rate would be a precursor causing the joint damage after COVID-19 infection, such as osteoarthritis in future. Our report provides the supplement to understand the features of COVID-19 and shows some clues helping understand the prognosis of severe acute respiratory syndrome coronavirus 2 infection.

DOI: https://dx.doi.org/10.12998/wjcc.v9.i6.1394

INTRODUCTION
In December, 2019, a cluster of patients with pneumonia of unknown cause emerged in Wuhan, China, and later were confirmed with infection of a novel coronavirus virus [named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)]\(^{[6]}\). Although most coronavirus disease 2019 (COVID-19) patients presented the initial signs and symptoms as fever or cough\(^{[7]}\), extra-pulmonary symptoms have also been reported\(^{[8]}\). Recent research has shown that patient with no clinical signs could be infected by the SARS-CoV-2\(^{[9]}\), while other studies have shown that COVID-19 can rapidly evolve into the acute respiratory distress syndrome and even multiple organ dysfunction\(^{[10]}\). Since most studies focused the changes of the respiratory system, the understanding of COVID-19 is still superficial, and the features of other organ involvement and prognosis in COVID-19 patients are unclear.

We herein describe an unexplained phenomenon that a high level of erythrocyte sedimentation rate (ESR) was present in a case of COVID-19, and aim to dissect the cause of abnormal ESR elevation in this case, in order to provide insight to understand the illness progression, and the long-term impact of COVID-19 on patients.

CASE PRESENTATION

Chief complaints
A 51-year-old male patient presented with high fever, dry cough, malaise, and pronounced tiredness for 8 d.

History of present illness
The patient, residing in Guizhou Province, China, returned from Wuhan, China on January 22, 2020, where there had been an outbreak of COVID-19. The patient was admitted to Guizhou Provincial People’s Hospital on January 29, 2020 with high fever,
dry cough, malaise, and pronounced tiredness.

**History of past illness**
The patient had a 5-year history of hypertension but denied any history of arthritis, hyperthyroidism, tuberculosis, autoimmune disease, and other chronic diseases.

**Personal and family history**
The patient had no particular individual or family history.

**Physical examination**
On admission, the physical examination revealed a body temperature of 37.8 °C and no physical signs suggestive of lymphadenopathy, leukemia, and hyperthyroidism. Detailed systemic physical examination revealed no abnormalities in the cardiovascular or abdominal systems.

**Laboratory examinations**
Laboratory examinations after admission showed mildly abnormal routine blood parameters and other inflammation parameters such as C-reactive protein (CRP), procalcitonin, interleukin-6 (IL-6) and ESR, aden normal liver and renal function parameters (Table 1). Arterial blood gas analysis was as follows: pH, 7.418; oxygen partial pressure, 71 (oxygen Index 173); partial pressure of carbon dioxide, 42 mmHg on room air. The nucleic acid assay of SARS-CoV-2 of throat swab was tested on January 29 and 30, 2020, and the results showed positive nucleic acid assay of SARS-CoV-2 twice.

**Imaging examinations**
Chest computed tomography (CT) on admission showed the feature of multiple ground glass opacifications in both lower lobes (Figure 1).

**FINAL DIAGNOSIS**
Based on the positive nucleic acid assay of SARS-CoV-2, symptoms, laboratory data, and CT results, COVID-19 was confirmed on January 31, 2020 according to the diagnostic criteria for COVID-19.

**TREATMENT**
After admission, main treatments included moxifloxacin, oseltamivir, γ-interferon, and Lianhua antipyretic granules. On February 2, 2020, the patient still had the symptoms of intermittent fever and dry cough, therefore, the anti-viral drugs, lopinavir and ritonavir tablets and methylprednisolone were given.

**OUTCOME AND FOLLOW-UP**
Up to February 14, 2020, the patient’s symptoms of malaise and pronounced tiredness were significantly improved, but he still had dry cough and intermittent fever. For centralized management of COVID-19 patients, he was transferred to Jiang Jun Shan Hospital (the designated hospital for COVID-19 patients in Guizhou Province, China). Laboratory data after transferring indicated that the count of leukocytes and lymphocytes decreased, while IL-6, CRP, and ESR increased, and liver function parameters were mildly abnormal (Table 2). Arterial blood gas analysis was as follows: pH, 7.41; oxygen partial pressure, 78 (oxygen index 270); partial pressure of carbon dioxide, 42 mmHg on room air (Table 3). Chest CT showed the streaky or coarse reticular pattern opacities, and lesions in both lower lobes were improved compared to those scanned before (Figure 2). Treatments with moxifloxacin and oseltamivir were replaced with the anti-virus drug Arbido. On February 21, 2020, the symptoms of dry cough and fever significantly resolved. Chest CT showed that the lesions in both lower lobes significantly improved (Figure 3), and the assay of blood sample indicated that all parameters of inflammation were normal except ESR (Table 4) tested on February 25, 2020. Also, both the nucleic acid assay of throat swab of SARS-CoV-2 tested on
Table 1 Main results of routine blood test, inflammation parameters, and liver and renal function

<table>
<thead>
<tr>
<th>Item/result</th>
<th>WBC (×10^9/L)</th>
<th>NEUT (%)</th>
<th>LYM (×10^9/L)</th>
<th>PCT (ng/mL)</th>
<th>IL6 (pg/mL)</th>
<th>ESR (mm/h)</th>
<th>CRP (mg/L)</th>
<th>CREA (umol/L)</th>
<th>UREA (mmol/L)</th>
<th>TBIL (umol/L)</th>
<th>ALT (U/L)</th>
<th>AST (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>3.57</td>
<td>53.5</td>
<td>1.29</td>
<td>0.06</td>
<td>35.65</td>
<td>22</td>
<td>43.58</td>
<td>103</td>
<td>4.6</td>
<td>17.3</td>
<td>9.73</td>
<td>38.45</td>
</tr>
<tr>
<td>Reference range</td>
<td>4-10</td>
<td>45-77</td>
<td>0.8-4</td>
<td>&lt; 0.5</td>
<td>0-7</td>
<td>0-15</td>
<td>0-8</td>
<td>40-106</td>
<td>2.9-8.2</td>
<td>5.1-20</td>
<td>5-40</td>
<td>8-40</td>
</tr>
</tbody>
</table>

WBC: White blood cells; NEUT: Neutrophil granulocytes; LYM: Lymphocytotoxicity; PCT: Procalcitonin; IL-6: interleukin-6; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; CREA: Creatinine; TBIL: Total bilirubin; ALT: Alanine transaminase; AST: Aspartate aminotransferase.

Table 2 Main results of routine blood tests, inflammation parameters, and liver and renal function

<table>
<thead>
<tr>
<th>Item/result</th>
<th>WBC (×10^9/L)</th>
<th>NEUT (%)</th>
<th>LYM (×10^9/L)</th>
<th>PCT (ng/mL)</th>
<th>IL6 (pg/mL)</th>
<th>ESR (mm/h)</th>
<th>CRP (mg/L)</th>
<th>CREA (umol/L)</th>
<th>UREA (mmol/L)</th>
<th>TBIL (umol/L)</th>
<th>ALT (U/L)</th>
<th>AST (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results</td>
<td>2.27</td>
<td>54.8</td>
<td>0.73</td>
<td>0.1</td>
<td>14.2</td>
<td>102</td>
<td>16.69</td>
<td>89</td>
<td>3.1</td>
<td>10.2</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>Reference range</td>
<td>4-10</td>
<td>45-77</td>
<td>0.8-4</td>
<td>&lt; 0.5</td>
<td>0-7</td>
<td>0-15</td>
<td>0-8</td>
<td>40-106</td>
<td>2.9-8.2</td>
<td>5.1-20</td>
<td>5-40</td>
<td>8-40</td>
</tr>
</tbody>
</table>

WBC: White blood cells; NEUT: Neutrophil granulocytes; LYM: Lymphocytotoxicity; PCT: Procalcitonin; IL-6: interleukin-6; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; CREA: Creatinine; TBIL: Total bilirubin; ALT: Alanine transaminase; AST: Aspartate aminotransferase.

Table 3 Results of examination related to erythrocyte sedimentation rate

<table>
<thead>
<tr>
<th>Item</th>
<th>Result</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT3 (pmol/L)</td>
<td>5.52</td>
<td>3.28-6.47</td>
</tr>
<tr>
<td>FT4 (pmol/L)</td>
<td>11.04</td>
<td>7.64-16.03</td>
</tr>
<tr>
<td>TSH (µIU/mL)</td>
<td>1.473</td>
<td>0.34-5.6</td>
</tr>
<tr>
<td>RF (U/mL)</td>
<td>10</td>
<td>0-20</td>
</tr>
<tr>
<td>ANCA</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Hb (g/L)</td>
<td>134</td>
<td>110-150</td>
</tr>
<tr>
<td>AFP (ng/mL)</td>
<td>3.35</td>
<td>0-10.9</td>
</tr>
<tr>
<td>CA125 (U/mL)</td>
<td>5</td>
<td>0-35</td>
</tr>
<tr>
<td>CA19-9 (U/mL)</td>
<td>20</td>
<td>0-37</td>
</tr>
<tr>
<td>CEA (ng/mL)</td>
<td>1.3</td>
<td>0-5</td>
</tr>
<tr>
<td>Mp-IgM</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>TB-IgG</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>AFB</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>T-SPOT.TB</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>HBsAg (IU/mL)</td>
<td>0</td>
<td>0-0.05</td>
</tr>
<tr>
<td>HIV</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

TSH: Thyroid stimulating hormone; RF: Rheumatic diseases; ANCA: Autoimmune diseases; Hb: Hemoglobin; AFP: Alpha fetoprotein; CEA: Carcinoma embryonic antigen; HIV: Human immunodeficiency virus.

February 22 and 24, 2020 were negative, indicating that this patient had recovered from COVID-19. With the improvement of the patient’s condition, we stopped the use of all anti-viral drugs on February 24, 2020. The patient’s situation was stable from February 24, 2020 to March 1, 2020, and he was discharged and entered the period of medical observation from March 1, 2020.

Strangely, the patient’s ESR gradually increased after admission, and reached 120
Increased ESR in a COVID-19 patient

Table 4 Main results of routine blood tests, inflammation parameters, and liver and renal function

<table>
<thead>
<tr>
<th>Item/result</th>
<th>WBC (×10^9/L)</th>
<th>NEUT (%)</th>
<th>LYM (×10^9/L)</th>
<th>PCT (ng/mL)</th>
<th>IL6 (pg/mL)</th>
<th>ESR (mm/h)</th>
<th>CRP (mg/L)</th>
<th>CREA (umol/L)</th>
<th>UREA (mmol/L)</th>
<th>TBIL (umol/L)</th>
<th>ALT (U/L)</th>
<th>AST (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>5</td>
<td>47.6</td>
<td>1.12</td>
<td>&lt; 0.05</td>
<td>13.97</td>
<td>120</td>
<td>8.3</td>
<td>99</td>
<td>7.1</td>
<td>11.4</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>Reference</td>
<td>4-10</td>
<td>45-77</td>
<td>0.8-4</td>
<td>&lt; 0.5</td>
<td>0-7</td>
<td>0-15</td>
<td>0-8</td>
<td>40-106</td>
<td>2.9-8.2</td>
<td>5.1-20</td>
<td>5-40</td>
<td>8-40</td>
</tr>
</tbody>
</table>

WBC: White blood cells; NEUT: Neutrophil granulocytes; LYM: Lymphocytotoxicity; PCT: Procalcitonin; IL-6: interleukin-6; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; CREA: Creatinine; TBIL: Total bilirubin; ALT: Alanine transaminase; AST: Aspartate aminotransferase.

Figure 1 Chest computed tomography images obtained on January 31, 2020. After admission, the high-resolution computed tomography scan of chest on January 31, 2020 showed ground-glass shadowing in both the left and right lower lobes (orange arrows).

Figure 2 Chest computed tomography images obtained on February 15, 2020. A high-resolution computed tomography scan of the chest was performed on February 15, 2020, which showed that the ground-glass shadowing in both the left and right lower lobes was improved, and there were streaky or coarse reticular pattern opacities (orange arrows).

mm/h on February 22, 2020. To figure out the possible reasons of ESR increase in this case, we tested the relevant parameters of tumor, inflammation, tuberculosis, rheumatic diseases, autoimmune diseases, hyperthyroidism, and anemia, but there was no evidence indicating that the elevation of ESR resulted from these possible factors (Table 3). The ESR tested on February 28 and 29, 2020 still reached 120 mm/h and 118 mm/h, respectively (Figure 4). Therefore, we excluded the possibility that the elevation of ESR resulted from the negative effect of drugs. Moreover, the high level of ESR sustained more than 1 mo after the patient was discharged from hospital, and the ESR tested on April 18, 2020 and April 24, 2020 was 18 and 15 mm/h, respectively. However, the exact cause of sustained ESR elevation in this case is unclear.
Increased ESR in a COVID-19 patient

Figure 3 Chest computed tomography images obtained on February 25, 2020. After the patient’s signs and symptoms resolved, a high-resolution computed tomography scan of the chest was performed on February 25, 2020, which showed that the ground-glass shadowing in both lower lobes, and the streaky or coarse reticular pattern opacities were further significantly improved (orange arrows).

Figure 4 Dynamic changes of the patient’s body temperature and erythrocyte sedimentation rate during hospitalization. After admission, the patient’s body temperature was monitored and the highest temperature in each day was recorded. The results are shown in this figure as a blue scatter curve. The erythrocyte sedimentation rate was examined at several indicated time points as indicated with red histograms.

DISCUSSION

As its high susceptibility, COVID-19 caused a serious public health issue around the world[3,8]. Although the treatments and prevention for COVID-19 progressed, little is known about the prognosis and clinical impact of COVID-19[2,9].

In this virus-imported case, the fever was the typical clinical feature of COVID-19 even though several inflammation parameters such as the count of leukocyte and neutrophils were normal (Table 1). Consistent with common characteristics of viral infection, lymphopenia presented after COVID-19 and returned to normal after recovery from virus infection (Tables 1 and 4). With the illness progression, COVID-19 could be associated with bacterial infection, as the results showed that inflammation parameters such as the count of leukocyte and neutrophils, IL-6, and CRP increased. However, the procalcitonin results indicated that viral infection rather than bacterial infection was mainly involved in this case (Tables 1, 2, and 4). As the nucleic acid assay of virus turned negative, the patient’s physical sign of fever and dry cough significantly relieved, therefore, the signs and symptoms of the patient are correlated...
Increased ESR in a COVID-19 patient

with the activity of SARS-CoV-2 infection.

Strangely, we found an unexplained laboratory data in this case that ESR began to significantly increase at about 2 wk after COVID-19. The high level of ESR sustained for a long time even though the sign of fever and dry cough resolved, the change of chest CT manifestations improved (Figure 3), and the test of nucleic acid assay of throat swab turned negative. Current results indicated the abnormal elevation of ESR in this case was not caused by the tumor, inflammation, tuberculosis, rheumatic diseases, hyperthyroidism, anemia, autoimmune diseases, or the side-effects of drugs (Table 3).

ESR is affected by the size, shape, and concentration of red blood cells and plasma characteristics\(^1\). The exact causes of the increased ESR in this case are not yet clear. We speculated that COVID-19 might trigger the change of the form of erythrocytes or plasma characteristics including the immune system via an unknown mechanism to increase the ESR. The sustained high level of ESR possibly brings a negative effect on COVID-19 patients’ prognosis, since high ESR could damage the joint and thus leads to joint diseases such as osteoarthritis\(^11\)\(^11\). Furthermore, it may be a precursor of hepatic and renal dysfunction\(^12\)\(^-\)\(^15\). Thus, COVID-19 may influence the long-term prognosis of patients; however, it is difficult to predict the long-term prognosis of COVID-19 patients on the basis of only ESR. More cases and evidence are needed to address this issue.

CONCLUSION

In summary, we have documented a patient with a sustained high level of ESR, even after he recovered from COVID-19. The increased ESR in this patient cannot be explained by the tumor, inflammation, tuberculosis, rheumatic diseases, hyperthyroidism, anemia, autoimmune diseases, or the side-effects of drugs. It is possibly associated with the patient’s prognosis, although it is difficult to predict the long-term prognosis of COVID-19 based on this single parameter.

ACKNOWLEDGEMENTS

We thank Dr. Ting-Ting Lou and Dr. Wen-Qi Zheng at Jiang Jun Shan Hospital for their assistance in the preparation and collection of clinical data.

REFERENCES


10.1016/S2213-2600(20)30076-X]
10 Ramsay ES, Lerman MA. How to use the erythrocyte sedimentation rate in paediatrics. *Arch Dis Child Educ Pract Ed* 2015; 100: 30-36 [PMID: 25205237 DOI: 10.1136/archdischild-2013-305349]
14 Hess CT. Monitoring laboratory values: transferrin, C-reactive protein, erythrocyte sedimentation rate, and liver function. *Adv Skin Wound Care* 2009; 22: 96 [PMID: 19155715 DOI: 10.1097/01.ASW.0000345287.28403.76]