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Telemedicine, Not The Panacea We Thought It Would Be. A Tale Of Caution

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Abstract
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Keywords
COVID-19, Telemedicine, Primary Care Medicine

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CASE REPORT

Telemedicine, Not the Panacea We Thought It Would Be. A Tale of Caution

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Abstract

In the last few decades, the growing use of telemedicine has allowed access to healthcare at reduced costs and increased monitoring of chronic conditions, especially in underserved and rural areas. It is a tool of great value in low-income countries where there is a paucity of specialists. In the height of the COVID-19 pandemic, telemedicine was used to screen patients with COVID-19 like symptoms and send them to test sites directly. This helped minimize unnecessary healthcare staff and patient exposure to the infection and helped decompress ERs. Due to a lack of testing resources, many mildly symptomatic patients were presumed to have COVID-19 infection and advised to self-isolate at home. We present a case of delayed diagnosis of acute leukemia resulting in a life-threatening presentation with leukostasis. This case highlights the need for a physical exam, lab investigations, and close follow up for new patient complaints seen over telemedicine. It also highlights the lack of evidence for the efficacy and safety of telemedicine in patients with new complaints.

Keywords: COVID-19, Telemedicine, Primary care medicine

1. Introduction

In the last few decades, technology has revolutionized mankind’s ability to communicate and exchange information over long distances. This allowed for the development of the field of telemedicine, enabling access to healthcare at reduced costs and increased monitoring of chronic conditions. This has especially been useful in underserved and rural areas, as well as in low-income countries where there is a paucity of specialists.1,2 Telemedicine has existed for many decades, but barriers to virtual care including reimbursement to providers, location constraints, and limited ability to perform a physical exam, prevented wide spread availability.3 With the onset of the Coronavirus Disease 2019 (COVID-19) pandemic, some of the financial and health care coverage difficulties in the United States have been waived, paving the way for increased access to telemedicine.4 It played a critical role in allowing safe access to healthcare and minimizing exposure for both patients and providers.5 Numerous reviews and studies have been conducted in the last two decades to investigate the effectiveness of telemedicine, but there is still limited high quality evidence to support the use of telemedicine for many conditions.6,7 As far as we are aware, there is no research about the effectiveness and safety of telemedicine in assessment and management of new patients or new complaints.

In the midst of the pandemic, telemedicine was being used to screen patients with COVID-19 like symptoms and send them to test sites directly, in an effort to identify and isolate mildly symptomatic patients while minimizing unnecessary health care staff exposure in an outpatient or urgent care/ emergency department (ED) setting. It also helped decompress emergency departments during the peak of the pandemic by weeding out minimally symptomatic patients and providing patients with self-isolation instructions over the phone.5 In the peak of the first wave of the pandemic however, in March of 2020, with the paucity of resources for testing for COVID-19, many mildly symptomatic
patients were instructed to self-isolate at home without definitive testing. The patient presented in this article was one such patient, but it unfortunately delayed his diagnosis of acute leukemia and resulted in a more life-threatening presentation and required emergent treatment.

2. Methods

A PubMed search was conducted using the Mesh subject heading “telemedicine” and keywords “effectiveness” or “efficacy” or “safety” to review the literature on the safety and efficacy of telemedicine. We also combined this search with “COVID-19” and “pandemic” to identify studies about the use of telemedicine in the time of the COVID-19 pandemic. The studies were screened using the title and abstract, and relevant studies were reviewed in full.

3. Case presentation

A 36-year-old male with no past medical history was seen by his primary care physician (PCP) office in March of 2020 over a telemedicine visit for new complaints fever (104 F), dry cough, fatigue, myalgia and night sweats of 1 week duration. He was told to quarantine at home for presumed COVID-19 infection and no lab investigations were done. Unfortunately, both rapid antigen and polymerase chain reaction (PCR) COVID-19 tests were not widely available at the time. Over the next two weeks he continued to be symptomatic, and he was again seen over a telemedicine appointment by his PCP and was prescribed amoxicillin for possibility of bacterial pharyngitis vs community acquired pneumonia, as well as benzonatate for cough, with instructions to follow up with his PCP or go to the ED if he worsens. The patient did not improve with this treatment and two days later he presented to the ED due to new pleuritic chest pain, as well as cough, shortness of breath, and fever. The chest pain was sharp, right sided, 7/10 in severity and started the morning of his presentation to the ED. He also reported new daily headaches, transient episodes of blurring of vision, and a peripheral numbness/tingling sensation over the last few days.

On review of systems, he denied any nausea or vomiting, difficulty urinating, rash, or any bleeding.

The patient has no known chronic medical problems, no known allergies, no recent travel to COVID hotspots, and no known exposure to patient with COVID-19 infection. He is a former smoker and does not drink any alcohol. He works as a car salesman. His family history was noncontributory.

On presentation to the ED, he appeared ill but non-toxic. He was alert and oriented to person, time, and place. He appeared dehydrated. He was normocephalic and atraumatic. Conjunctivae were normal. Neck was supple. He was tachycardic in the 110s beats per minute, with regular rhythm and normal heart sounds. He was hypotensive with blood pressure of 78/40 mmHg. Breath sounds were normal. Abdomen was flat and soft with normal bowel sounds, with questionable splenic enlargement. Normal lower extremities with no edema. Skin was warm and dry. Peripheral numbness to light touch and pain in upper and lower limbs was found on examination. He received intravenous (IV) fluid resuscitation and started on piperacillin-tazobactam empirically for concern of sepsis.

Lab investigations in the ED revealed a White blood cell count (WBC) of 165,000 with 20% blasts (Table 1). Peripheral smear showed numerous circulating blasts and blasts with cleaved nuclei. Lactate was 1.3 mmol/L, uric acid 4.8 mg/dl, Lactate dehydrogenase (LDH) 390 U/L. Coagulation profile showed slight elevation in Prothrombin time (PT) and International Normalization Rate (INR) (Table 2). Kidney functions were at baseline with blood urea nitrogen (BUN) 13 ng/dl (Ref: 9–23 mg/dl), creatinine 1.28 mg/dl (Reference: 0.70–1.30 mg/dl). COVID and influenza was negative. EKG and troponin were normal.

Imaging included chest X ray which showed clear lung fields (Fig. 1), and CT scan of the chest with contrast which showed bilateral patchy alveolar opacities with focal alveolar opacity in the right lower lobe medially. There was also enlarged

<table>
<thead>
<tr>
<th>Table 1. CBC with differential results.</th>
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<tr>
<td>CBC with differential</td>
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<tr>
<td>------------------------</td>
</tr>
<tr>
<td>WBC 165.2</td>
</tr>
<tr>
<td>RBC 3.89</td>
</tr>
<tr>
<td>HBG 11.2</td>
</tr>
<tr>
<td>HCT 35</td>
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<tr>
<td>MCV 91</td>
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<tr>
<td>MCH 28.8</td>
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<tr>
<td>MCHC 31.7</td>
</tr>
<tr>
<td>RDW 16.6</td>
</tr>
<tr>
<td>Platelet Count 77</td>
</tr>
<tr>
<td>Neutrophils 2</td>
</tr>
<tr>
<td>Lymphocytes 72</td>
</tr>
<tr>
<td>Monocytes 6</td>
</tr>
<tr>
<td>Eosinophils 0</td>
</tr>
<tr>
<td>Basophils 0</td>
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<tr>
<td>Blasts 20</td>
</tr>
<tr>
<td>Neutrophils Count 3.3</td>
</tr>
<tr>
<td>Lymphocytes Count 118.9</td>
</tr>
<tr>
<td>Monocytes Count 9.9</td>
</tr>
<tr>
<td>Basophils Count 0.0</td>
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<td>Basophils Count 0.0</td>
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subcarinal lymph node (2.3 cm in short axis) and subcentimeter lymph nodes within both hilar regions and within the aortopulmonary window region, the largest measuring 1.1 cm (Fig. 2). Splenomegaly was also noted.

Hematology was consulted upon admission and the patient was started on hydroxyurea and allopurinol for suspected Acute Lymphoblastic Leukemia (ALL) and concern for Tumor Lysis Syndrome (TLS). Due to high WBC count and potential symptoms of leukostasis with headache, vision changes, chest pain and neuropathy, patient underwent urgent leukoreduction.

Peripheral blood flow cytometry was consistent with diagnosis of T cell lymphoblastic leukemia. Lumbar puncture was done and cerebrospinal fluid cytometry was negative for leukemia cells. He was eventually received induction chemotherapy based on the pediatric protocol AALL 0434 with Vincristine, daunorubicin, Pegaspargase, Prednisone, Cytarabine and intrathecal methotrexate. He was later discharged home after a 30 day hospital stay.

<table>
<thead>
<tr>
<th>Table 2. Coagulation test results.</th>
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<tbody>
<tr>
<td>Coagulation test</td>
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<tr>
<td>------------------</td>
</tr>
<tr>
<td>Protime</td>
</tr>
<tr>
<td>INR</td>
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<tr>
<td>APTT</td>
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<td>Fibrinogen</td>
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<td>D-Dimer</td>
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</tbody>
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4. Discussion

Our case report aims to highlight the potential limitations of telemedicine and provide a cautionary tale for providers. With the emergence of the COVID-19 pandemic, there has been an increased reliance on telemedicine to deliver healthcare in a safe and effective form for patients and minimize unnecessary exposure to both the patients and health care professionals. This has created increased demand for telemedicine, especially in the primary care setting. A recent publication in the Journal of the American Medical Association (JAMA) showed that 92.9% of primary care encounters in 2018–2019 were office based. With the start of the COVID-19 pandemic, there was a decrease of 21.4% in total visits in Q2 of 2020 as compared with the average Q2 levels in 2018 and 2019, and a decrease of 50.2% in office visits in Q2 of 2020 as compared to Q2 of 2018–2019. Telemedicine visits on the other hand increased from 1.1% of visits in 2018–2019, to 35.3% of visits in Q2 of 2020. The reduction in primary care encounters associated with the start of the COVID-19 pandemic was partially offset by an increase in telemedicine visits. However, it is not clear if care delivered over telemedicine is as effective and safe compared to care delivered in the traditional office setting.

Telemedicine’s inherent drawback is that because the patient is not physically present, a thorough physical examination is not possible. With limited

Fig. 1. Normal chest x-ray.
physical examination, vitals and lab work, telemedicine may cause missed or delayed diagnoses. This is especially true for new complaints and patients that are not well established with the primary care provider. It is also important to be aware of cognitive biases such as anchoring bias, which occurs with overreliance on initial information and failure to consider alternative diagnoses and seek additional avenues of testing and treatment. Providers need to err on the side of caution with labs, frequent follow up, and ER visits if necessary, to avoid delays in diagnosis and management.

With the wider availability of video visits, inspection may be possible, although it may be hampered by low video quality and poor lighting. Patients can be asked to perform vitals on themselves including measurement of heart rate, blood pressure, and O2 saturation. However, this is not currently routine practice, and not all patients can obtain home kits to measure their vitals. Although patients may be talked through lymph node examination, it is unclear how accurate this would be. A study from 2020 showed a reduction in primary care assessment of blood pressure in telemedicine visits compared to traditional office visits (9.6% vs 69.7%, p < 0.001), as well as cholesterol assessment (13.5% vs 21.6%, p < 0.001). If telemedicine is to be used more widely in the primary care setting, it should be routine practice to obtain vitals, weight and BMI measurements, which are usually obtained in office visits and help screen and monitor diseases such as obesity and hypertension.

It is also important to develop guidelines for which visits can be best completed over telemedicine. The evidence for this has been conflicting and of low quality. A systemic review published in 2001 identified 50 controlled assessment studies of telemedicine, of which 34 assessed some form of clinical outcome. Most of the studies were identified as low quality, and evidence of effectiveness was found only for teleradiology, teleneurology, telepsychiatry, and the use of electronic referrals enabling conferencing between primary and secondary health care providers. A Cochrane database review included 7 trials comparing telemedicine with face-to-face patient care, and found that although none of the studies showed detrimental effects, they also did not show unequivocal benefits and did not provide evidence for the safety of telemedicine. Other studies showed evidence supporting the use of telemedicine as a promising alternative method of delivering healthcare for psychiatry and psychotherapy, monitoring chronic conditions such as diabetes and respiratory conditions. Further studies are needed to show which conditions, complaints, or settings, can be safely evaluated and treated over telemedicine.

Conflict of interest

The authors have no conflicts of interest to disclose.

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References


Fig. 2. CT chest with IV contrast. Note: The CT chest showed bilateral patchy alveolar opacities with focal alveolar opacity in the right lower lobe medially (black arrow). There was also enlarged subcarinal lymph node (2.3 cm in short axis) (white arrow).


