

Live donor kidney transplantation in a COVID 19 positive patient: case report and literature review

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Keywords: COVID-19; renal transplantation; kidney; real-time Polymerase Chain Reaction (PCR) positive

Abstract

Introduction

Coronavirus disease 2019 [COVID-19] has become a pandemic resulting in a large number of deaths. The complications of COVID-19 are severe in post-transplantation patients on immunosuppression, resulting in more mortality. Therefore renal transplantations [KT] were stopped temporarily in Sri Lanka during the peak of the COVID-19 epidemic. And a few months later when the KT was restarted only patients who were real-time polymerase chain reaction [PCR] test negative was accepted for KT. This case report describes a live donor KT done on a patient who recovered from COVID-19 infection but had persistently positive PCR test.

Case presentation

A 29-year-old male with end-stage renal failure due to chronic kidney disease of unknown aetiology underwent a live donor KT. He had COVID-19 infection more than 4 weeks before the KT and was asymptomatic with normal chest X-ray [CXR] and white cell count [WBC]. But his PCR was positive. The donor was a 41-year-old male. The KT was done on 2nd February 2021. He had no significant postoperative complications.

Discussion and conclusions

The main diagnostic tests for COVID-19 infection are PCR and Rapid antigen tests. PCR detects the viral genomic RNA. It is known that patients who clinically recover from COVID-19 infection continue to excrete RNA particles. These are detected by PCR. Therefore it is suggested that if a patient clinically recovers from COVID-19 and has normal WBC, CXR and 6 weeks after the onset of initial infection can undergo KT safely despite having a positive PCR.

Introduction

The Coronavirus Disease 2019 [COVID-19] is caused by severe acute respiratory syndrome coronavirus 2. It was first detected in Wuhan, China in 2019 and at present, it has become a pandemic [1] [2]. By February 2021, according to the World Health Organization [WHO] data, 223 countries were affected causing 2.5 million deaths out of 114 million confirmed cases [3]. According to the ministry of health of Sri Lanka, at the end of February, Sri Lanka had a total of 93,595 confirmed cases and 586 deaths [4].

Coronavirus is a Ribo Nucleic Acid [RNA] virus. It is transmitted by respiratory droplets and contact with contaminated surfaces [5] [6]. Healthcare workers are at higher risk of getting infected especially under specific circumstances in which procedures producing aerosols are performed; i.e., endotracheal intubation [7]. Few studies have reported the presence of Coronavirus in faeces. But there is no evidence of feco-oral transmission of COVID-19 [8].

The onset of symptoms is from 2 to 14 days from the time of exposure. But the patient can infect others from 3 days before the onset of symptoms to 10 days after the onset of symptoms. But this can vary depending on the viral load [9]. COVID-19 real-time polymerase chain reaction [PCR] and rapid antigen test [RAT] are the commonly used diagnostic tests in Sri Lanka. This is done on a nasopharyngeal swab. These tests detect viral RNA. Therefore following recovery from COVID-19 infection some patients persistently excrete viral RNA and become positive on PCR test. But it is shown that patients who clinically recover and more than four weeks after the onset of infection are not a source of infection despite being PCR positive [10] [11].

Due to immunosuppressive drugs given for patients undergoing kidney transplantation [KT], post-transplantation infections including COVID-19 is associated with higher morbidity and mortality [12] [13]. In addition post, KT patients and patients on haemodialysis are at a higher risk of acquiring COVID-19 due to increased exposure to staff and others in hospitals [14]. This case report describes a live donor KT [LDKT] done on a post COVID-19 infection patient who had persistently positive PCR test and negative RAT.

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Received: 07-09-2021 Accepted: 27-11-2021

DOI: <http://doi.org/10.4038/sljs.v39i3.8862>



Case report

A 29-year-old male with End-Stage Renal Disease [ESRD] on regular Haemodialysis [HD] was planned for an LDKT. He was diagnosed with chronic kidney disease of unknown aetiology 7 years ago. His weight was 60 kg with a BMI of 24kg/ m². His native urine output was 100ml/day. While awaiting LDKT, in December 2020, the patient developed shortness of breath and fever. COVID- 19 PCR was positive. The LDKT was postponed and the patient was transferred to the National Infectious Disease Hospital [IDH] for further care of COVID 19. He recovered and was discharged after a negative PCR test. A further home quarantine was done for 2 more weeks.

He was admitted again for LDKT in January 2021. During this admission, the PCR was weakly positive [CT value more than 30] and COVID- 19 specific antibody level was also positive. The patient was asymptomatic since the time of discharge from the IDH. The patient was referred to the national COVID- 19 Committee for expert opinion. According to the expert committee, since the patient was asymptomatic from the time of discharge from IDH and his antibody levels were positive, the positive PCR was considered due to persistent RNA remnant excretion from the initial infection. Therefore permission was granted for LDKT.

His basic investigation results were; C reactive protein [CRP] -16 mg/l [<6], White cell count [WBC] – 8410/ mm³[7-11], haemoglobin - 8 g/dl [11-16], serum Sodium - 140 mmol/l [136-145], serum Potassium - 4.6mmol/l [3.5-5.1], total serum calcium - 8.7mg/dl [8.6-10.2] and serum Magnesium - 1.7 md/dl [1.6-2.6]. The Chest X Ray [CXR] was normal.

He underwent LDKT after 6 weeks after the initial diagnosis of COVID-19 infection, despite positive COVID-19 PCR. Basiliximab, Methylprednisolone, Mycophenolate mofetil [MMF], Tacrolimus were used as induction agents and Prednisolone, MMF and tacrolimus were used as maintenance agents. A second dose of Basiliximab was given on postoperative day 4.

The donor was a 41 year male with a body mass index [BMI] of 23.7 kg/m². The right kidney was harvested. An end to side anastomosis was done between the renal vessels of the donor kidney and the external iliac vessels of the recipient. The donor ureter was anastomosed to the recipient's bladder [ureteroneocystostomy]. The total ischemic time was 108 minutes.

The patient developed immediate polyuria. His urine output [UOP] in the first 24 hours was 7000ml. UOP on day 2 was 3500ml. Post-op CRP value was 9 mg/l and the serum creatinine was 2.07 mg /dl on day 2 and it was 1.2 mg/dl on

day 3. He had an uneventful postoperative recovery and was discharged from the hospital on post-transplant Day 7.

Discussion

This case report describes the first case of LDKT done in a recent COVID-19 positive patient with persistently positive PCR in Sri Lanka.

The COVID-19 pandemic has resulted in an overall mortality rate of 2.2% in the world and an overall mortality rate of 0.62% in Sri Lanka [4]. Renal Transplantation [KT] is the best long term option for patients with ESRD. During the recent COVID-19 pandemic all KT were temporarily stopped. This is due to the fear of COVID-19 infection-related complications in a transplant recipient receiving immunosuppressive drugs. The available evidence also indicates that the outcome of COVID-19 in transplant recipients is worse compared to the non-immunosuppressed population. For example in a study done in France among post-transplant recipients, the mortality was 1% in non-COVID-19 patients and it was 24% in patients with COVID-19 infection. The other risk factors associated with increased mortality were obesity, diabetes mellitus, asthma and chronic pulmonary diseases. And in another study done in Spain among transplant recipients, the case fatality rate was 27.8%. [12] [13]. This increased mortality is probably due to long-term immunosuppression causing a lack of T cell function [15].

Clinical features of infections are also reduced in intensity in patients on immunosuppressants. Therefore the diagnosis of infection may be delayed. The commonly described clinical features of COVID-19 include fever, cough, shortness of breath, headache, loss of taste and sense of smell sensations, sore throat and diarrhoea. In one study fever, shortness of breath, cough and diarrhoea occurred only in 70.2%, 49.1%, 63.8% and 30.4% of transplant recipients [16].

Common investigations done in patients with suspected COVID 19 include CXR, CRP, WBC and Computerized Tomography of the chest [CT]. One study reported an incidence of abnormalities in CXR and CT as 79.7%. [16]. The other findings are an elevated CRP and leukopenia [WBC less than 4000/ mm³]. In COVID-19 the reported incidence of leukopenia is about 17.8% [16]. And the reported levels of CRP was 41.0 - 68.5 [17] [18]. The pre-transplantation investigation findings in the present case were, normal white cell count i.e. 8410/ mm³ [7000-11000], the CRP was 16 mg/l [<6] and the chest X-ray was normal.

Treatment of COVID-19 in post-transplant recipients is mainly symptomatic and supportive. In post-transplant recipients reducing the doses of immunosuppressants is also tried [19]. At present, the transplantation is done only on

patients who are COVID-19 PCR negative. But studies have reported that about 9% to 14.5% of patients who have recovered and tested negative with PCR became positive on retesting [20]. This is due to the excretion of the viral genome rather than active viral particles. In a study done on 87 patients with re positive PCR, no active virus particles were detected on virus culture [21]. This again confirms the above fact that the PCR positivity is due to the viral genome rather than active virus particles. Also, a systematic review found that there were no active virus particles beyond 9 days of the illness. Another study found that there was no infection to the close contacts of their positive patients [22]. Also, evidence shows that patients who clinically recover from COVID-19 and are more than four weeks after the onset of infection are not a source of infection despite PCR being positive [10] [11]. But it has been shown in patients with chronic kidney disease the duration for viral clearance is prolonged. In one study it was found that the mean duration of viral clearance was 32.4 ± 12.3 days in patients with chronic kidney disease [23]. Therefore we recommend that the kidney transplantation can be done on a post-COVID-19 patient with chronic kidney disease, who is clinically well and after 6 weeks of the onset of infection despite having a positive PCR.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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