



# Small bowel transplantation management during COVID-19 pandemic in a child with microvillus inclusion disease from Turkey

## Türkiye’den mikrovillus inklüzyon hastalığı olan bir çocukta COVID-19 pandemisi sırasında ince bağırsak nakli yönetimi

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### Abstract

Microvillus inclusion disease is a cause of congenital intestinal intractable diarrhea. Total parenteral nutrition is required throughout life and the patients need intestinal transplantation for survival. The new Coronavirus Disease 2019 (COVID-19) caused a worldwide pandemic in January 2020. Emergency surgical interventions are suggested to carrying out by taking appropriate measures during the pandemic period. In this case report, we aimed to discuss the small bowel transplantation management during the COVID-19 pandemic by presenting a child with microvillus inclusion disease who was underwent emergency small bowel transplantation due to the appropriate cadaveric organ donation.

Key words: The new Coronavirus Disease 2019, small bowel transplantation, microvillus inclusion disease, child

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### Öz

Mikrovillus inklüzyon hastalığı, konjenital intestinal inatçı diyare nedenidir. Yaşam boyunca total parenteral beslenme gerekir ve hastaların sağkalmı için bağırsak nakline ihtiyacı vardır. Yeni Coronavirus Hastalığı 2019 (COVID-19), Ocak 2020’de dünya çapında bir pandemiye neden oldu. Acil cerrahi müdahalelerin pandemi döneminde uygun önlemler alınarak yapılması önerilmektedir. Bu olgu sunumunda, uygun kadavra organ bağıışı nedeniyle acil ince bağırsak nakli yapılan mikrovillus inklüzyon hastalığı olan bir çocuğu sunarak COVID-19 salgını sırasında ince bağırsak nakli yönetimini tartışmayı amaçladık.

Anahtar kelimeler: Yeni Koronavirüs Hastalığı 2019, ince bağırsak nakli, mikrovillus inklüzyon hastalığı, çocuk

## Introduction

Microvillus inclusion disease (MID) is a known congenital cause of intractable diarrhea resulting intestinal failure that need intestinal transplantation for survival. Novel Coronavirus Disease 2019 (COVID-19), which was first identified in Wuhan city of China in December 2019, and is the cause of pandemic worldwide in January 2020. SARS-CoV-2 (COVID-19 virus) was identified as the responsible agent. The first cases were identified in Turkey in March 2020 [1]. During the pandemic period, only emergency surgical interventions were carrying out by taking appropriate measures. To the best of our knowledge, mostly liver, kidney, lung and heart transplantation have been reported from solid organ transplantations during the COVID-19 pandemic period, there is no small bowel transplantation (SBTx) notification [2]. We present a case with MID who underwent SBTx during the COVID-19 pandemic due to the appropriate cadaveric organ donation that he had been waiting for one year.

## Case report

An 18-month-old boy who had intractable diarrhea since the neonatal period, and was diagnosed MID, was being followed up in our center for SBTx for one year. He was receiving total parenteral nutrition (TPN) support, and he had enteral feeding intolerance. In genetic analysis, c.4399C> T homozygous was detected in the MYO5B gene. SBTx was planned, but he waited eight months in cadaveric transplantation list for appropriate donor. With the onset of the COVID-19 pandemic period, the patient was started to follow in the organ transplant service with being pay attention to all isolation and protective measures. While the first month of COVID-19 pandemic in our country, organ donation was performed compatible for the patient's age-weight and tissue-type. The SARS CoV-2 polymerase chain reaction (PCR) analysis was negative, the patient had no fever and lung findings. He had no signs of infection and transplant preparations were initiated. The entire transplant team worked in accordance with the mask and hygiene rules pre-operation and during the operation process. Before the operation, SARS CoV-2 PCR was applied to the donor and it was found to be negative. Donor was a 2 years old girl deceased due to trauma. Before the operation, the family was informed about the risks of surgical intervention during the COVID-19 period, and a detailed consent form was obtained. Isolated small bowel segment was transplanted to our case. Anti-thymocyte globulin (ATG) and high dose steroid regimen were used in induction period. No additional treatment regimen was applied for COVID-19. During this period, low dose ganciclovir treatment and was broad-spectrum antibiotherapy was used according to our transplantation protocol. Post-transplant follow-up of the patient was performed in our pediatric intensive care clinic, where there was no patient with COVID-19. In this isolated area, healthcare staff wasn't following the case with COVID-19 disease. In the postoperative follow-up, all healthcare personnel paid attention to the contact and isolation measures of the patient who was under immunosuppression. After twelve days, the patient was taken to the organ transplant service and the caregiver was evaluated with SARS CoV-2 PCR. After the test was found to be negative, the caregiver was allowed to take care of the patient. The patient was taken to intensive care unit due to septic shock after four days, and his SARS CoV-2 PCR negative. Ostomia output was increased, and fecal rotavirus test was positive. Oral immunoglobulin regimen was used. Donor specific anticor test was detected negative. Graft was found to be

minimally edematous in endoscopy that was performed according to COVID-19 measures. Acute severe rejection was developed at the 20th day after transplantation. Rituximabe was started following ATG and pulse steroid regimen for rejection, after SARS CoV-2 PCR was detected negative. But there was no response to rejection treatment. The graft had to be removed due to severe rejection one month after SBTx.

Written informed consent was obtained from parent for publication.

## Discussion

In our patient who underwent SBTx during the COVID-19 pandemic, sepsis and rejection were seen. Sepsis and rejection are the most common complications after SBTx. It is seen that COVID-19 has no effect on morbidity in this case. After this operation, which requires immunosuppressive treatment, the patient was protected by paying attention to all COVID-19 precautions during pre-operation, intra-operation and post-operation term.

Unfortunately, organ donation in childhood is not sufficient in our country. Therefore, patients who are candidate for SBTx, can wait for a very long time in cadaver waiting list [3]. Therefore, emergency transplantation conditions are provided when a suitable donor is detected. Nevertheless, the effects of perioperative physiological stress on predisposition to or recovery from COVID-19 are not known but it is assumed that relative immunocompromise after major surgical intervention worsens the prognosis of those who either contract COVID-19 perioperatively or have been asymptomatic carriers prior to intervention. Infection with this virus can complicate the perioperative course and prove a significant diagnostic challenge with an unacceptably high fatality rate [4]. Patient-to-patient, and patient-to-healthcare worker infection was described and human-to-human transmission has been confirmed. As such, strict infection prevention practices are essential [5].

According to the guideline of the Ministry of Health in our country, it is recommended to carry out all kinds of medical care and interventions that are indicated by taking necessary and appropriate measures during the COVID-19 pandemic period. It is recommended to apply the use of personal protective equipment (PPE) for all patients during the operation. Necessary PPEs in the operating room: N95 / FFP2 mask, sterile surgical gown, disposable sterile gloves, goggles / face protector, disposable shoe cover, disposable foot protector / shoe covers, alcohol-based hand antiseptic are recommended. It is recommended to perform normal surgical procedures in patients who have not COVID-19 infection. If the patient has a diagnosis or suspicion of COVID-19, non-emergency surgeries should canceled or postponed. Anesthesia and surgical intervention may adversely affect the course of COVID-19. It is recommended that the patient and her family be informed about the increased risk of COVID-19 related surgery in emergency surgeries and that they give approval with a detailed consent form [6]. During the operation, we performed the transplantation by paying attention to all these PPEs and obtaining a consent form from the family.

According to the recommendations of The Transplantation Society; persons who have been exposed to a patient with confirmed or suspected COVID-19 within 14 days should not be accepted as a donor. Likewise donors with unexplained respiratory failure leading to death should be excluded. Donors with positive PCR testing for COVID-19 should not be utilized [7]. Some national guidelines recommend routine testing of donors for SARS-CoV-2. Combining epidemiological data and PCR testing is one approach that has been used. Additionally, in a country with widespread community transmission, temporary suspension of the deceased

donor program should be considered, especially when resources at the transplant center may be constrained [8]. If a transplant candidate is sick and found to be infected with COVID-19, transplant should be deferred until clinically improved with no detectable virus. Prolonged viral shedding has been described. Documentation of negative PCR testing at least 24 hours apart is recommended before a candidate should be cleared for transplant unless the need for transplant is urgent. Ideally, patients should be tested 10-14 days after symptom onset and only once symptoms have resolved. Patients should have 2 negative PCR tests done at least 24 hours apart [9].

In a study evaluating liver transplants in pandemic period in Italy, it is reported that donors and recipients were screened for SARS-CoV-2. In the postoperative period, two of the 17 LT patients had positive SARS CoV-2 PCR test and one patient died due to Covid-19. They suggested that only patients with true end-stage liver disease and extremely poor prognosis should undergo LT [10]. Changes in immunosuppression treatment are also not well studied in the transplant populations. Calibration of dose reduction has to balance consequences of rejection. We did not reduce the immunosuppression treatment post-transplant period in our patient, too.

Consequently, emergency solid organ transplants can be carried out during COVID-19 period. The important thing is to take protective measures that can ensure the safety of the recipient and the healthcare staff. It is important for the recipient to be maintained protective measures under immunosuppressive treatment before and after transplantation in order to increase survival. We used this option in the patient who had no chance of survival other than SBTx. However, the rejection was developed independent of the COVID-19 pandemic. For this reason, if the conditions of the transplant clinic are appropriate during the pandemic period, we believe that the SBTx program is sustainable for emergent and selected cases after all measures are taken.

## References

1. T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, COVID-19, SARS-Cov-2 Enfeksiyonu, Genel Bilgiler, Epidemiyoloji ve Tanı, Bilimsel Danışma Kurulu Çalışması, 1 Haziran 2020, Ankara.
2. Kumar D, Manuel O, Natori Y, Egawa H, Grossi P, Han SH, et al. COVID-19: A global transplant perspective on successfully navigating a pandemic. *Am J Transplant* 2020 Mar 23. doi:10.1111/ajt.15876.
3. Tugmen C, Baran M, Sert I, Anil AB, Kebapçı E, Dogan SM, et al. Pediatric small bowel transplantation: A single-center experience from Turkey *Turk J Gastroenterol.* 2016;27: 428-32.
4. Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. *Br J Surg.* 2020;107:785-87.
5. Del Rio C, Malani PN. 2019 Novel Coronavirus-Important Information for Clinicians. *JAMA* 2020 Feb 5. doi:10.1001/jama.2020.1490.
6. T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, COVID-19, COVID-19 Pandemi Döneminde Ameliyathanelerde Alınacak Enfeksiyon Kontrol Önlemleri, 27 Nisan 2020, Ankara.
7. The Transplantation Society. Guidance on Coronavirus Disease 2019 (COVID-19) for Transplant Clinicians. Updated 8 June 2020.
8. Chung SJ, Tan EK, Kee T, Krishnamoorthy TL, Phua GC, Sewa DW, et al. Practical Considerations for Solid Organ Transplantation During the COVID-19 Global Outbreak: The Experience from Singapore. *Transplant International* 2020; 6:e554.
9. Sun J, Xiao J, Sun R, Tang X, Liang C, Lin H, et al. Prolonged Persistence of SARS-CoV-2 RNA in Body Fluids. *Emerg Infect Dis* 2020 May 8. 2020; 26. doi:10.3201/eid2608.201097.
10. Umberto M, Luciano C, Daniel Y, Michele C, Enrico R, Giorgio R, et al. The impact of the COVID-19 outbreak on liver transplantation programs in Northern Italy. *Am J Transplant* 2020 Apr 24. doi: 10.1111/ajt.15948.