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Case Report

Fatal Scedosporiosis in Multiple Solid Organ Allografts Transmitted From a Nearly-Drowned Donor

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***Scedosporium* spp. is the most common mold infection in pneumonia resulting from near-drowning. Three fatal scedosporiosis cases developed after solid organ transplantation, probably transmitted from the nearly-drowned donor. One heart transplant recipient and two kidney transplant recipients developed fatal scedosporiosis following deceased donor transplantation from the same donor, a nearly-drowned victim of a suicide attempt. Genotypically, indistinguishable strains of *Scedosporium auratiacum* were recovered from the three recipients. Two liver transplant recipients from the same donor received prophylactic voriconazole without any subsequent signs of infection. To determine the safety of donation from nearly-drowned donors, a national traceback investigation was also performed of the causes of deaths in all transplant recipients who received organs from drowned donors between 2001 and 2013. Over 13 years, 2600 deceased donor transplants were performed in Korea. Among these 2600 deceased donor transplants, 27 (1%) victims of drowning donated their organs. From these 27 donors, 84 patients received organ transplants and 18 died, including the above three. We found no microbiologic evidence of invasive mold transmission from the nearly-drowned donors to the other 15 recipients. Although disseminated infection in the donor could not be demonstrated by culture, undiagnosed disseminated donor infection and transmission of *Scedosporium* spp. should be considered in near-drowning events.**

Abbreviations: CLSI, Clinical and Laboratory Standards Institute; CMV, cytomegalovirus; CNS, central nervous system; ECMO, extracorporeal membrane oxygenation; HD, hospital day; ITS, internal transcribed spacer; KODA, Korea Organ Donation Agency; KONOS, Korean Network for Organ Sharing; MELD, model for endstage liver disease; MIC, minimum inhibitory concentration; PCR, polymerase chain reaction; PELD, pediatric for end-stage liver disease; PT, posttransplant day; RAPD, random amplified polymorphic DNA; TMP-SMX, trimethoprim-sulfamethoxazole; WBC, white blood cell

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Introduction

Drowning is the third most common cause of accidental deaths among young and otherwise healthy individuals (1). Because of the problem of donor shortage, this makes these individuals ideal donors (2,3). Although organ donation from drowned victims is considered a risk factor for transmission of filamentous fungal infections, there are only two reported events of possible donor-derived transmission of mold infections involving scedosporiosis (4)

and mucormycosis (5) respectively, from drowned victims. Here, we describe a case involving three organ recipients who developed fatal scedosporiosis following deceased donor transplantation from the same nearly-drowned donor, together with the survival of two other recipients who received prophylactic antifungal therapy.

Methods

Epidemiologic review

To assess the safety of donation from drowned donors, the causes of death among all transplant recipients who received organs from drowned donors between 2001 and 2013 were reviewed. We searched the national databases of the Korea Organ Donation Agency (KODA) and Korean Network for Organ Sharing (KONOS) to identify organ transplant recipients from nearly-drowned donors. We investigated the causes of deaths and the presence of unusual opportunistic infections of all such recipients using a standardized questionnaire.

Culture and susceptibility testing

The ATB Fungus 3 panel (bioMérieux, Lyon, France) was used for susceptibility testing according to the Clinical and Laboratory Standards Institute (CLSI) broth microdilution M38-A2 protocol. The test was performed following the manufacturer's instructions modified to suit each mold. Briefly, 20 μL of a 1.5 McFarland standard mold suspension was added to the specific growth medium (ATB Fungus 3 medium).

Random amplified polymorphic DNA (RAPD)

Three RAPD primers—GC70 (5′-CGG CCA CTG T-3′), UBC-701 (5′-CCC AAC AAC CC-3′), and UBC-703 (5′-CCA ACC ACC C-3′)—previously selected for their efficiency in discriminating among strains of the *Scedosporium apiospermum* complex (6), were used to amplify total DNA samples. Amplifications were carried out in a GeneAmp® PCR System 9700 thermocycler programmed for 40 cycles consisting of denaturation (1 min at 94°C), annealing (1 min at 36°C), and elongation (2 min at 72°C). Amplicons were separated by electrophoresis on 1% agarose gels in Tris (40 mM)-acetate (10 mM)-EDTA(0.5 mM) buffer (pH 8.0) and visualized by UV transillumination after ethidium bromide staining.

Broad-range polymerase chain reaction (PCR) amplification

Broad-range PCR amplifications of the internal transcribed spacer (ITS) regions and ~600 nucleotide D1/D2 region of the 28S subunit were performed using the following primers: ITS forward (ITS-1) 5′-TCC GTA GGT GAA CCT GCG G-3′, ITS reverse (ITS-4) 5′-TCC TCC GCT TAT TGA TAT GC-3′; D1/D2 forward (NL-1) GCA TAT CAA TAA GCG GAG GAA AAG-3′, D1/D2 reverse (NL-4) 5′-GGT CCG TGT TTC AAG ACG G-3′ (7,8). Amplicons were purified using a Power Gel Extraction kit (TaKaRa Bio Inc., Shiga, Japan) and directly sequenced on an ABI Prism 3130*xl* genetic analyzer (Applied Biosystems, Foster City, CA, USA) using a BigDye Terminator v 3.1 cycle sequencing kit (Applied Biosystems). The quality of the generated sequence was assessed according to guideline MM18-A of the CLSI: Interpretive criteria for identification of bacteria and fungi by DNA target sequencing; approved guideline. CLSI document MM18-A (ISBN 1-56238-664-6). Wayne, PA: (CLSI 2008).

Results

After two recipients from the same donor died of scedosporiosis, donor-derived transmission was suspected and this information was transmitted to other hospitals involved in organ transplantations from this donor. One of the kidney recipients had already developed septic shock due to scedosporiosis but two liver recipients did not develop clinical symptom and signs of infection caused by *Scedosporium*. All three fungal isolates from the three recipients who died were collected for further microbiologic and molecular examination. In addition, tissue from the donor intended for tissue donation and random liver biopsy tissue were examined. Clinical courses of the transplant recipients who received solid organs from the nearly-drowned donor are summarized in Figure 1.

Donor

This 24-year-old male threw himself into the Han River, the largest river in South Korea, in an attempted suicide and was nearly drowned. He aspirated water and his mouth was stained with mud. He was admitted to hospital A in cardiac and respiratory arrest. He had previously been healthy except for a gastric ulcer 1 year before. His initial chest X-ray showed bilateral infiltration in both lungs (Supplemental Fig. S1A), and he was given prophylactic antibiotics, ceftizoxime and clindamycin. On hospital day (HD) 3, he developed a fever of 38.8°C with a white blood cell (WBC) count of 9,830/mm^3; thereafter his temperature returned to normal. He received continuous renal replacement therapy to control pulmonary edema, and on HD 5 a chest X-ray showed improvement of the bilateral infiltration (Supplemental Fig. S1B). The inotropics including dopamine and norepinephrine were needed to maintain his blood pressure during the 5 days. A diagnosis of brain death was established on HD 5, and organ transplantation donorship was considered. Sputum culture on HD 1 revealed no growth as did blood culture, urine culture, and sputum culture on HD 5.

Heart recipient

A 19-year-old male suffering from heart failure had been admitted to hospital B. On HD 40 (post-transplant, PT 0), he underwent heart transplantation. Induction basiliximab was administered. On posttransplant day (PT) 1, tacrolimus, mycophenolate and methyprednisolone were started. He received empirical antibiotics including teicoplanin, cefepime, trimethoprim-sulfamethoxazole (TMP-SMX) and acyclovir prophylaxis. On PT 7, seizure occurred with WBC count of 40,380/mm^3 and brain CT revealed acute intracerebral hemorrhage in the right frontal lobe extending to the ventricles with mild midline shifting (Fig. 2A). The patient underwent right frontal craniotomy and removal of the hematoma on the same day. On PT 11, he developed fever to 38.1°C with WBC count of 24,960/mm^3, and from PT 12 he received empirical antibiotics including amphotericin-B, vancomycin, meropenem, ampicillin-sulbactam and ganciclovir. From On PT 13, right side weakness and mutism with mental status changes occurred, and brain MRI revealed multifocal acute infarction in both cerebral hemispheres, suggestive of embolic infarcts (Fig. 2B).

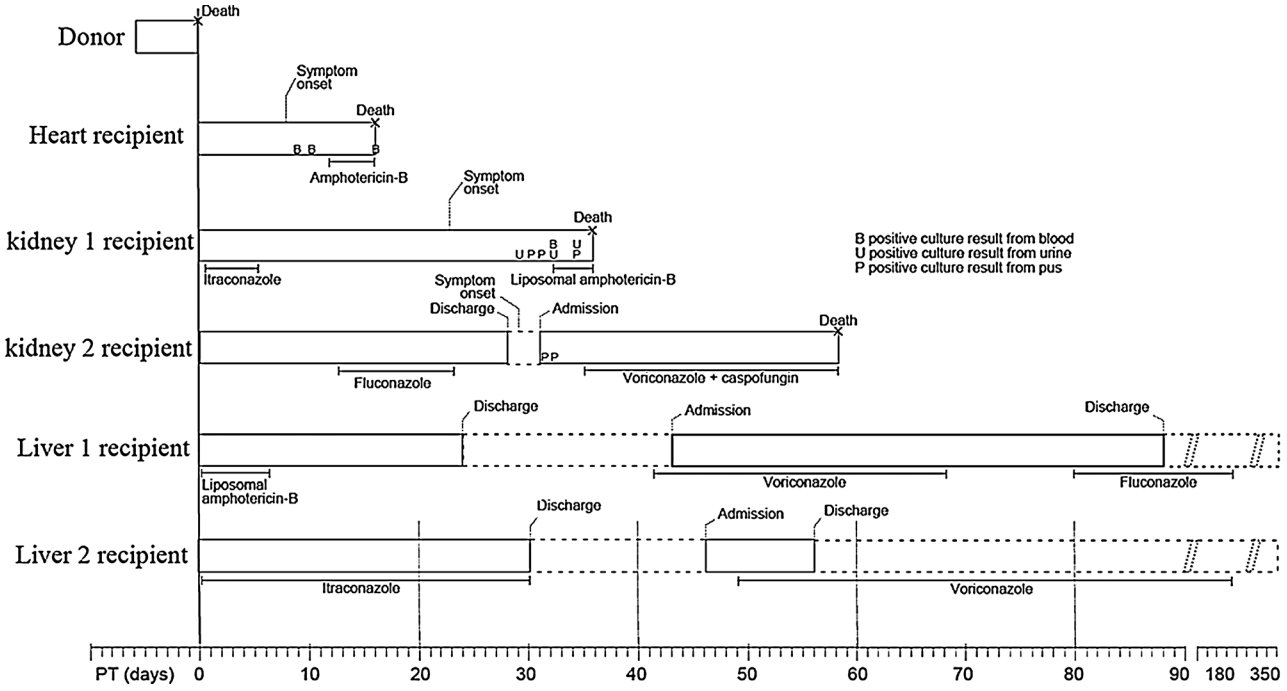

Figure 1: Clinical course of the transplant recipients who received solid organs from the nearly-drowned donor.

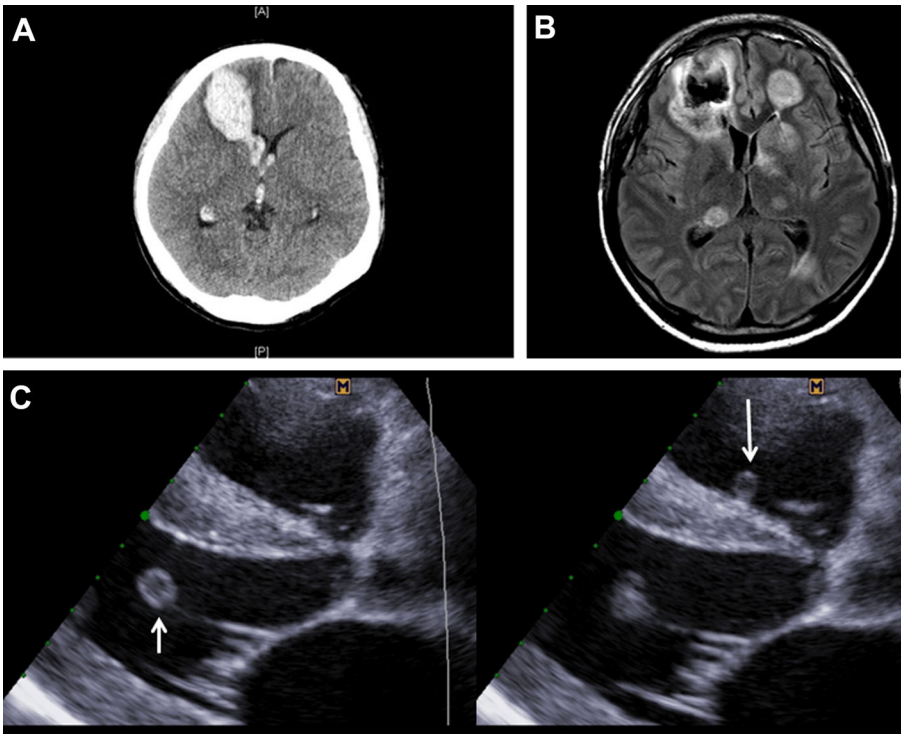

Figure 2: (A) Brain computed tomography of the heart transplant recipient on posttransplant day 7 showing acute intracerebral hemorrhage in the right frontal lobe. (B) Brain magnetic resonance image on posttransplant day 13 revealing multifocal embolic infarctions. (C) Echocardigraphy on posttransplant day 16 exhibiting 1 cm vegetation of the left ventricle (short arrow) and 0.5 cm vegetation of the right ventricle (long arrow).

Echocardiography revealed a 0.7 cm vegetation at the papillary muscle with ejection fraction 59%. On PT 16, follow-up echocardiography showed increased size of the vegetation (1 cm) in the left ventricle and a newly developed 0.5 cm vegetation in the right ventricle with reduced ejection fraction (39%) (Fig. 2C). His clinical condition deteriorated and he died on PT 17. Blood cultures on PT 11, PT 12 and PT 17 revealed *Scedosporium* spp. (Fig. 3) 7 days, 6 days and 5 days after the blood cultures drawn.

Kidney recipient 1

A 56-year-old male suffering from chronic renal failure underwent kidney transplantation at hospital C. Induction anti-thymocyte rabbit immunoglobulin and methylpreodnisolone were administered. On PT 3, tacrolimus and mycophenolic acid were started. Initial creatinine level was 11.09 mg/dL on PT 1 which did not decrease to normal, and oliguria persisted after transplantation; therefore intermittent hemodialysis was continued throughout the hospital course. The patient received intravenous ganciclovir for cytomegalovirus (CMV) prophylaxis from PT 1 which was switched to valaciclovir from PT 5, plus oral itraconazole prophylaxis (400 mg/d), intravenous cefotaxime with ampicillin-sulbactam for bacterial prophylaxis and oral TMP-SMX from PT 1. Oral itraconazole was discontinued on PT 5 due to an adverse reaction related to drug interaction. On PT 23, he developed mental status changes, and on PT 24 developed fever to 37.8°C. At this time, brain MRI showed nonspecific ischemic changes in periventricular white matter without definite evidences of central nervous system (CNS) infection. On PT 27, wound dehiscence was noticed (Supplemental Fig. S2A). On PT 32, his condition rapidly declined with a need for mechanical ventilation and extracorporeal membrane oxygenation (ECMO), and chest CT revealed multiple nodules and consolidations with pleural effusion (Fig. 2B). His cardiac ejection faction was markedly reduced on PT 32. He received liposomal amphotericin B, meropenem and vancomycin from PT 32. His clinical condition deteriorated and he died on PT 36. Urine culture on PT 29, wound culture on PT 30, and blood cultures on PT 32 revealed *Scedosporium* spp (Fig. 3) 2 days after the blood cultures drawn.

Kidney recipient 2

A 57-year-old female suffering from chronic renal failure underwent kidney transplantation at hospital D. Induction basiliximab and methylprednisolone were administered. On PT 1, cyclosporine, mycophenolate and prednisolone were started. Initial creatinine was 4.60 mg/dL on PT 1, but her creatinine slowly decreased to 2.61 mg/dL on PT 7 and 1.75 mg/dL on PT 28. She received fluconazole (400 mg/day) for oral candidiasis between PT 13 and PT 23, and TMP-SMX prophylaxis from PT 3. She was discharged on PT 28. She was admitted to the emergency room on PT 31 for general weakness. Urinalysis showed pyuria and occult hematuria. On PT 32, mental status changes occurred and physicians noted a yellowish discharge from the skin overlying the transplanted kidney. Abdominal CT revealed swelling of the transplanted kidney and of the overlying skin (Supplemental Fig. S3A. abdominal CT). Incision and drainage were performed on PT 32. On PT 34, *Scedosporium* spp. was identified in the wound swab culture. Voriconazole (8 mg/kg/day) and caspofungin were immediately started, but her condition rapidly declined until she needed mechanical ventilation and ECMO support. Brain CT or MRI was not performed. Fundoscopy on PT 35 suggested fungal endophthalmitis with vitreous opacity, retinal haziness and yellowish retinal infiltration (Supplemental Fig. S3B). We diagnosed disseminated scedosporiosis including central nervous system involvement and continued medical treatment with voriconazole and caspofungin. Her clinical condition deteriorated and she died on PT 58.

Liver recipient 1

A 35-year-old male suffering from liver cirrhosis caused by hepatitis B virus was admitted to hospital D. He was in a

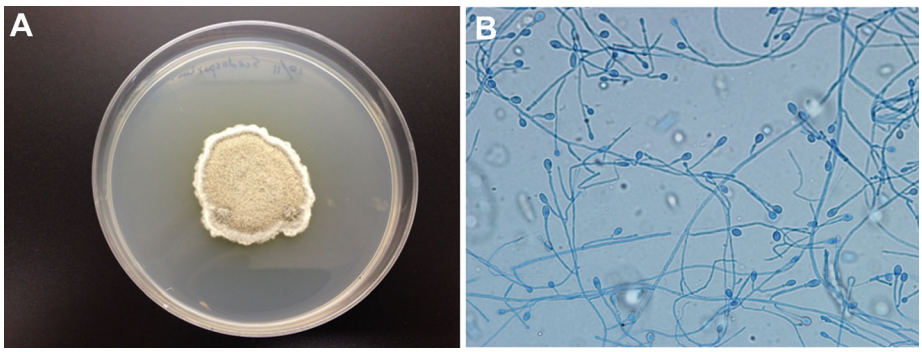

Figure 3: (A) White-to-gray-colored cottony colonies growing on Sabouraud's dextrose agar after incubation for 7 days at 25°C. (B) Micrograph of a culture of *S. aurantiacum* showing single conidia at the tip of single conidiophores from the lateral side of the mycelium. Lactophenol cotton blue stain, ×400.

state of acute-on-chronic liver failure with model for end-stage liver disease (MELD) score of 35. On HD 23, he underwent split liver transplantation using an extended right lobe of the donor. The immunosuppressive regimen included induction therapy with basiliximab and maintenance therapy with tacrolimus, mycophenolate and methyprednisolone. As routine protocol-based antifungal prophylaxis, he received low dose liposomal amphotericin B 1 mg/kg/day between PT 1 and PT 8. He was discharged on PT 25. Based on data accumulating from the care of three recipients, prophylactic oral voriconazole 8 mg/kg/day were administrated from PT 42. However, he was admitted for dizziness on PT 44. His headache, dizziness and visual disturbance gradually worsened, and he showed behavioral changes and psychotic features on PT 66. Fundoscopy and brain MRI revealed no abnormal lesions. After voriconazole was discontinued on PT 68, his symptoms became normalized. Based on *in vitro* susceptibility data showing a relatively low minimum inhibitory concentration (MIC) for fluconazole and the late onset of scedosporiosis in kidney recipient 2 who received fluconazole treatment, fluconazole 400 mg po qd was administered from PT 80 to PT 220. He was followed until PT 340 without any signs of infection.

Liver recipient 2

A 28-month-old girl with liver cirrhosis due to congenital biliary atresia status, post Kasai operation, received split liver transplantation using a left lateral section graft at hospital C. Her pediatric for end-stage liver disease (PELD) score was 2. The induction regimen was methylprednisolone, and tacrolimus was given as maintenance immunosuppression. Her immediate post-transplant course was uneventful except for mild fever twice, on PT 1 and 9, respectively, which was controlled with empiric antibiotics. She was discharged on PT 24. Of note, the patient received itraconazole prophylaxis according to the pediatric liver transplant protocol of hospital C from PT 1 to PT 30.

At home, she developed cough and rhinorrhea on PT 37 and mild chest retraction was also observed on PT 42. The data accumulating from the care of the three recipients prompted the transplant team to investigate evidence of infection in this pediatric recipient. She was admitted on PT 46 and her laboratory results were unremarkable. However, her chest CT showed uneven aeration in both lung fields and abdominal CT showed increased turbid ascites compared to images on PT 14. Diagnostic BAL and aspiration of ascites were performed on PT 48. The patient was placed on voriconazole (5 mg/kg/day) on PT 49 while waiting for the test results. Respiratory virus PCR detected rhinovirus. Culture did not grow any organisms. 16S ribosomal DNA sequencing for bacterial identification and ITS ribosomal DNA sequencing for fungal identification did not yield any positive results. She received voriconazole with drug level monitoring above 1 μg/mL. Follow-up chest CT and abdominal CT on PT 101 showed disappearance of uneven aeration in the lung fields and decreased ascites in the abdomen. Voriconazole was maintained until PT 188 and she was followed to PT 350, without any sign of infection.

Mycologic results

We were able to grow the fungi recovered from the three recipients (blood in the heart recipient, blood in kidney recipient 1 and wound pus in kidney recipient 2). Multiple white cottony colonies were observed after 3 days' incubation at 30°C and they turned into grayish colonies with black undersides as they matured. Based on phenotypic characteristics (Fig. 3A and B), they were identified as *Scedoporium apiospermum* complex. Direct PCR sequencing of the ITS regions from the three isolates showed that they had 100% sequence identity in the ITS regions and were 100% (591/591) homologous to the published sequence of *Scedosporium aurantiacum* isolate IHEM 23068 and 94.3% (558/592) homologous to that of *Pseudallescheria minutispora* isolate IHEM. In addition, the D1/D2 sequences of the three fungi were identical to each other and to the corresponding sequences of *S. aurantiacum* ATCC 28206. Phylogenetic analysis of the ITS and D1/D2 regions confirmed the identity of these three isolates as *S. aurantiacum* (Fig. 4A). Near-identical patterns were observed for three isolates of *S. aurantiacum*, and RAPD allowed discrimination of all the other clinical isolates of *S. apiospermum* complex (Fig. 4B).

In all three strains from the three dead recipients, the MICs of amphotericin B, fluconazole, itraconazole, and voriconazole were >16, $16, >4$ and $0.5\,\mu g/mL$, respectively. According to the CLSI M51-S1, these strains appeared susceptible to only voriconazole.

Random liver biopsy tissue for liver donation and skin tissue for tissue donation were obtained. Fungal culture from the skin tissue revealed no growth. Broad-range PCR amplification of the ITS regions and D1/D2 region of these tissues all gave negative results.

Epidemiologic analysis of organ transplantation from drowned donors in Korea

Between 2001 and 2013, 2600 deceased donor transplants were performed in Korea. Among these 2600 deceased donors, 27 (1%) were victims of drowning. From these donors, 84 patients were given the following organs: 49 kidneys, 25 livers and 11 hearts (one simultaneous liver and kidney transplantation). We investigated the outcomes of these recipients. Of the 84 patients, 18 died including the three involved in the event presently under discussion. Of the remaining 15 dead patients (8 liver, 4 kidney and 3 heart), 12 patients (6 liver, 3 kidney and 3 heart) died of non-infectious complications and 3 (2 liver and 1 kidney) died of infectious complications. One liver transplant recipient died of an intra-abdominal infection with *Acinetobacter*

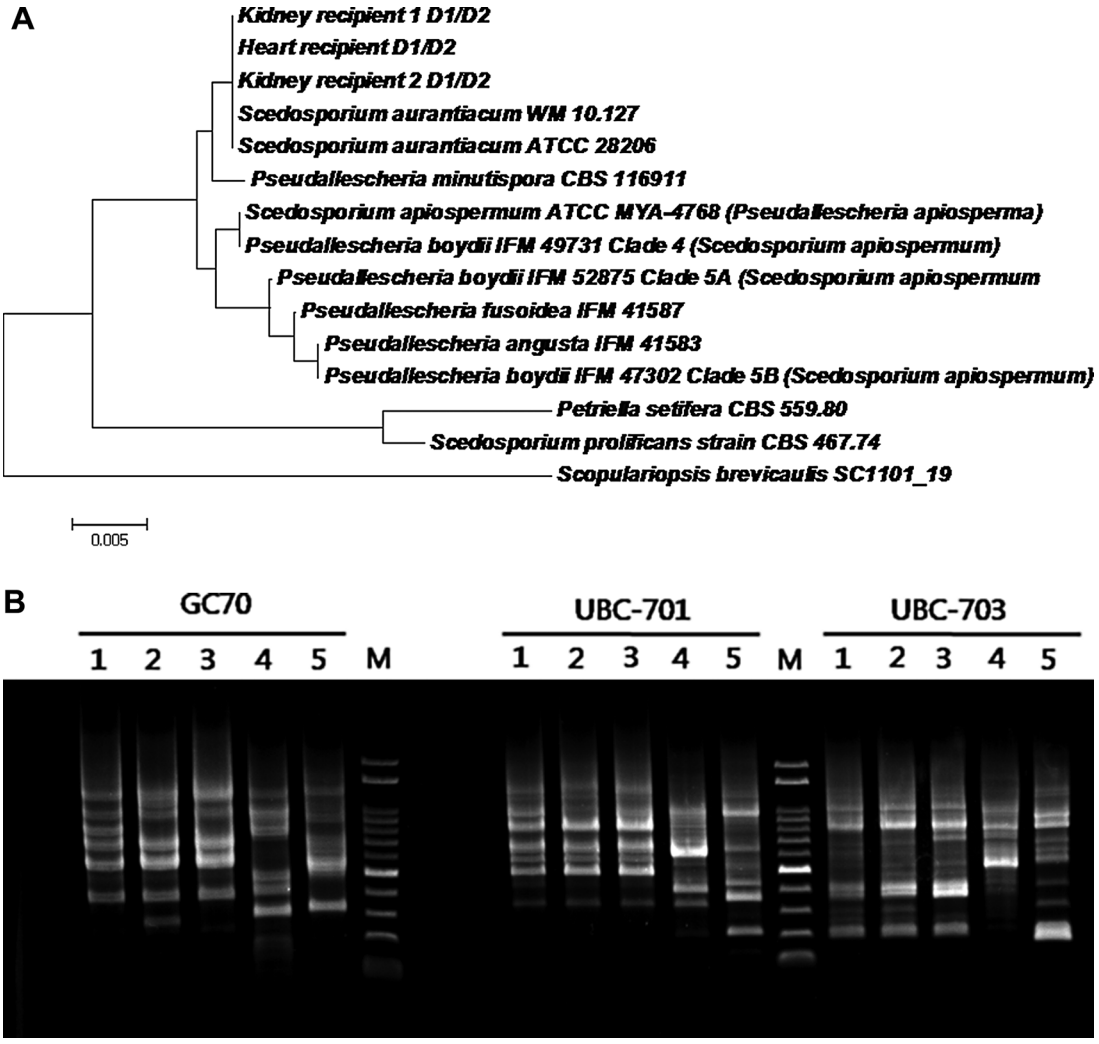

Figure 4: Phylogenetic analysis of the D1/D2 region of three isolates (A). The evolutionary history was inferred using the Neighbor–Joining method. The optimal tree with a sum of branch length of 0.09818013 is shown. The tree is drawn to scale, with branch lengths in the same units as those of the evolutionary distances used to infer the phylogenetic tree. The latter were computed by the Maximum Composite Likelihood method and are in units of the number of base substitutions per site. The analysis involved 15 nucleotide sequences. Codon positions included were 1st + 2nd + 3rd + noncoding. All positions containing gaps and missing data were eliminated. There were a total of 575 positions in the final dataset. Evolutionary analyses were conducted in MEGA5. RAPD analysis of three isolates (B). RAPD patterns exhibited by five individuals of the *Scedosporium apiospermum* complex (lanes 1, Hospital B strain; lane 2, Hospital C strain; lane 3, Hospital D strain; lane 4, stored strain; 5, ATCC 24132), using primers GC70, UBC-701 and UBC-703. M = molecular weight marker (ladder 100 bp).

baumannii bacteremia with no evidence of fungal infection 1 year after transplantation, and the other liver transplant recipient died of pneumonia and intra-abdominal infection with *Burkholderia cepacia and Stenotrophomonas maltophilia* bacteremia 6 weeks after transplantation. The kidney transplant recipient underwent graftectomy due to anatomosis site bleeding 10 days after transplantation, and culture taken from the graft revealed *Candida trophicalis*, with histologic findings suggesting candida infection. The patient eventually died of uncontrolled sepsis 1 month after transplantation.

Discussion

Scedosporium spp. are uncommon in immunocompromised patients, but scedosporiosis is the most common mold infection in nearly-drowned pneumonia in non-immunocompromised hosts (9,10). It is worthy of comment that the demonstration of *Scedosporium* spp. in nearly-drowned patients is difficult. One study showed that *Scedosporium* spp. was cultured from respiratory secretions in only 6 of 23 patients with scedosporiosis after near-drowning (11). Hence we strongly suspect that our donor

had disseminated scedosporiosis, even if disseminated infection could not be demonstrated by culture. Actually, these cases were classified as probable donor-derived scedosporiosis transmission according to the uniform definitions proposed by the recent paper (12).

Sequence analysis and RAPD of three isolates of *S. aurantiacum* from the recipients in this study indicated the clonality of all the isolates. Therefore all patients must have acquired *S. aurantiacum* from the same source, probably through donor-derived transmission. To the best of our knowledge, this is the first report of the transmission of *S. aurantiacum* to three transplant recipients from a drowned donor. The *S. apiospermum* complex is further divided into *S. apiospermum* and *S. aurantiacum*, based on molecular techniques (13). A recent study showed that 37% of *S. apiospermum* complexes were later classified as *S. aurantiacum* (13). Until now, only two examples of possible donor-derived transmission from victims of drowning have been published. The first is a possible case of donor-derived scedosporiosis published in 1980 (4), in which the drowned victim aspirated water and mud and his kidneys were donated to two recipients. The first recipient died despite of graftectomy, which revealed the growth of *Scedosporium apiospermum*, and the second recipient survived with the removal of the graft. The culture from the donor and the second recipient yielded a fungal growth, but further species identification and molecular analysis was not performed. The second case was possible donor-derived mucormycosis (5). The drowned person fell into a retention ditch and her kidneys were donated to two recipients. The first recipient died despite of graftectomy, which revealed the growth of *Apophysomyces elegans*. An exploration was performed on the second recipient on PT 10 and her graft was removed. Therefore, our event is the second known donor-derived transmission of scedosporiosis from a victim of drowning. Although three recipients died, two others were protected from fatal scedosporiosis by voriconazole prophylaxis. Thus, we learned from these cases the lesson that prompt removal of the graft and/or voriconazole prophylaxis can prevent the transmission of fatal scedosporiosis.

Our traceback investigation revealed that 27 drowned victims have been used as organ transplant donors in South Korea, and 84 patients received solid organ transplants from these donors. While the infrequent use of drowned donors makes it difficult to determine the safety of organ transplantation from drowning donor, we found no microbiologic evidence of mold transmission from drowned donors in the 18 dead recipients other than the 3 involved in the present events. However, this traceback investigation did not look for transmission that would not result in death. Although nearly-drowned donors are considered a risk factor for the transmission of filamentous fungal infection (14), there are no standardized protocols for organ use in potential nearly-drowned donors. As shown in our case and reviewed in the 23 cases with scedosporiosis after near-drowning reported in the literature (11), routine culture may not detect disseminated scedosporiosis in such patients. So, additional aggressive work-up including microbiologic and pathologic examination of random lung or central nervous system biopsies might be considered in nearly-drowned victims, and prophylactic antifungal agents such as voriconazole might be used in transplant recipients from nearly-drowned donors with suspected scedosporiosis. Further studies are needed in this area. However, the most important thing is early recognition and data sharing in these unusual occurrences. After the unusual event of *Scedosporium* spp. transmission that we have described, the communication of information between the procurement organization and the transplant centers in our national donor-sharing network system was reviewed, and an improved reporting system like the well-established network system in US (15) is building to reduce the delay in communicating information about possible donor-derived transmission. Timely warning also helps laboratories invest greater effort in detecting the pathogen, and is necessary for conserving isolates for further epidemiological typing, and elucidating the source of infection. Furthermore, transplant surgeons and infectious disease specialists should show more interest in donor-derived transmission and they should bear in mind that earlier reporting of possible donor-derived transmission can save the lives of transplant recipients.

This study has several limitations. First, we did not perform the susceptibility test of posaconazole. The previous study reported that *S. apiospermum* isolates were susceptible *in vitro* to voriconazole (MIC_{90} 0.5 ug/mL) and posaconazole (MIC_{90} 2 ug/mL)(16). Some argue that posaconazole could be considered in case that the serious adverse effect of voriconazole occurred in liver recipient 1. However, the recent study reported that *S. aurantiacum* showed high MIC in all antifungal agents including posaconazole (MIC_{90}>16 ug/mL) except voriconazole (MIC_{90} 1 ug/mL) (17). We selected fluconazole based on that the relative low MIC (Supplemental Fig. S4) and the late onset of scedosporiosis in kidney transplant recipient 2 who received fluconazole treatment due to urinary candidiasis. So, the further studies are need on the issue of the potential use of posaconazole and fluconazole in *S. aurantiacum* infection. Second, we investigated the causes of deaths and the presence of unusual opportunistic infections of all recipients from the 27 drowned donors for 13-year period. So, it is possible that transmitted infections including mold or parasite (i.e. *Balamuthia*) infections without microbiological documentation that were successfully treated could be missed.

In conclusion, we describe 3 organ recipients who developed fatal scedosporiosis following deceased donor transplantation from the same drowning donor, along with the survival of 2 other recipients who received prophylactic antifungal therapy. Although disseminated infection in the donor could not be demonstrated in culture studies, undiagnosed disseminated donor infection and

transmission caused by *Scedosprium* spp. in nearly-drowning events should be considered. A standardized protocol for possible organ use in nearly-drowned donors is urgently needed. In addition, physicians should keep in mind that reporting possible donor-derived transmission earlier may save the lives of transplant recipients.

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Disclosure

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

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Supporting Information

Additional Supporting Information may be found in the online version of this article.

Figure S1: (A) Chest X-ray of the donor on day 1. There are bilateral infiltrations in both lungs. (B) Follow-up chest X-ray of the donor on day 5. The bilateral infiltrations in both lungs have improved.

Figure S2: (A) Abdominal computed tomography of kidney transplant recipient 1 on posttransplant day 27 showing wound dehiscence and abscess formation. (B) Chest computed tomography of kidney transplant recipient 1 on posttransplant day 32 revealing multiple nodules and consolidations with pleural effusion.

Figure S3: (A) Abdominal computed tomography of kidney transplant recipient 2 on posttransplant day 32 showing swelling of the overlying skin and transplanted kidney. (B) Fundoscopy of kidney transplant recipient 2 on posttransplant day 35 revealing vitreous opacity, retinal haziness, and yellowish retinal infiltration.

Figure S4: The broth microdilution test for various antifungal agents. (A) The MICs of amphotericin-B and fluconazole were >16 μg/mL and 16 μg/mL, respectively. (B) The MICs of itraconazole and voriconazole were >4 μg/mL and 0.5 μg/mL, respectively.