Case Report

A case of subarachnoid and intracerebral hemorrhages complicated by trichosporonosis

Shunsuke Shibao¹, Makoto Kaburaki², Katsuya Saito¹, Hideyuki Tomita¹

Departments of ¹Neurosurgery and ²Internal Medicine, Ashikaga Red Cross Hospital, Ashikaga, Japan.

E-mail: ¹Shunsuke Shibao - pochiuke616@mac.com; Makoto Kaburaki - superkabuvol1@yahoo.co.jp; Katsuya Saito - csrb415@yahoo.co.jp; Hideyuki Tomita - htomita@seikeikai-cmc.jp

ABSTRACT

Background: Trichosporonosis has an extremely poor prognosis. In this report, we describe a case of subarachnoid hemorrhage and intracerebral hemorrhage due to a fungal aneurysm caused by Trichosporon.

Case Description: A 71-year-old woman who experienced subcortical hemorrhage developed a subarachnoid hemorrhage. Endovascular parent artery occlusion was performed for a fungal aneurysm in the left posterior cerebral artery caused by Trichosporon. After surgery, voriconazole and liposomal amphotericin B were administered. The patient died of massive left putamen hemorrhage.

Conclusion: Effective treatment for intracranial hemorrhage due to trichosporonosis has not yet been established and an accumulation of cases is required.

Keywords: Fungal aneurysm, Intracerebral hemorrhage, Subarachnoid hemorrhage, Trichosporonosis

INTRODUCTION

Trichosporon is an opportunistically infective yeast-like fungus. About 74.7% of Trichosporon infections reach the bloodstream, which is associated with an extremely poor prognosis.[2] Infectious cerebral aneurysms are caused by cerebral artery wall destruction due to infection and are relatively rare, accounting for <1% of intracranial aneurysms.[7] Causative organisms are usually Streptococcus (30%–44%), Staphylococcus (14%–18%), or unknown (10–12.5%).[4] There have been no reports of infected aneurysms caused by Trichosporon.

We describe a case of subarachnoid hemorrhage due to rupture of a fungal aneurysm caused by Trichosporon, resulting in recurrent intracerebral hemorrhage and death.

CLINICAL SUMMARY

The patient is a 71-year-old woman who underwent surgical aortic mechanical valve replacement for aortic dissection and was started on warfarin postoperatively. Seven months after her aortic valve replacement surgery, she experienced her first intracerebral hemorrhage. No other underlying medical conditions, such as diabetes or immunodeficiencies, were noted. The hemorrhage was subcortical, in the right parietal lobe. The hematoma was removed by
craniotomy in the neurosurgery department of another hospital (day 0) [Figure 1].

Thirty-eight days after the onset of the first hemorrhage (day 38), the patient was transferred to our hospital for convalescent rehabilitation. At that time, neurological findings included a Japanese Coma Scale 1 and GCS 15 (E4 V5 M6) level of consciousness, left unilateral spatial neglect, left facial paralysis, and left hemiplegia. Thirteen days after transfer (day 51), the patient developed a fever of unknown etiology, and antibiotic therapy (levofloxacin, ceftriaxone, and meropenem) was administered for possible urinary tract infection and meningitis. The patient’s laboratory results during the course of the fever included white blood cell count 11600/µL, C-reactive protein 3.76 mg/L, procalcitonin 0.18 ng/mg, and βD glucan 7.2 pg/ml. Cerebrospinal fluid examination revealed a cell count of 46.2/µL (57 mononuclear cells and 43 polymorphonuclear cells), 70 mg/dL protein, and 45 mg/dL sugar. Echocardiography showed an echo-free around the prosthetic valve, but coronary computed tomography (CT) showed no obvious abscess formation around the valve.

Three days later (day 54), the patient developed subarachnoid hemorrhage and was referred to our department [Figure 2a]. Cerebral angiography showed an aneurysm in the P4 segment of the left posterior cerebral artery (PCA) [Figure 2b], and endovascular parent artery occlusion was performed with a coil on the same day. A 5Fr Fubuki Dilator Kit (ASAHI INTECC, Aichi, Japan) was inserted into the left vertebral artery through the left brachial artery. A microcatheter (1.7Fr RESTAR, Medico’s Hirata, Osaka, Japan) was guided to the distal part of the aneurysm neck using a 3.2Fr TACTICS (Technocrat, Aichi, Japan) as the distal access catheter [Figure 3a] and filled with a total of 12 coils in a sequential refilling fashion to complete the procedure [Figures 3b and c]. Intraoperatively, blood was collected from a microcatheter tip near the aneurysm, from which Trichosporon species were cultured.

Postoperatively, the patient was treated for vasospasm and started on voriconazole (VRCZ) as an antifungal. On the 3rd postoperative day (day 57), head CT showed asymptomatic subcortical hemorrhage in the left temporal lobe [Figure 4a]. Liposomal amphotericin B (L-AMB) was added to the VRCZ regimen and the blood culture was negative for Trichosporon. Contrast-enhanced CT 1 month after the operation (day 85) showed multiple diffuse microaneurysms [Figure 4b]. One week later (day 92), a massive intracerebral hemorrhage in the left putamen resulted in cerebral herniation and the patient died [Figure 4c]. The prothrombin time-international normalized ratio (PT-INR) immediately before death was 4.41, suggesting that the interaction between VRCZ and warfarin caused an overextension of the PT-INR. There were no obvious findings of disseminated intravascular coagulation. Autopsy was not performed because patient’s family did not wish it.

**DISCUSSION**

Trichosporon species are present in the human microbiota of skin and gastrointestinal tract.[11] Deep-seated Trichosporon is an opportunistic infection with a poor prognosis. Risk factors for the onset of the disease include neutropenia, steroid therapy, intensive care unit admission, and highly invasive surgery. The mortality rate has been reported to be 60–90%.[16] Furthermore, Trichosporon infections of the central nervous system are rare. Although there have been reports of abscesses and meningitis, fungal aneurysms caused by trichosporonosis have not been reported.[1,5,6,8,10-15] This is the first report of an intracranial fungal aneurysm caused by trichosporonosis. Trichosporon species are naturally resistant to candin antifungals, so there is a risk of breakthrough infection in case of inadvertent use.[9] As for Trichosporon treatment, some reports indicate that both VRCZ and L-AMB improve prognosis. The patient was treated with VRCZ and L-AMB and blood cultures were negative for Trichosporon. However, it is thought that the VRCZ enhanced the effect of warfarin through interaction, resulting in fatal

**Figure 1:** Head computed tomography (CT) at first onset of intracerebral hemorrhage. A hematoma 7 cm in size was found in the right parietal lobe in axial (a) and coronal (b) view.

**Figure 2:** (a) Head CT showed subarachnoid hemorrhage. (b) Three-dimensional reconstruction of CT angiography showed aneurysm in the P4 segment of the left posterior cerebral artery.
bleeding. This could be considered a pitfall in the treatment of *Trichosporon*. The mechanism is inferred to be bleeding from an infected aneurysm, which was contributed to by an over-prolonged PT-INR, leading to a cerebral herniation. The route of invasion was unknown, but, as there was a history of valve replacement, one would suspect that it may have been the source of infection. Coronary CT did not demonstrate any abscess around the prosthetic valve so that remains unconfirmed. Despite successful treatment of the fungal infection using VRCZ and L-AMB, the patient developed multiple microaneurysms and passed away.

As for fungal aneurysms, the known routes of entry include hematogenous dissemination, direct invasion, and surgical contamination. The most frequently reported fungi are *Aspergillus*, *Candida*, *Zygomycetes*, and *Coccidioides*. There are no reports of intracranial aneurysms caused by *Trichosporon*. Aneurysms caused by direct invasion are more common in proximal arteries, such as the internal carotid artery, while those caused by blood dissemination are more common in distal arteries, such as the anterior cerebral artery, middle cerebral artery, and PCA. Reports of both craniotomy and endovascular surgery indicate that the location and shape of the aneurysm determine which is more appropriate for management. Endovascular parent vessel occlusion may be indicated for distally infected aneurysms.[3,17] In this case, we performed endovascular parent artery occlusion for an aneurysm caused by *Trichosporon* distal to the PCA.

An accumulation of reports is needed to formulate a proper plan of management in such cases. Furthermore, the clinical summary may aid clinicians in the diagnosis and treatment of similar rare occurrences of trichosporonosis infection.

**CONCLUSION**

We report an unprecedented case of intracranial fungal aneurysm caused by trichosporonosis. Effective intracranial trichosporonosis management has not yet been established and the treatment for such cases with subarachnoid or intracerebral hemorrhage requires careful analysis of multiple cases.
Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Basiri K, Meidani M, Rezaie F, Soheilnader S, Fatehi F. A rare case of Trichosporon brain abscess, successfully treated with surgical excision and antifungal agents. Neurol Neurochir Pol 2012;46:92-5.
2. Castano G, Yarrarapu SN, Mada PK. Trichosporonosis. Treasure Island (FL): StatPearls; 2021.
3. Champeaux C, Walker N, Derwin J, Grivas A. Successful delayed coiling of a ruptured growing distal posterior cerebral artery mycotic aneurysm. Neurochirurgie 2017;63:17-20.
4. Clare CE, Barrow DL. Infectious intracranial aneurysms. Neurosurg Clin N Am 1992;3:551-66.
5. Hajjar J, Restrepo A, Javeri H, Wiederhold NP, Papanastassiou AM, Patterson TF. Multiple brain abscesses caused by Trichosporon inkin in a patient with x-linked chronic granulomatous disease (CGD) successfully treated with antifungal therapy. J Clin Immunol 2017;37:17-20.
6. Heslop OD, Nyi MP, Abbott SP, Rainford LE, Castle DM, Coard KC. Disseminated trichosporonosis in a burn patient: Meningitis and cerebral abscess due to Trichosporon asahii. J Clin Microbiol 2011;49:4405-8.
7. Kamei S, Takasu T. Nationwide survey of the annual prevalence of viral and other neurological infections in Japanese inpatients. Intern Med 2000;39:894-900.
8. Kumar A, Udayakumaran S, Babu R, Rajamma BM, Prakash A, Panikar D, et al. Trichosporon asahii infection presenting as chronic meningo-ventriculitis and intra ventricular fungal ball: A case report and literature review. Mycoses 2015;58:99-103.
9. Kushima H, Tokimatsu I, Ishii H, Kadota J. Antifungal susceptibility and drug-resistant mechanism of Trichosporon. Med Mycol J 2015;56:123-8.
10. Mathews MS, Prabhakar S. Chronic meningitis caused by Trichosporon beigeli in India. Mycoses 1995;38:125-6.
11. Milan EP, Silva-Rocha WP, De Almeida JJ, Fernandes TU, Prudente AL, De Azevedo MF, et al. Trichosporon inkin meningitis in Northeast Brazil: First case report and review of the literature. BMC Infect Dis 2018;18:470.
12. Rastogi VL, Nirwan PS. Invasive trichosporonosis due to Trichosporon asahii in a non-immunocompromised host: A rare case report. Indian J Med Microbiol 2007;25:59-61.
13. Ruan SY, Chien JY, Hsueh PR. Invasive trichosporonosis caused by Trichosporon asahii and other unusual Trichosporon species at a medical center in Taiwan. Clin Infect Dis 2009;49:e11-7.
14. Surmont I, Vergauwen B, Marcelis L, Verbist L, Verhoef G, Boogaerts M. First report of chronic meningitis caused by Trichosporon beigeli. Eur J Clin Microbiol Infect Dis 1990;9:226-9.
15. Thien SY, Chung SJ, Tan AL, Hwang WY, Tan BH, Tan TT. Recurrent trichosporonosis with central nervous system involvement in an allogeneic hematopoietic stem cell transplant recipient. Transpl Infect Dis 2016;18:768-72.
16. Walsh TJ. Trichosporonosis. Infect Dis Clin North Am 1989;3:43-52.
17. Yamaguchi J, Kawabata T, Motomura A, Hatano N, Seki Y. Fungal internal carotid artery aneurysm treated by trapping and high-flow bypass: A case report and literature review. Neurol Med Chir (Tokyo) 2016;56:89-94.

How to cite this article: Shibao S, Kaburaki M, Saito K, Tomita H. A case of subarachnoid and intracerebral hemorrhages complicated by trichosporonosis. Surg Neurol Int 2022;13:472.