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SNI: Neuro-oncology

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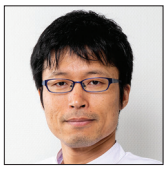
Case Report

Intra-and peritumoral hemorrhage in the meningioma of a nonagenarian due to administration of direct oral anticoagulants after mechanical thrombectomy

Katsuyoshi Miyashita, Kosuke Nambu, Shio Kinami, Kenshu Nogami, Iku Nambu, Yasuo Tohma

Department of Neurosurgery, Fukui Prefectural Hospital, Fukui, Japan.

E-mail: *Katsuyoshi Miyashita - kmiya0810@gmail.com; Kosuke Nambu - kosukenmb0380@gmail.com; Shio Kinami - s-kinami@med.kanazawa-u.ac.jp; Kenshu Nogami - k.nogami@med.kanazawa-u.ac.jp; Iku Nambu - namnamnambuiku@med.kanazawa-u.ac.jp; Yasuo Tohma - tohma_7262@yahoo.co.jp



***Corresponding author:**
Katsuyoshi Miyashita,
Department of Neurosurgery,
Fukui Prefectural Hospital,
Fukui, Japan.

kmiya0810@gmail.com

Received : 06 January 2023
Accepted : 20 April 2023
Published : 05 May 2023

DOI
10.25259/SNI_18_2023

Quick Response Code:

ABSTRACT

Background: Spontaneous intratumoral hemorrhage of meningiomas is rare, and their incidence due to anticoagulants is unclear. The incidence of both meningioma and cardioembolic stroke increases with age. We report the very elderly case of intra- and peritumoral hemorrhage in frontal meningioma induced by direct oral anticoagulant (DOAC) following mechanical thrombectomy, in whom, surgical resection was required 10 years after the tumor was first indicated.

Case Description: A 94-year-old woman with independence in daily living who suffered sudden consciousness disturbance, total aphasia, and right hemiparesis was admitted to our hospital. Magnetic resonance imaging showed an acute cerebral infarction and left middle cerebral artery occlusion. There was also a left frontal meningioma with peritumoral edema, which was discovered 10 years prior, and the size and edema had remarkably increased. The patient underwent urgent mechanical thrombectomy, and recanalization was achieved. Administration of DOAC was initiated for the atrial fibrillation. Computed tomography (CT) revealed an asymptomatic intratumoral hemorrhage at postoperative day 26. The patient's symptoms gradually improved; however, she suffered sudden disturbance of consciousness and right hemiparesis on postoperative day 48. CT revealed intra- and peritumoral hemorrhages with compression of the surrounding brain. Therefore, we decided to perform tumor resection instead of conservative treatment. The patient underwent surgical resection, and the postoperative course was uneventful. It was diagnosed with transitional meningioma with no malignant features. The patient was transferred to another hospital for rehabilitation.

Conclusion: Peritumoral edema representing a pial blood supply might be a significant factor associated with intracranial hemorrhage due to DOAC administration in patients with meningioma. The evaluation of hemorrhagic risk due to DOACs is important not only for meningioma but also for other brain tumor cases.

Keywords: Direct oral anticoagulant, Intratumoral hemorrhage, Mechanical thrombectomy, Meningioma

INTRODUCTION

The incidence of atrial fibrillation increases with age; therefore, that of cardioembolic stroke in elderly patients also increases. It has been reported that the incidence of cardioembolic stroke sharply increases with age, especially in those aged >80 years.[15]

The incidence of meningioma also increases with age. It was reported that its in patients over 85 years of age doubled from the ages of 65–69 years.[1] Spontaneous intratumoral hemorrhage of meningiomas is rare, with a reported frequency of 1–2%.[3] It has been reported that direct oral anticoagulants (DOACs) do not increase the incidence of intracranial hemorrhage (ICH) relative to heparin in patients with intracranial tumors,[14] while there have been a few reports of ICH in meningioma patients treated with anticoagulants.

Here, we report on an intra-and peritumoral hemorrhage in the frontal meningioma of a very elderly patient induced by DOAC administration following mechanical thrombectomy, and surgical resection was required 10 years after the tumor was revealed.

CASE REPORT

A 94-year-old woman with independence in daily living who suffered sudden consciousness disturbance and right hemiparesis was admitted to our hospital. Magnetic resonance imaging (MRI) revealed an acute cerebral infarction in the left corona radiata and a left middle cerebral artery occlusion [Figures 1a-c]. Asymptomatic left frontal meningioma with peritumoral edema was also observed [Figures 1a and b]. Although it was indicated 10 years prior, periodic follow-up was suspended 5 years prior because she refused operation. The tumor size and edema were remarkably increased [Figures 1d-g]. She underwent urgent mechanical thrombectomy and recanalization was achieved [Figures 2a-c]. Administration of DOACs was initiated for atrial fibrillation.

Computed tomography (CT) revealed an asymptomatic intratumoral hemorrhage at postoperative day 26 [Figure 3a]. We did not discontinue the DOAC due to the presence of a small asymptomatic intratumoral hemorrhage and order to prevent stroke recurrence. The patient's symptoms gradually improved with rehabilitation; however, she suffered consciousness disturbance and right hemiparesis at postoperative day 48. CT and MRI revealed an intra-and peritumoral hemorrhage with compression of the surrounding brain [Figures 3b and c]. Although there was conservative treatment option due to the patient's old age, we decided to perform tumor resection to prevent being bedridden and re-administrate of DOAC. The patient underwent surgical resection and Simpson grade II resection was obtained [Figure 4]. Her postoperative course was uneventful. The tumor was diagnosed as transitional

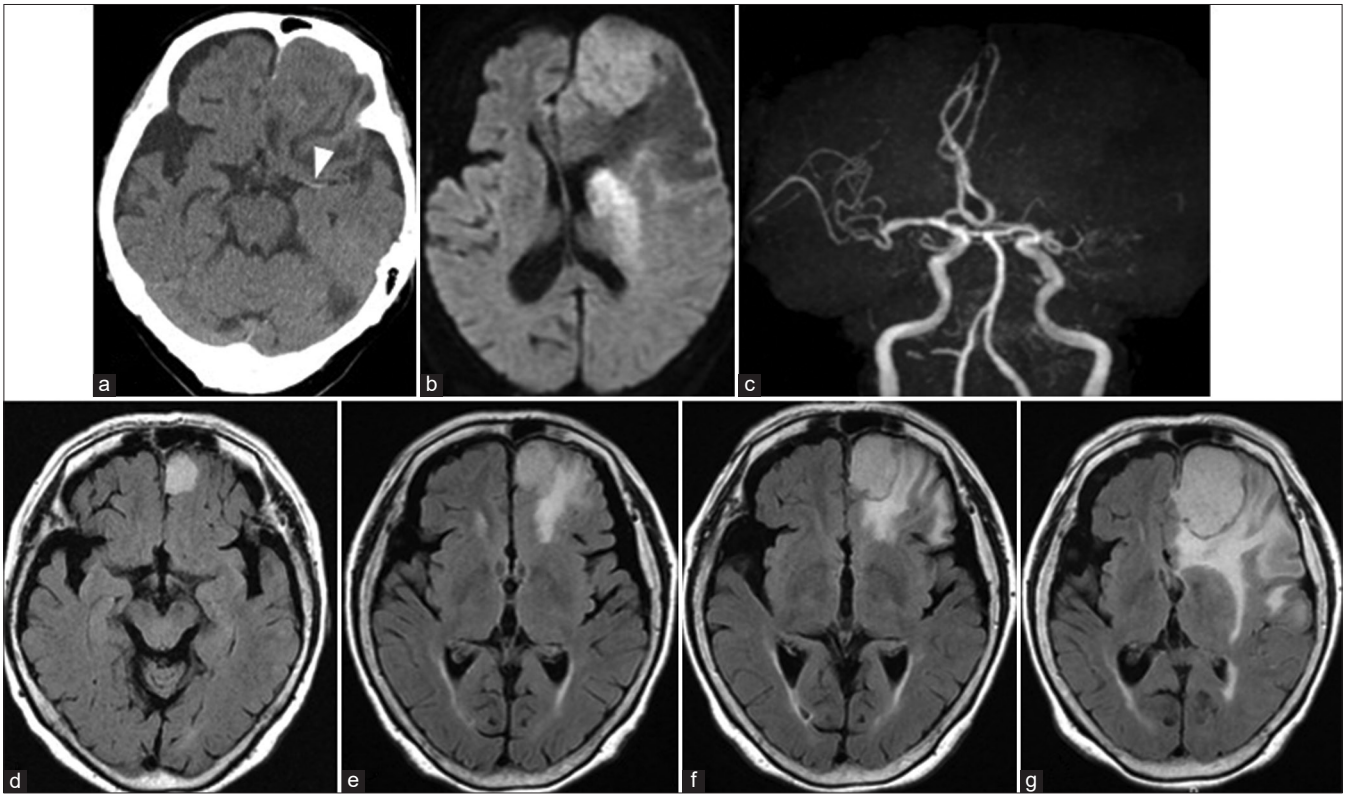


Figure 1: Preoperative computed tomography (CT) and magnetic resonance imaging (MRI). CT showing a left frontal tumor and left hyper dense sign (arrowhead) (a). Diffusion-weighted image on MRI showing an acute cerebral infarction (b), and magnetic resonance angiography showing a left middle cerebral artery occlusion (c). Fluid-attenuated inversion recovery image on MRI showing enlargement of tumor and peritumoral edema 10 years prior (d), 7 years prior (e), 5 years prior (f) to the onset, and at the onset of cerebral infarction (g).

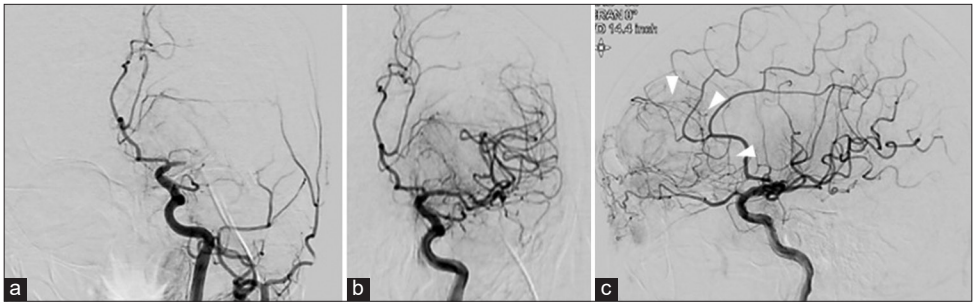


Figure 2: Digital subtraction angiography (DSA) of the pre- and post-mechanical thrombectomy. Pre-DSA showing a left middle cerebral artery occlusion (a). Post-DSA showing the recanalization of the middle cerebral artery (b) and the tumor staining of left frontal tumor with a pial supply in the posterior part of the tumor (arrow head) (c).

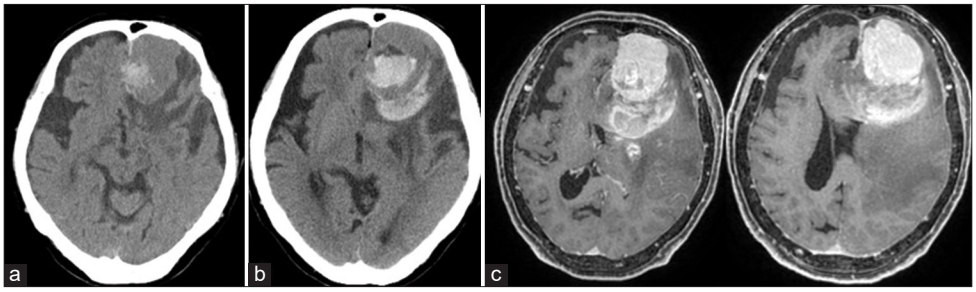


Figure 3: Postoperative day 26 computed tomography (CT) showing intratumoral hemorrhage (a). Postoperative day 48 CT showing intra and peritumoral hemorrhage (b). Gadolinium-enhanced T1-weighted image on MRI showing a diffuse enhanced tumor with an intratumoral hemorrhage and peritumoral hemorrhage compressing the surrounding brain (c).

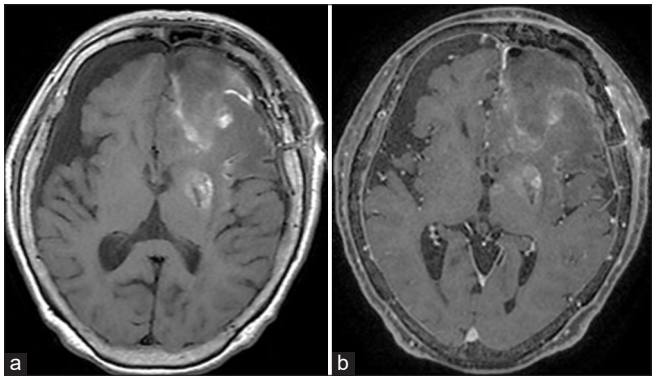


Figure 4: Post tumor resection T1-weighted (a) and Gadolinium-enhanced T1-weighted magnetic resonance imaging (b) showing gross total resection of the tumor.

meningioma with no malignant features. Finally, the patient was transferred to another hospital for rehabilitation. Her symptoms were improved and she became able to make a daily living with mild assistance 6 months after the transfer.

DISCUSSION

Several reports have mentioned that the incidence of ICH in patients with intracranial tumors did not increase with DOAC administration compared with low-molecular-weight heparin (LMWH) administration. In the primary brain tumors, the cumulative incidences of major ICH at 12 months with DOAC and LMWH administration was 0% and 18.2%, respectively.[4] In metastatic brain tumors, these were 5.1–11.1% and 11.1–17.8%, respectively.[4,7] In glioblastomas, the cumulative incidence of ICH at 6 months with DOAC and LMWH administration was 0% and 24%, respectively.[12] Another report mentioned that the major bleeding rate of ICH in central nervous system malignancies (including glioblastomas, meningiomas, and metastatic brain tumors) was 9.6% with DOACs compared to 26% with LMWH.[14] There are also a few reports of ICH in meningioma cases receiving anticoagulants.[6,8,10] If DOACs are limited, there is only one report of ICH in a meningioma case.[6] Although the accurate incidence of ICH in meningioma patients due to DOACs is unclear, it is expected to be several percent, as mentioned above. The risk factors of ICH in meningioma cases were reported to be as follows: Age (<30 years and >70 years), tumor location (convexity and intraventricular), fibrous meningioma, and peritumoral edema.[3,5] The present case was high risk in terms of advanced age and the presence of peritumoral edema, even when excluding the using of DOACs. We should estimate the risk of hemorrhage due to DOACs in cases of intracranial tumors including meningiomas.

The mechanism of ICH associated with meningiomas remains unclear. In the present case, the most critical factor was peritumoral hemorrhage rather than intratumoral hemorrhage. Several reports have described peritumoral edema in meningiomas associated with a pial blood supply and expression of vascular endothelial growth factor.[2,11,16] In the present case, there was significant peritumoral edema and pial vascular supply in the posterior part of the tumor, the location of which corresponded to the location of peritumoral hematoma [Figures 2b and c, 3b]. According to the operative findings, the peritumoral hematoma existed purely in the extratumor and the boundary between the hematoma and the brain was clear. It has been reported that intra-and peritumoral hemorrhage in meningioma with a pial blood supply occurred by the contrast medium 4 days after the angiography.[9] That case had pial blood supply from middle cerebral artery, and the location was in accordance with the hematoma. As mentioned above, peritumoral bleeding could occur in meningiomas with pial blood supply if the intratumoral environment changes. We should recognize that DOACs may increase the risk of ICH in cases of meningioma, especially cases with peritumoral edema.

The appropriateness of surgical resection for nonagenarian meningiomas is debatable. Surgery for meningiomas over the age of 80 years is feasible when the SKALE score is over 8.[13] SKALE score consists of following five factors; Sex, Karnofsky Performance Scale, American Society of Anesthesiology Class, Location of Tumor, and Peritumoral edema. The present case was at high risk because the patient was over 90-years-old and had a SKALE score of 6. We assessed the surgical resection option to be relatively safe considering that the general condition of the patient was good for the very old age. Combined cases of brain tumors and cardioembolic stroke may be encountered in clinical practice, especially in super-aged societies such as Japan; therefore, accurately judging the surgical indications for a tumor is essential.

CONCLUSION

We report the rare case of intra-and peritumoral hemorrhage due to DOAC administration in a very elderly meningioma patient following mechanical thrombectomy. Peritumoral edema representing a pial blood supply might be an important factor that increases the risk of ICH due to DOACs in meningioma cases. The incidence of both meningioma and cardioembolic stroke increases with age; thus, combined cases such as that in this this report may become more common in super-aged societies.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Miyashita K, Nambu K, Kinami S, Nogami K, Nambu I, Tohma Y. Intra-and peritumoral hemorrhage in the meningioma of a nonagenarian due to administration of direct oral anticoagulants after mechanical thrombectomy. Surg Neurol Int 2023;14:164.