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CASE REPORT

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Occipital abscess developed after endovascular AVM treatment with liquid embolizing agent: case report

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Abstract

Background In arteriovenous malformations, endovascular embolization was first used in the 1960s to occlude feeding vessels. In recent years, the success of endovascular treatments has increased. Thus, the use of endovascular therapy in the treatment of arteriovenous malformation has become widespread. Recently, it is the primary treatment method or an adjunctive treatment to surgery. The development of intracranial abscess after endovascular treatment with a liquid embolizing agent has been reported very rarely in the literature. In this article, a case of intracerebral abscess that developed after endovascular treatment with a liquid embolizing agent was presented.

Case Presentation A 24-year-old male patient was admitted to the hospital with the complaints of dizziness and syncope. Arteriovenous malformation was observed in radiological imaging. Endovascular treatment for the AVM was performed. He was admitted to the hospital with similar complaints 2 months after the treatment. An abscess was observed around the AVM in the patient's cranial imaging. Infected materials in the mall were surgically removed, and the abscess was drained. After antibiotic treatment, the patient was discharged with full recovery.

Conclusion Due to the recent popularity of endovascular treatment methods, the incidence of abscess formation after embolization may change in the near future. Further research should be done to prevent this serious complication.

Keywords Arteriovenous malformation, Endovascular, Brain abscess

Background

Endovascular embolization of arteriovenous malformations (AVMs) was first described in the 1960s by Luessenhop and Spence, who injected methyl methacrylate pellets to occlude feeding vessels in an AVM 1. The increase in endovascular treatment success rates in cerebral vascular malformations 2 has led to the widespread use of endovascular treatment in recent years 3. Therefore, this method has been involved in the management of AVMs for over 50 years 4. The place of endovascular therapy is third after microsurgery and stereotactic radiosurgery.

Typical complications include bleeding, ischemic stroke, vessel perforation or dissection, and microcatheter retention as a result of polymerization of embolic material 5. It has been reported that infection occurs in a very rare (0.1%) portion of endovascular procedures 6.

In this report, it is aimed to present a case of brain abscess that developed after endovascular embolization of a brain arteriovenous malformation and to discuss it in light of the cases described in the literature so far.

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Case presentation

A 24-year-old male patient presented with the complaints of dizziness and fainting. Neurological examination revealed limited outward gaze in the left eye. Digital subtraction angiography (DSA) was performed because AVM was suspected in the brain magnetic resonance imaging (MRI). In DSA, a vascular malformation 33×27x18 mm in size, staining from the posterior cerebral artery and draining into the straight sinus was observed. Thereupon, AVM embolization was performed by interventional radiology with 2 glues and 6 liquid embolizing agents (ONYX). Postoperative angiography showed that the AVM was fully occluded (Fig. 1). In the imaging of the patient who presented to the emergency department with the complaints of dizziness, headache, nausea, and vomiting 2 months after the procedure, increased edema was observed around the AVM compared to previous imaging. Bilateral papilledema was observed in the fundus examination of the patient whose neurological examination was normal. Afterward, peripheral contrast-enhancing abscess formations were observed in contrast-enhanced cranial MRI. Diffusion MRI showed diffusion restriction in abscess formations and intense edema around the lesions (Fig. 2). Laboratory tests were C-reactive protein (CRP): 180, procalcitonin: 0.06, and sedimentation: 30. Other foci of infection were screened by physical examination, laboratory tests, and radiologic imaging, but no additional foci of infection were found.

The patient, whose surgical preparations were completed, underwent surgery with the preliminary diagnosis of abscess developed after endovascular AVM embolization. The patient underwent occipital abscess drainage and AVM excision, accompanied by neuronavigation, with an incision matching the right occipitoparietal craniotomy. Pseudomonas aeruginosa was grown in the intraoperative culture of the patient whose pathology was reported as abscess findings and pyogenic inflammatory granulation tissue. The patient's complaints regressed after IV antibiotic therapy for the postoperative agent, and his final laboratory tests resulted as CRP: 13, procalcitonin: 0.04, and sedimentation: 27. So the patient was discharged with full recovery.

Discussion

The morbidity rate of embolization of AVMs is approximately 16% 7. Although bleeding, ischemic stroke, vessel perforation, or dissection are the most common complications, infection has been reported very rarely 8. Bacterial spread pathways in delayed brain abscess associated with endovascular procedures are percutaneous colonization of systemic infection and hematogenous spread 7, 9.

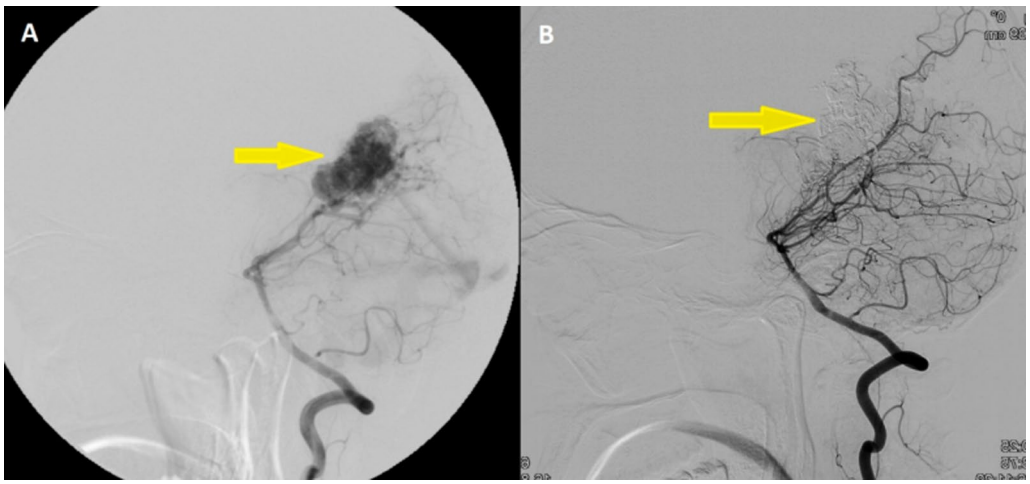

Fig. 1 **A** Before endovascular treatment, a vascular malformation 33×27×18 mm in size, staining from the posterior cerebral artery. **B** After endovascular treatment, angiography showed that the AVM was fully occluded

(See figure on next page.)

Fig. 2 **A** Preoperative diffusion restriction seen(yellow arrow) on diffusion-weighted MRI, B1000. **B** Preoperative diffusion restriction and vasogenic edema(red arrow) on diffusion-weighted MRI, ADC. **C** Preoperative T2-weighted MRI axial section, the lesion with surrounding vasogenic edema(red arrow). **D** Preoperative T1-weighted MRI axial section, the abscess formation with peripheral contrast enhancement. **E** Postoperative T2-weighted MRI axial section, reduced vasogenic edema compared to before (red arrow), space filled with cerebrospinal fluid remaining after surgery (yellow arrow). **F** Postoperative T1-weighted contrast-enhanced MRI axial section, without contrast enhancement

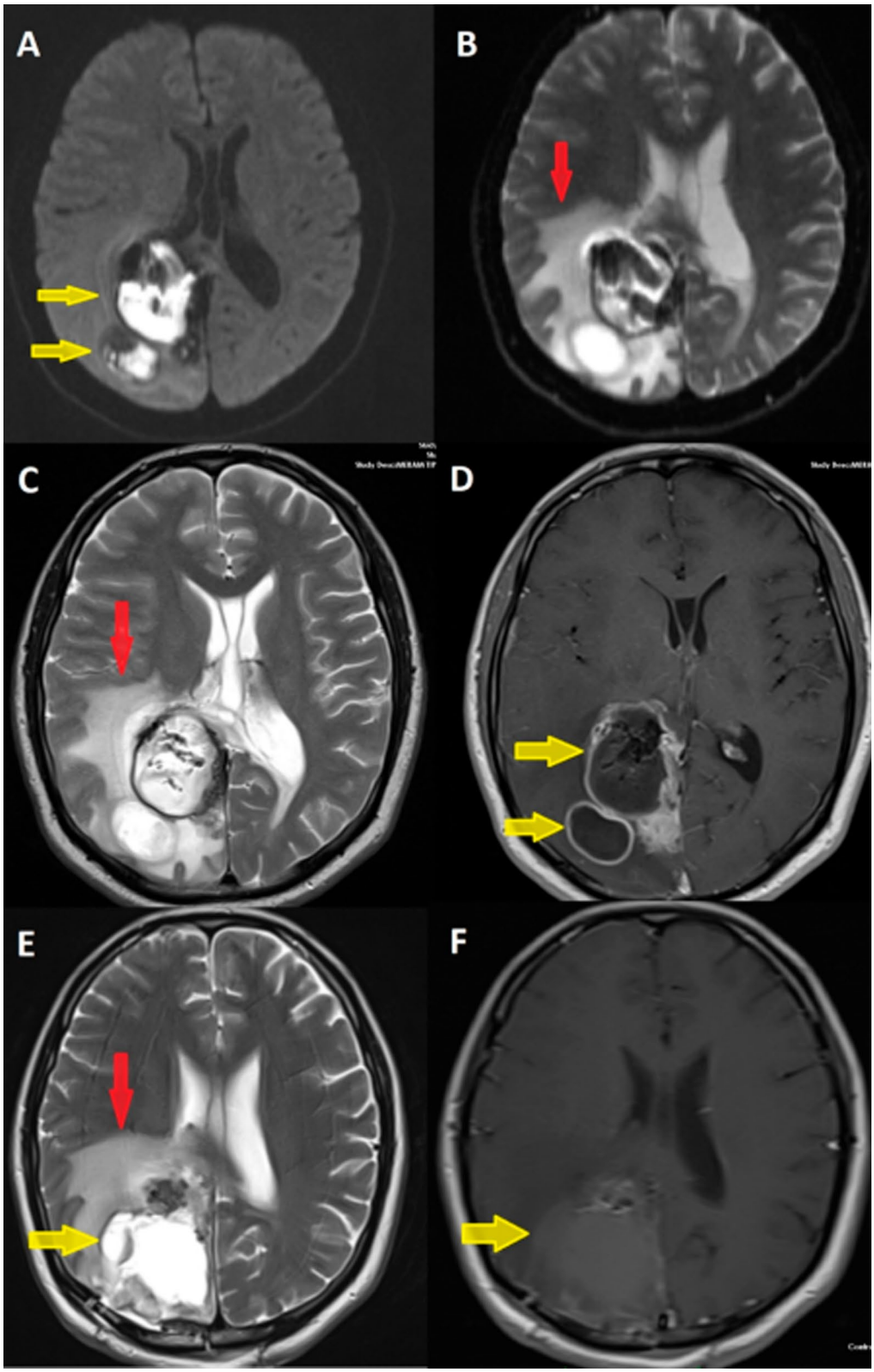

Fig. 2 (See legend on previous page.)

Although the pathogenesis of cerebral abscess after endovascular embolization is not clear, disruption of the blood–brain barrier is accepted as an important risk factor 7. The blood–brain barrier provides resistance to infections, and damage to this barrier causes infections such as brain abscess 10. Complicated brain abscess has been reported to occur between 2 months and 10 years after the procedure. The most commonly associated agents are Staphylococcus aureus, Pseudomonas aeruginosa, skin-related microorganisms, and in-hospital colonization, respectively 11, 12.

Inappropriate catheter use, excessive use of foreign material, and the length of the procedure have been considered as possible risk factors for infection 10, 13.

The best treatment to prevent recurrent infections is to drain the abscess, remove the contaminated foreign material causing the abscess, and administer antibiotics 14. In this case, we were used surgery and antibiotic therapy for our patient.

Conclusion

Intracranial abscesses after AVM embolization are very rare. Being aware of the risk of infection after embolization is very important for recognizing and managing this complication. Brain abscess that develops after endovascular treatment is a serious complication that requires urgent treatment. Further studies are needed on the use of prophylactic antibiotics to prevent cerebral abscess complications after endovascular treatment.

Abbreviations

AVM	Arteriovenous malformation
CRP	C-reactive protein
DSA	Digital subtraction angiography
MRI	Magnetic resonance imaging

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Not applicable.

Author contributions

MEY obtaining patient consent, reviewing the literature, converting the obtained data into an article, and organizing the English translation of the article. BG performed literature review, transformation of the obtained data into an article, and translation of the article into English. MK presented transformation of the obtained data into an article and translation of the article into English. MFE did transformation of the obtained data into an article and translation of the article into English. SY carried out transformation of the obtained data into an article and translation of the article into English. AÖG provided transformation of the obtained data into an article and translation of the article into English. FK approved transformation of the obtained data into an article and translation of the article into English.

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Availability of data and materials

All findings and data obtained to reach conclusions are recorded and preserved in the archive of Necmettin Erbakan University Faculty of Medicine.

Declarations

Ethics approval and consent to participate

Informed consent was obtained in writing from all patients included in the study.

Consent for publication

All authors have given permission for the article to be published.

Competing interests

There is no conflict of interest.

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