



Limbic disconnection after Fornix Infarction: 5-year Follow-up Case Report

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Introduction

The fornix, which constitutes a limbic circuit, is a white matter bundle located in the mesial aspect of the cerebral hemispheres and plays a crucial role in emotion, behavior, and memory. Damage to the fornix can result in memory impairment and emotional or behavioral changes. We present a patient with limbic disconnection after fornix infarction and the recovery process through 5 years of follow-up.

Case Description

A 43-year-old man had a sudden headache and visited our institution's emergency department. The brain CT revealed a subarachnoid hemorrhage, and he underwent coil embolization. Subsequent days post-subarachnoid hemorrhage, the patient had a vasospasm resulting in the fornix infarction (Figure 1).

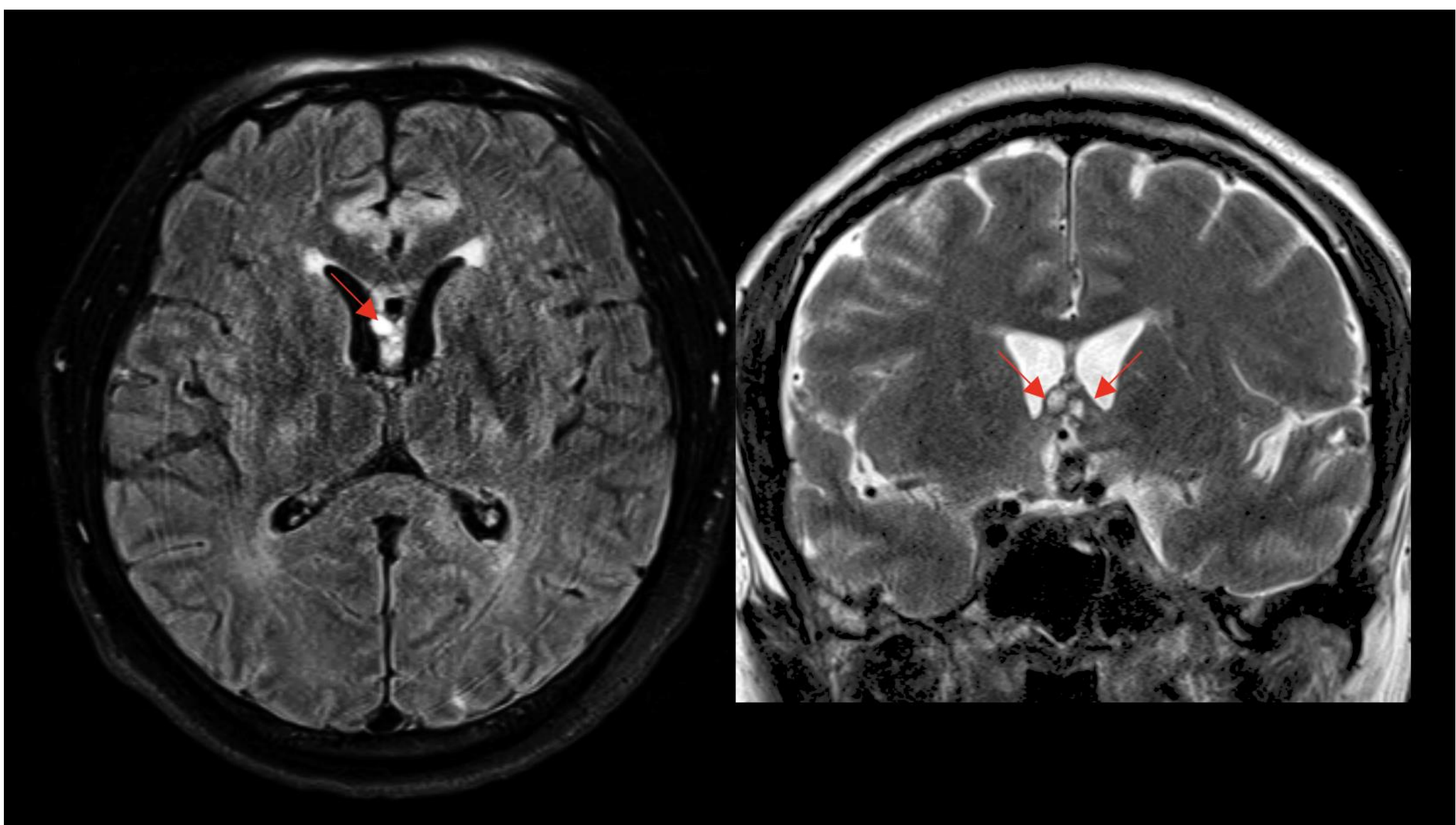


Figure 1. Bilateral fornix infarction

He suffered cognitive-behavioral disorders with the following features: One-month post-subarachnoid hemorrhage, his wife complained that he had

1. Impaired memory registration: "He could not remember daily episodes, such as brushing his teeth repeatedly.";
2. Impaired learning and memory storage/retrieval: "He could not recall the names of objects, even though his wife reminded him every day.";
3. Loss of emotional and behavioral control: "He could not withstand mild low back pain and screamed. He became angry very quickly."

The diffusion tensor tractography revealed the degeneration of the bilateral fornix and a resultant limbic disconnection. He received the inpatient cognitive rehabilitation for two months from onset.

After discharge from the hospital, he performed home-based cognitive training using a web-based program. He took medication, including donepezil and memantine, to enhance cognitive function, especially in the memory domain. He showed steady improvement in memory and could return to work two years after the onset. Five years later, we performed follow-up diffusion tensor tractography that confirmed bilateral fornix regeneration and increased tract volume of bilateral uncinate fasciculus. Ultimately, the cognitive-behavioral disorder could be overcome by the structural recovery of the limbic circuit.

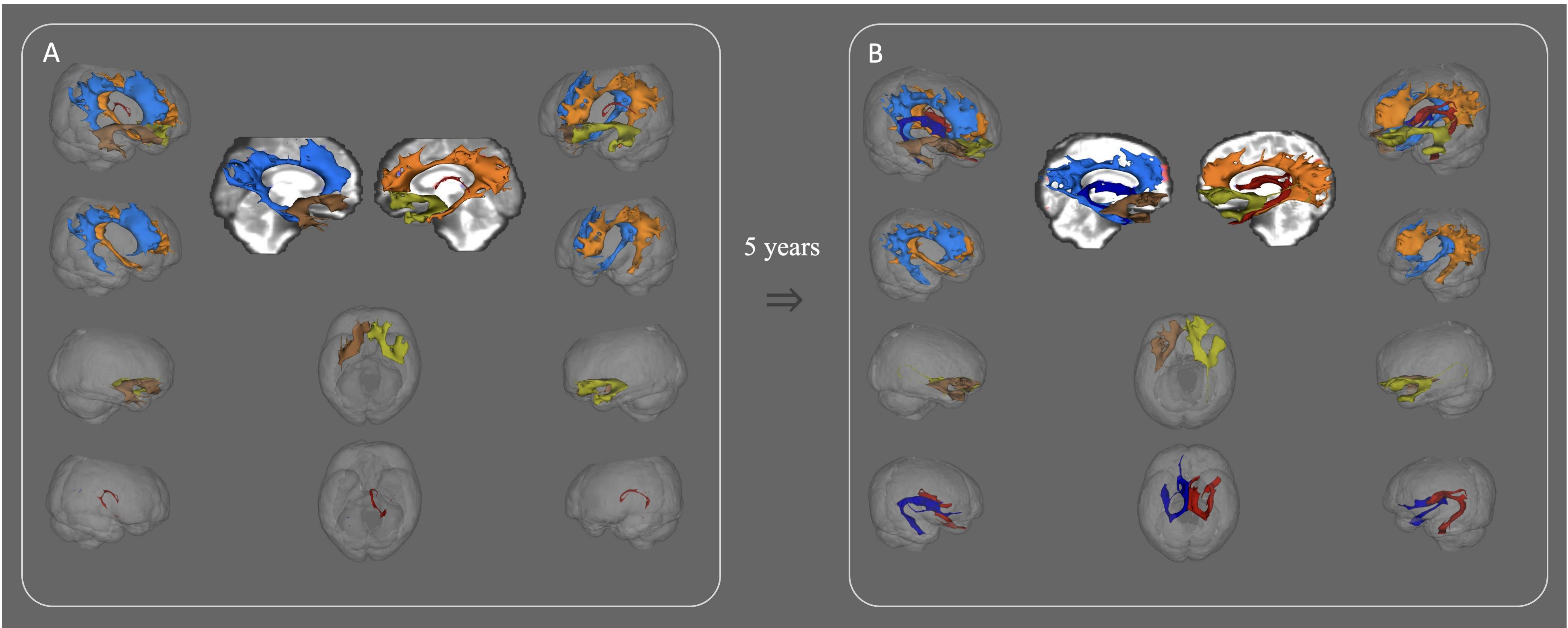


Figure 2. Diffusion tensor tractography 1-month post-subarachnoid hemorrhage revealed the degeneration of the bilateral fornix and a resultant limbic disconnection (A). Five years later, follow-up diffusion tensor tractography demonstrated bilateral fornix regeneration and increased tract volume of bilateral uncinate fasciculus.

Conclusion

Fornix infarction can result in limbic disconnection, which can lead to cognitive-behavioral disorders. Long-term personalized rehabilitation management can help restore memory function and enhance emotional and behavioral control. Diffusion tensor tractography helped diagnose limbic disconnection, and the follow-up assessment can determine the structural recovery of the disconnected limbic circuit.