

# Dural Arteriovenous Fistula a Rare Cause to Dementia: a Case Report

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## Abstract

Dementia is estimated to affect 55 million people worldwide. Alzheimer's disease is the most common cause of dementia, but a variety of other conditions can also cause dementia. In this case report, we present a patient who experienced severe cognitive deterioration over 3 months. When we saw her at our clinic, she could barely remember her birthday, had trouble finding words, suffered from apraxia, was very tired, and her personality had changed. She was immediately hospitalized, and scan revealed dural arteriovenous fistula. The fistula was closed with endovascular surgery, and the patient regained most of her cognitive function.

**Keywords:** Alzheimer's disease, dementia, dural arteriovenous fistula, neurodegenerative diseases.

## Introduction

Dementia is a common disease among older people, with 10 million new cases diagnosed every year worldwide. Fifty-five million people are living with the disease (1). The number is going to increase as a result of the increased number of older people. Alzheimer's disease is the leading cause of dementia and is responsible for 60–70% of all cases. However, a great variety of diseases and injuries can cause dementia, some of which are reversible. A thorough examination is therefore important (1). Herein, we present a patient with dementia caused by a rare but possible reservable condition.

## Case Report

A 75-year-old female patient was admitted to our department with symptoms of dementia. Her symptoms were rapidly progressing. Over 3 months, her functional level had drastically decreased.

Her short-term memory was weak, and she could barely remember her personal identification number. Severe head turning was observed. The patient had trouble finding words and answered all questions with remarkably latency. The husband

said that she had become very quiet. The patient had also got difficulties with practical tasks such as cooking. The level of initiative decreased. She would even forget to take a shower. The personality was changed. Finally, the patient became very tired and slept much more than usual. Apart from the above-mentioned symptoms, the patient had hypertension and cold thyroidea adenoma. Mini-mental state examination (MMSE) were 13/30 and Addenbrooke's Cognitive Examination were 38/100. Katz's activities of daily living were 2. The neurological examination was normal, except for an unsafe walk. Computed tomography (CT) scan showed a bit of cortical atrophy (global cortical atrophy 1) but no atrophy of the hippocampus (medical temporal lobe atrophy 0). The symptoms did not appear typical of Alzheimer's disease. The patient was hospitalized due to suspicion of encephalitis. Lumbar puncture excluded encephalitis.

A magnetic resonance (MR) scan was performed showing abnormal venous arteries in the fossa posterior bilaterally, abnormal signal in the left sinus transversus and sinus rectus obs fistula, possible thrombosis in the left sinus sigmoideus, and edema in the left cerebellar hemisphere. The subsequent MR angiography showed venous thrombosis in the sinus and arterial

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flow in the sinus transversus. CT angiography showed venous thrombosis next to the sinus sigmoideus sinister and a defect in the left mastoid toward the sinus sigmoideus. The fistula was closed after endovascular therapy. Following surgery, the patient was admitted for physical therapy. Three weeks after the patient was hospitalized, the final result from the lumbal puncture was obtained. The answer revealed that the patient also could suffer from Alzheimer's disease [425 beta-amyloid (>1100 ng/l), 415 tau protein (<250 ng/l) and 13 phosphorylated tau (<25 ng/l)]!

Six months after surgery, the patient was seen at our clinic. The patient has had experienced remarkably progress since the surgery. The initiative was back, and the patient again took part in daily house care without the husband having to remind her of the tasks. The tiredness had vanished. Although their memory had clearly become better, but remembering agreements could still be difficult. Her speech had improved, but she was still suffering from aphasia. She could still miss a word and sometimes say something wrong, although it is understandable. She was still attending a speech therapist. Katz's activities of daily living were now 6, which were in alignment with her remarkable improvement in anamnestic ability. The MMSE score was 13/30. The lack of improvement in the patient's MMSE score after treatment may be due to aphasia combined with underlying Alzheimer's disease.

## Discussion

Rapidly progressively developing dementia is caused by many different conditions. The most common cause is prion disease, with Creutzfeldt Jakob's disease counting for 25–60% of the cases (2). Other common causes are neurodegenerative diseases, vascular diseases, toxic/metabolic conditions, infections, autoimmune diseases, and para- and neoplastic entities. Rapidly progressive dementia (RPD) caused by inflammatory and toxic/metabolic conditions recovers relatively well. RPD caused by neurodegenerative diseases is associated with some of the worst prognoses (3). A quick and careful investigation is important because some patients experience a good recovery. A Chinese retrospective study evaluated 149 patients with RPD. They found that age was negatively correlated with MMSE score and Glasgow outcome scale (3). A dural arteriovenous fistula is a very rare cause of RPD. Fistulas can occur in different places in the brain, but the most common place is the sinus sigmoideus, as in our patient (2). The fistulas cause edema and thereby high local pressure in the brain, which is believed to cause symptoms. Dementia is a rare symptom of a fistula. The most common symptoms of a fistula are headache and dizziness. Brito et al. (4) investigated 389 patients admitted to their clinic with a dural

arteriovenous fistula and found that only 1.4% of the patients had RPD as a symptom of the fistula. It is important to detect a fistula because it is curable and the patient's symptoms may resolve. Case reports have shown full or partial regression of dementia symptoms when the fistula is closed (5). Our patient regained almost all of her cognitive skills except for speech problems. The fact that the speech did not fully recover can either be explained by two things. First, the fistula might have caused irreversible damage because it was located in the left hemisphere, the same place as the language. Second, her Alzheimer's disease might have affected her speech skills.

## Conclusion

With rapidly progressing dementia, other conditions other than Alzheimer's disease must be considered. In this case, our patient suffered from dural arteriovenous fistula and Alzheimer's disease. The fistula was closed with endovascular surgery, and the patient improved almost all cognitive symptoms that had worsened due to the fistula.

## Footnotes

### Authorship Contributions

Surgical and Medical Practices: L.E.H.K., Concept: L.E.H.K., L.W., Design: L.E.H.K., Data Collection or Processing: L.E.H.K., Analysis or Interpretation: L.E.H.K., Literature Search: L.E.H.K., Writing: L.E.H.K., L.W.

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