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## Case Report

# A typical neurofibromatosis type 1 in adult with intracranial T2 hyperintensities and pinealoma: A Case Report

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## Abstract

Neurofibromatosis type 1 (NF-1) is a common autosomal dominant inherited disorder. Aside from typical symptoms like pigmentary manifestation, patients with NF-1 can also have unspecified T2 hyperintensities (T2Hs) on the brain and may develop benign or malignant tumours in central nervous system or other parts of the body. In this article, we reported a 54-year-old female diagnosed as NF-1 combined with T2Hs and pinealoma that was proved to be a high-grade glioma in later follow-up. We noticed some clinical manifestations such as pigmented teeth and dentition defects that had not been described before. There were some reflections from the poor prognosis of this patient. Even though the course of the disease is relatively indolent most of the time, long-term surveillance is in need and treatment may be required in those with symptoms or unstable imaging findings.

## Introduction

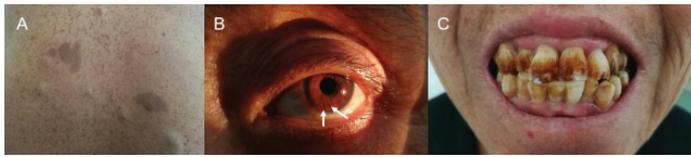
Neurofibromatosis type 1 (NF-1) is a common autosomal dominant inherited disorder. Patients with NF-1 often have unspecified T2 hyperintensities (Unidentified Bright Objects, UBOs) on the brain MRI which may disappear over time. In addition, they may tend to develop benign or malignant tumours in central nervous system and other parts of the body [1]. Neurofibromatosis type 1 was first described by Frederich von Recklinghausen in 1882. Then in 1987, clinical diagnostic criteria of NF-1 were published by the National Institutes of Health [2]. As a genetic neurocutaneous syndrome, NF-1 is usually detected in children at an early age. Here, we are going to present a typical case of NF-1 in adult and some reflections from it.

## Case presentation

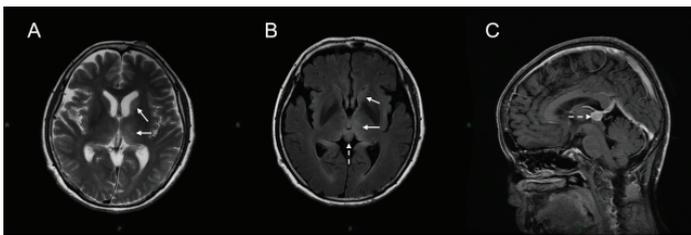
A 54-year-old female complained that her left eye blurred for 20 days and hands vibrated for 15 days. Without any

inducements, she developed left eye blurred vision accompanied with dizziness and fatigue sometimes. Then her hands vibrated involuntarily when doing housework. She walked unsteadily and fell over for 2 times when walking in a narrow path. She denied headache, diplopia, amaurosis, nausea or vomiting. She was a farmer who had never been to school. She underwent a fibromectomy 10 years ago and had a history of postpartum hemorrhage for 2 times. For physical examination, she had typical café-au-lait macules freckling neurofibromas Lisch nodules and scoliosis which could conclude the definite clinical diagnosis of NF-1 according to NIH criteria (Figure 1A,B). No genetic confirmation was obtained. For nervous system examination she had binocular uncoaxial upward gaze palsy and vertical nystagmus. Her right upper limb rigidity increased. She could not complete Mann test and had positive right palm jaw reflection and positive bilateral Rossolimo's sign. From the contrast enhanced brain MRI, lesions with slightly T1 hypointensity signals and T2 hyper-intensity signals could be seen in her left caudate, left thalamus and left hippocampus without mass effect and contrast enhancement. There was also a

pinealoma about 1.3cm×1.1cm with homogenous enhancement (Figure 2).



**Figure 1:** (A) Pigmentary manifestation and neurofibromas on the skin. (B) Lisch nodules that were not easily found because of the brown color of iris. (C) Pigmented teeth and dentition defects.



**Figure 2:** (A) T2 hyper-intensity signals in the left caudate and left thalamus without mass effect (solid arrows). (B) Hyper-intensity signals that were evident in the left caudate, left thalamus (solid arrows) and high-grade glioma lesion (dotted arrow) in axial T2-FLAIR image. (C) The pinealoma (dotted arrow) compressed the quadrigeminal plate directly.

## Discussion

In spite of typical pigmentary manifestations, the patient also had distinctive osseous lesion such as scoliosis and short height. But we also noticed that she had pigmented teeth that were fragile since a young age (Figure 1C). Teeth brushing twice a day could not relieve these symptoms. This hasn't been reported previously. But there were researches about supernumerary molars and aberrations in wisdom tooth form in NF-1 patients [3]. The cause of the tooth anomalies is unknown but it might have some association with low bone-mineral densities and osteoclast activation [3,4]. More researches on bone metabolism in NF-1 are in demand.

T2 hyperintensities are a highly sensitive and specific marker for the diagnosis of NF-1 [5]. These T2 hyperintensities on MRI (UBOs) are distinguished with probable tumours based on location, border, shape, presence of mass effect or contrast enhancement. However, individuals with NF-1 are prone to develop intracranial tumours, among which gliomas, especially optic pathway gliomas are the commonest [6,7]. Glioblastomas and malignant peripheral nerve sheath tumours can also occur in NF-1 patients [1]. Some of them may stay neurological asymptomatic, but others can be symptomatic and deteriorate as the tumours grow. Owing to the tumours' location, symptoms vary. Brainstem gliomas are the most frequently discovered brain tumour outside of the optic pathway in NF-1 patients [8]. For this patient, the nature of the pinealoma was unknown at first. After conducting lumbar puncture and serum tests, the mild elevated Human Chorionic Gonadotropin (HCG) level was found in both serum and cerebral spinal fluid. Pure germinoma

was a suspected diagnosis. In later follow-up, the patient underwent a gross total resection because of tumour enlarging combined with hydrocephalus 4 months since her first MRI. Finally, glioma grade III-IV was pathologically defined. The prognosis of this patient was poor and she passed away 6 months since her first MRI scan even though she had surgical resection followed by adjuvant radiation and chemotherapy. From this case, we should be fully aware of that patients with NF-1 have at least a fivefold increased risk for developing other brain tumours including glioblastomas [1], which may lead to a poor outcome. Treatment principles are similar with sporadic glioblastomas but this therapeutic process is tough. Biopsy might be performed as early as possible in patient with NF-1 combined with tumours.

To conclude, typical locations for T2 hyperintensities include the thalamus, basal ganglia, brainstem and cerebellum, as well as the subcortical white matter [9]. Although the nature of these lesions suggests a rather indolent course and may decrease over time, long-term surveillance is warranted to better understand whether there is progression or tumour combined. Treatment may be required in those with symptoms or unstable imaging findings.

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