

**CASE REPORT**

## MR Imaging of The Wilson's Disease

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**Abstract**

Wilson's disease is known to have various hepatic manifestations like acute hepatitis, chronic hepatitis, cirrhosis of liver and acute fulminant hepatic failure can occur in early childhood. However, we report here Wilson's disease, presented with neurological manifestations without hepatic involvement.

**Key Words**

Wilson's Disease, Hepatic, Neurological, Hepatolenticular Degeneration

**Introduction**

Wilson's disease or hepatolenticular degeneration is an autosomal recessive hereditary disease, that localise to chromosome 13 characterized by a deficiency of ceruloplasmin, the serum transport protein for copper. The most pronounced involvement is in the liver, brain, with typical involvement of the lenticular nucleus. Various hepatic forms like acute hepatitis, chronic hepatitis, cirrhosis of liver and acute fulminant hepatic failure can occur in early childhood (1). Neurological manifestations appear in the second decade and early symptoms are incoordination, tremor, dysarthria, dystonia, rigidity and difficulty with fine motor tasks (2). Neuroimaging studies and gross pathology can show diffuse or focal atrophy. Typical sites of cerebral involvement are deep grey matter and central white matter. Grey matter nuclei involvement is more common, usually bilateral symmetric in the putamen, caudate, thalamus, globus pallidus, dentate nucleus, pons and mesencephalon. We report here Wilson's disease, presented with neurological manifestations without hepatic involvement.

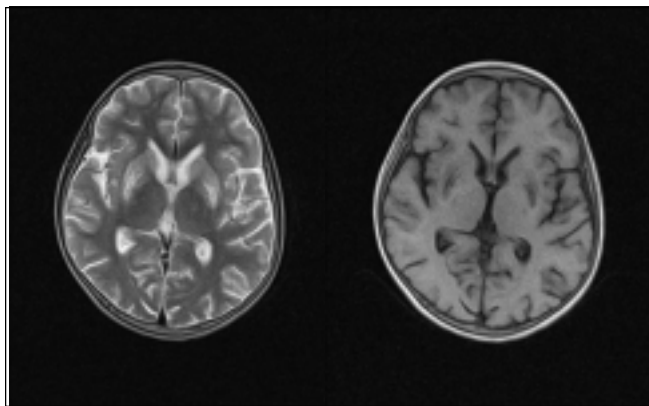
**Case Report**

A 10 years old boy, born to non-consanguineous parents presented with distension of abdomen and involuntary movement of the limbs since 3 month. There was history of episodic abnormal posturing and rigidity of limbs. No h/o jaundice, hematemesis, melena, hemoptysis, blood transfusions in the past, fever, rash, joint pains, chest pain, history of drug intake, bleeding disorders in the family. His developmental milestones were normal. On examination his vital signs were stable. Per abdominal

examination revealed spleen palpable 6 cms below left costal margin, hard in consistency with smooth and regular surface. Liver was not palpable. Neurological examination showed dystonia, choreiform movements of the limbs, exaggerated deep tendon reflexes and ankle clonus was present. Babinski's sign was positive. Complete blood count revealed hemoglobin concentration of 7 gm%. The white blood cell count was 3500cells/cu.mm (Neutrophil 56%, Lymphocytes 42%, Eosinophils 2%) and Platelets count was 90,000/mm<sup>3</sup>. Reticulocyte count was 0.6%. Liver function test were normal. Serum Ceruloplasmin level was 14mg/dl, serum copper was 245mcg/dl. 24 hours urinary copper was 1032mcg/24hrs. Serum calcium and phosphate levels were 7 mg/dl and 3.5 mg/dl respectively. Non-contrast CT Scan brain revealed hypodensity in basal ganglia and putamen. On MRI, T2-weighted images revealed high signal hyperintensities in the bilateral basal ganglia and putamen region (*Fig.1*), same region is hypointense on T1-weighted images (*Fig.2*). Ophthalmoscopic examination by slit lamp showed Kayser-Fleischer rings in both eyes. Patients was diagnosed as wilson's disease and started on penicillamine therapy. After one week of therapy the child developed pancytopenia with hemoglobin level 6gm%, TLC: 3,200/cumm and platelet count was 40,000/cumm, for which the drug was withdrawn for one week till hematological stability was regained. Therapy was again started after one week, and child responded very well to therapy. On follow up, his dystonia and abnormal movements were reduced.

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**Fig 1&2. MRI T2 & T1-Weighted Image Reveals Hyperintensity & Hypointensity in Bilateral Basal Ganglia & Putamen Region**

### Discussion

Wilson disease (WD) is an autosomal recessive condition characterized by inability of the liver to transport and store normally absorbed dietary copper resulting in abnormal deposition of copper in the basal ganglia, eyes, liver and other tissues(1,2). The clinical presentations of WD are liver and neuropsychiatric problems. Chronic active hepatitis, culminating in cirrhosis is the most common hepatic presentation, but some patients present with fulminant liver failure. Typical neurological signs include tremor, rigidity, drooling, speech changes, incoordination, tremor, difficulty with fine motor tasks, and gait difficulties. Psychiatric manifestations include compulsive behavior, aggression, depression, impulsive behavior, and phobias. Clinical presentation of WD is between 5 to 50 years. However, early childhood WD usually presents with chronic liver disease or hemolytic anemia and neurological manifestations are rare before the age of ten years (3). Diagnosis is based on clinical evaluation along with biochemical and neuroimaging confirmation. Biochemical studies reveal a low serum ceruloplasmin level (<20 mg/ dl) and increased urinary copper excretion (more than >100 µg copper per 24 hours). Hepatic copper estimation, of more than 250 µg of dry tissue (Normal 15-55 µg/g) is the most definitive method of diagnosis (4,5). In patients with WD, neuroimaging abnormalities occur in gray matter of lentiform, caudate and thalamic nuclei (5,6). Cerebral atrophy with ventricular dilatation especially of the frontal horns and cerebellar atrophy are also frequently observed in WD (6). Our patient did not have significant ventricular dilatation or cerebellar atrophy. Computerised tomography (CT) scan of the brain revealed gray matter abnormalities manifest as hypodensities. Ventricular dilatation, brainstem atrophy, and posterior fossa atrophy are other possible

findings. MRI provides a more elaborate anatomical information than CT scan of brain on the structure of basal ganglia and brain stem. On MRI, they are hypointense on T1-weighted images and hyperintense on T2-weighted sequences. The high signal intensity on T2 weighted images is believed to be due to edema, gliosis, necrosis and cystic degeneration (6). The original description of the ‘face of the giant panda’ sign by Hitoshi *et al* (7) consisted of high signal intensity in the tegmentum except for red nucleus, preservation of signal intensity of the lateral portion of the pars reticulata of the substantia nigra and hypointensity of the superior colliculus. In WD patients, neuroimaging abnormalities occur in gray matter of lentiform, caudate and thalamic nuclei (6,7). Positron emission tomography scan reveals a significantly reduced regional cerebral metabolic rate of glucose consumption in the cerebellum, striatum, and, to a lesser extent, in the cortex and thalamus (7,8). The disease is treated with lifelong use of chelating agents such as D-penicillamine or trientine hydrochloride, drugs that help remove copper from tissue. Use of zinc for maintenance therapy and for treatment of asymptomatic sibs (1,3). In our case neurological manifestation was the presenting feature without any association of hepatic involvement detected clinically and by liver function studies.

### Conclusion

Therefore, it is concluded that neurological feature may be the presenting manifestation of Wilson’s disease even in the absence of clinical evidence of hepatic involvement.

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