



A Case Report on Young Adult with Wilsons Disease

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ABSTRACT

Introduction: Wilsons disease is a rare inherited disorder which is characterized by impaired copper excretion which leads to excessive deposition of copper in many tissues and organs like brain, liver, and eye. This is also characterized by Kaiser-Fleischer ring, low serum ceruloplasmin levels and elevated urinary copper excretion.¹

Aims: To observe the pharmacological along with non-pharmacological therapy for better clinical care as directed by pharmacist counselling.

Case details: A 26year male patient came to the neurology department with chief complaints of involuntary tremors of both hands and difficulty in walking in the last one month associated with swaying to one side in the last 20 days.

Discussion: On examination the patient is having Kaiser-Fleisher ring positive and upon further investigation Magnetic resonance imaging brain was performed which revealed the features in favor of Wilson's disease. And for this condition the patient is treated with chelating agents and benzodiazepines.

Conclusion: There is no cure for this disease and the patient should require lifelong medication with good adherence. We can minimize the symptoms by eliminating the excess copper from the body. Patient should also follow the pharmacological along with non-pharmacological therapy for better clinical care as directed by pharmacist counselling.

Key Words: Wilson's Disease, Kaiser- Fleisher ring, Chelating agents, Benzodiazepines, Rare inherited disorder, Counselling

INTRODUCTION

Definition: Wilson's disease also known as hepatolenticular degeneration and degeneration syndrome or copper storage disease is defined as a rare, autosomal recessive and genetical disorder which is characterized by gene mutation changes in ATP7B gene leads to excessive copper deposition in the body tissues and mainly organs like brain, liver and eye and if it is not treated earlier it will lead to life threatening condition^{2,8}

Etiological factors

• Mutations of ATP7B gene:

ATP7B gene is a p-type ATPase gene located on the human chromosome 13 that consists of 21 exons and provide instructions in making a protein called copper-transporting ATPase². Mutations of this gene will prevent the body in eliminating the

excess copper were normally the liver releases excess copper into bile and the bile carries the copper along with waste products and toxins to eliminate from the body.

The people who have ATP7B gene without a mutation and 1 ATP7B gene with a mutation will not have Wilson's disease but they are the carriers of Wilson's disease.³

Epidemiology:

Although estimates vary, where Wilson's disease is seen in approximately 1 in 30,000-40,000 population worldwide. And we will also see approximately 1 in 90 people are the carriers of the disease. And 2,000-3,000 cases are seen in united states and actually 9,000 people are affected by Wilson's disease in united states.

Wilson's disease occurrence is equally distributed to males and females.⁴

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Signs and symptoms:

Signs and symptoms will be seen in various organs of the body such as Liver-Weight loss, Vomiting's, Tiredness, Weakness, Nausea, decreased appetite, Itching.

If not treated-Jaundice, Abdominal pain, Muscle cramps, Spider angiomas.

Brain related- Depression and anxiety, Insomnia, Personality changes, Drooling, Improper walking, Vision and memory impairment, Migraine.

Mainly we observe- sunflower eyes or sunflower cataracts in eyes, Kaiser- Fleisher ring in eyes which is in gold or brownish in color.

Other symptoms- Hypotension, Arthritis, Kidney stones, Irregular menstrual cycle, Low bone density, bluish discoloration in nails.⁵

Diagnosis:

- Serum level of ceruloplasmin
- 24 hour urinary copper excretion
- Serum, urine and liver copper levels
- Kaiser-Fleisher ring
- Neuroimaging
- MRI brain
- Features of liver disease and cirrhosis.

Neuropsychiatric disturbances.

Episodes of hemolysis.

Electrophysiological methods

Genetic testing.

Leipzig score.⁶

Pathogenesis:⁷

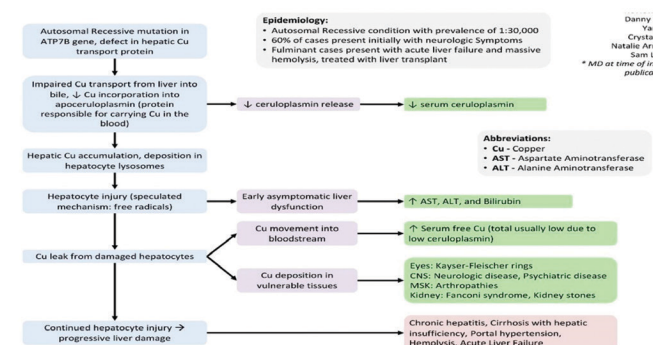


Figure 1: Pathogenesis and clinical findings of Wilson's disease.

Complications:¹⁰

1. Acute liver failure.
2. Cirrhosis and liver failure

3. Chronic hepatic dysfunction with portal hypertension or hepato-cellular carcinoma and sometimes-relentless course to cirrhosis.
4. Bleeding from varices.
5. Hepatic encephalopathy.
6. Hepato-renal syndrome.
7. Coagulation abnormalities.
8. Increased susceptibility to infections and bone fractures.
9. Anemia.
10. Muscle atrophy.
11. Spleen disorders.
12. Physical and intellectual disability.
13. If not treated or liver plantation not done leads to death.

Treatment algorithm:⁹

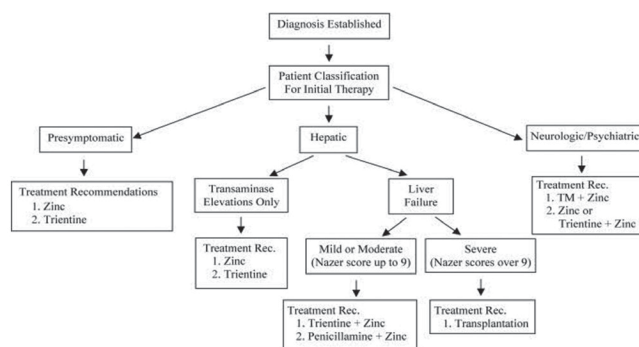


Figure 2: Initial treatment recommendation for various classification of Wilsons disease.

Pharmacological approach ¹¹

The treatment should be lifelong.

- Medications include chelating agents (penicillamine, trientine).

Penicillamine

- **MOA:** Penicillamine can chelate heavy metals such as copper, lead, and mercury and form a soluble complex that is renally excreted in the urine.
- **Adrs:** loss of appetite, change in the way things taste, nausea, vomiting, diarrhea, abdominal pain, wrinkling of skin, nail changes.
- **Dose:** 750 - 1500mg/day

Trientine

- **MOA:** Trientine chelates heavy metals including copper, iron, and zinc and forms stable complexes that can be excreted by the kidneys. Urinary copper, iron, and zinc concentrations all increased in parallel with trientine excretion.
- **Adrs:** skin rash, muscle spasm or contractions, heartburn, stomach pain, loss of appetite, skin flaking, cracking, or thickening.

• **Dose:** 750 - 1250mg/ day
zinc supplements (zinc acetate), these act as inductors of metallothionein's.

Zinc acetate

MOA: induction of intestinal cell metallothionein (Mt), which blocks copper absorption from the intestinal track.

Adrs: nausea, vomiting, stomach irritation or discomfort, indigestion, metallic taste.

Dose: 50 mg

Vitamin B6 (pyridoxine)

- MOA: it will improve the vit B6 levels in the Other agents (Sodium dimer capto succinate, dimer capto succinic acid, tetra thio molybdate).
- Surgical decompression, liver transplantation or TIPS (trans Juglar intra hepatic stunting)- used in the treatment of portal hypertension with recurrent or uncontrol variceal bleeding.
Non pharmacological approach ^{12,13}
- Limit copper containing food or supplements like: beef liver, shellfish, mushrooms, nuts, chocolates, black-eyed peas, vegetable juices, coca and also test your drinking water for copper (copper free water).
- Avoid multivitamin tablets that contain copper.
- Intake of foods like eggs, rice, butter and cream, regular oats meal, tea and coffee, vegetables like tomatoes, bread and pasta (from refined flour).
- Intake of vitamin B6 foods like: oats, bananas, soya beans, pork, poultry such as chicken or turkey, milk.
- Fruits like citrus fruits- orange, lemon, grape fruits and vegetables like starchy-potatoes, green peas, corn.
- Avoiding multivitamins that contain copper
- You should test your drinking water for copper, or find a source of water that is free of copper. It's also important to return to your doctor for regular follow-up visits and lab tests, to make sure your copper levels are under control.
- If you want to get pregnant, or are pregnant, tell your doctor. You may need to change your medication dosages, so you can have a healthy pregnancy.
- Also, talk with your doctor about other steps you can take to keep your liver healthy, such as getting vaccinated against hepatitis A and B.

Lifestyle:

- Increase your physical activity in day-to-day life.
- Avoid unwanted stress.
- Avoidance of toxins.
- Practice yoga and meditation.
- Abstinance alcohol and smoking.
- Consume vitamin and mineral rich foods.
- Take iron rich foods if the patient is deficient of iron content in the blood.

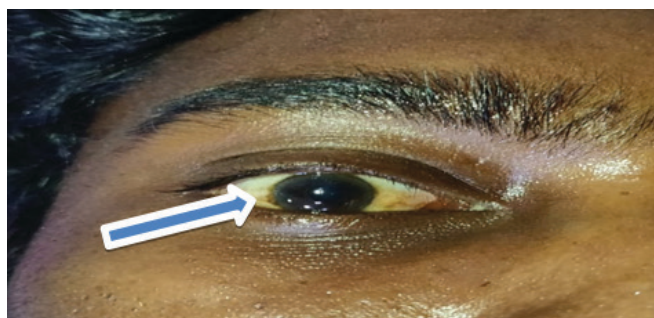
Case summary

A male patient PSN age of 26 years old admitted in the neurology department, Tertiary care teaching hospital with chief complaints of tremors of both hands and difficulty in walking for one month. Hand swaying to one side in the last 20 days, stiffening of limbs, tripping of foot, slurred speech, difficulty in comprehending the speech by the attenders not associated with behavioral.

On examination patient observed was conscious, coherent, complete and obeying commands, all vitals, CVS, RS, per abdomen are normal.

In Physical examination using torch light both eyes examined very clearly. We have found copper ring encircle the iris of the eyes. Final diagnosis was positive as **Kayser-Fleischer ring**.

Image of the patient's eye with KF ring:



As we observed altered echo texture in liver by USG Abdomen and MRI report says double panda sign positive. So final diagnosis was concluded by the above clinical evidence as Wilson's disease.

DISCUSSION

Wilson's disease is a rare inherited disorder which is characterized by impaired copper excretion which leads to excessive deposition of copper in many tissues and organs like brain, liver, and eye. It is a chronic progressive disease with a genetical determined autosomal recessive mode of inheritance and multi-system condition which affects majorly kidneys, eyes, liver and CNS which can be slowly progressive or acute and very severe. As patient have to take life-long medication medication were kaiser-fleischer ring was observed with the help of using slit lamp on the both eyes confirms that there is a copper accumulation in the body and MRI brain impression reveals that features of Wilson's disease. The patient is treated with chelating agents and zinc supplements for managing his condition, stabilized and discharged with maintenance therapy.

CONCLUSION

As we observed that there is no cure for this disease and the patient require lifelong medication with good adherence. We can minimize the symptoms by eliminating the excess copper from the body. Patient should also follow the pharmacological along with non-pharmacological therapy for better clinical care as directed by pharmacist

- Avoid copper utensils.
- Avoid copper containing foods like mushrooms, chocolates, shellfish.
- Prefer zinc containing foods like pumpkin seeds, red meat, crab, whole grains, beans.

As it is incurable and ATPB7 gene mutation disease one should maintain quality of life, properly treated.

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