Levetiracetam Induced Pancytopenia

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Case Presentation:
A 79-year-old female with a medical history of hypertension, type II diabetes, and CVA who presented with MRI brain showing a right temporo-parietal mass.

Hospital Course:
- Patient was started on dexamethasone prior to surgery due to the extensive amount of vasogenic edema.
- She underwent a temporal craniotomy with resection of the mass.
- Levetiracetam was started off-label as seizure prophylaxis.
- Postoperatively, her hemoglobin count remained stable.
- She was on levetiracetam, dexamethasone, pantoprazole, and enoxaparin as prophylaxis.
- She was noted to have an episode of melena and anemia on the fifth day postoperatively.
- Two units of packed red blood cell were transfused with an appropriate response.
- No acute gastroenterological intervention was deemed necessary at that time.
- The patient was noted to develop thrombocytopenia and leukopenia.
- Development of leukopenia was witnessed with start of levetiracetam and improvement in leukopenia was observed with discontinuation of the medication.

Laboratory Studies

**Fig 1:** Graph depicting relationship between white blood cell count and number of days post-operatively (POD). Levetiracetam was started on post-operative day 0 and was discontinued on post-operative day 10. Development of leukopenia was witnessed with start of levetiracetam and improvement in leukopenia was observed with discontinuation of the medication.

**Fig 2:** Graph depicting relationship between platelet count and number of days post-operatively (POD). Levetiracetam was started on post-operative day 0 and was discontinued on post-operative day 10. Development of thrombocytopenia was witnessed with start of levetiracetam and improvement in thrombocytopenia was observed with discontinuation of the medication. Patient was transfused 5 units of platelet on POD 8 and POD 9.

**Fig 3:** Graphs depicting relationship between red blood cell count and hemoglobin and number of days post-operatively (POD). Levetiracetam was started on post-operative day 0 and was discontinued on post-operative day 10. Patient experienced an acute bleed requiring transfusion of 2 units of RBC on POD 5, followed by a steady decline in Hgb and RBC. Improvement in anemia was observed with discontinuation of the medication.

**Fig 4:** Blood smear showing lack of schistocytes, and immature cell lines. Findings on blood smear correlate with absence of disseminated intravascular coagulation and thrombotic thrombocytopenic purpura, and are suggestive of bone marrow suppression.

Case Report

A noticeable increase in white blood cells and hemoglobin were seen five days after that.

**Fig 1:**
- WBC
- Fig 2:
- Platelets
- Discontinuation of levetiracetam
- Hgb
- RBC
- Fig 3:
- Discontinuation of levetiracetam
- Fig 4:
- Blood smear showing lack of schistocytes, and immature cell lines.

Discussion

- Levetiracetam (Keppra) is a pyrrolidone derivative and acts as an anti-epileptic medication by modulating neurotransmitter release.
- Levetiracetam was approved by FDA for partial seizure, myoclonic seizure, and generalized tonic-clonic seizure. It is used off-label as seizure prophylaxis.
- This medication is associated with a few side effects that include behavioral changes, headache, drowsiness, and weakness.
- Hematologic adverse effects are rarely caused by this therapy. These effects include anemia, thrombocytopenia, and leukopenia.
- Pancytopenia is a very rare adverse effect caused by levetiracetam. There are fewer than four case reports in the medical literature discussing the association between levetiracetam and pancytopenia.
- The pathogenesis behind this relationship is unclear.
- Our patient developed pancytopenia induced by levetiracetam which resolved after we discontinued this medication.
- Her hemolysis profile and blood smear did not reveal any signs of hemolysis. Therefore, we hypothesize that levetiracetam induced pancytopenia by causing bone marrow suppression.

Conclusion

- Clinicians should be aware that levetiracetam induces severe pancytopenia.
- Clinicians should consider changing levetiracetam to other agents in patients who develop pancytopenia with negative hemolysis profile.
- Further studies should be conducted to explain how levetiracetam induces bone marrow suppression and to find a diagnostic test for diagnosis.
- This case will serve to spread awareness of a rare cause of pancytopenia and to hypothesize how this medication causes pancytopenia.

References


*Equally contributed*