CASE REPORT

Acute carbamazepine intoxication - is plasma exchange useful?

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Abstract

We herein describe a 28 years old male who had severe acute carbamazepine (CBZ) intoxication with cardiovascular and central nervous system manifestations who had dramatic clinical recovery with significant reduction of carbamazepine levels after plasma exchange therapy

Key words: Carbamazepine (CBZ), plasma exchange (PE), high flux dialysis (HFD) charcoal hemoperfusion (CH)

Introduction

Carbamazepine (CBZ) is commonly used to treat partial seizure disorders and neurological pain syndromes. Severe acute CBZ intoxication is fatal because the drug predominantly effect the central nervous system and cardiovascular system. Oral activated charcoal and CH are still commonly used to treat acute intoxication. HFD and plasma exchange have been tried as an alternative modality of therapy in some patients with acute CBZ intoxication. We present a case of severe acute carbamazepine intoxication with cardiovascular and central nervous system involvement who improved dramatically after plasma exchange

Case report

A 28 year male was brought to the casualty in an unconscious state. He was suspected to have anticonvulsant drug overdose since one of his family member was a known epileptic. At admission his CBZ level was 110 micromol/dl and phenobarbitone level was normal. His CT head, CSF studies, EEG, renal functions and liver function tests were normal. He required mechanical ventilation and inotropic support since his respiratory effort was poor and was hemodynamically unstable. On the day of admission he was started on activated charcoal 50 G every six hours and received 2 L plasma exchange. Next day the CBZ levels decreased to 53 micromol/dl despite which he remained drowsy and hypotensive. On the second day he received another 2L plasma exchange after which the CBZ level decreased to 23 micromol/dl and he was fully alert. After 48 hours of observation he remained stable and was discharged.

Discussion

The manifestations of acute CBZ over dosage is variable. The drug has an excellent safety record, however over dose can result in death unless treated appropriately. 70 - 80% of the drug is protein bound and predominantly excreted by the kidneys. The volume of distribution (Vd) of the drug is 1-2 L/kg and peak plasma levels of the drug is achieved in 6 - 24 hours. The therapeutuc concentrations is between 4 - 12 micromol/L and half life of the drug is between 10 - 20 hours.

The correlation between drug levels and the clinical manifestation is poor and the clinical manifestations may range from mild ataxia and profound coma, respiratory failure, cardiac arrhythmias, hypotension and death. Serious neurological and cardiovascular manifestations are often seen in patients CBZ level > 60 micromol/dl. The clinical outcome depends on severity of intoxication, time between initiation of treatment and drug intoxication, co-intoxication with other drugs such as phenobarbitone and tricyclic antidepressant drugs.

The management of acute CBZ intoxication include cardiovascular monitoring and specific treatment to remove the drug from plasma. Activated oral charcoal and charcoal hemoperfusion have been used as a primary modality of therapy for the past many decades. The results of charcoal hemoperfusion is good however newer modalities like high flux dialysis and plasmapheresis are being offered in some cases and results were reported comparable to CH.

Enough data has been published on the role charcoal hemoperfusion in treating acute CBZ intoxication, however there is paucity of published data on the role
of HFD and PE. The role of these newer modalities in the treatment of acute CBZ is still controversial and there only few case reports published in the literature\textsuperscript{2}. Since CBZ is predominantly bound to protein it is logical that any method which removes larger molecular weight substances such as plasma proteins from the plasma should remove the drug along with removal of proteins.

HFD and PE are the two modalities that remove significant quantities of large molecular weight proteins. Duzova et al\textsuperscript{3} reported a 15 year girl with severe acute carbamazepine intoxication being treated with plasma exchange and reported a significant decrease in the carbamazepine levels with improvement in clinical signs and symptoms. Another case report by Kale et al\textsuperscript{4} who treated a patient with severe acute CBZ intoxication with plasma exchange which did not improve the clinical status.

We report a patient who had severe carbamazepine intoxication and a significant decrease in the levels of CBZ and good recovery after PE.

**Conclusion**

Severe acute CBZ intoxication is fatal and delay in the treatment may result in death. CH is the gold standard and is still used as primary modality in many centers. CH is a cumbersome procedure with difficulties such as delay in supply of charcoal cartridges when they are needed and bleeding complications due to consumption of platelets by the charcoal. HFD and PE were found to be beneficial in some cases and equivocal results in other cases, hence they are still not accepted as the standard treatment modalities. PE was found to be useful in our patient who improved dramatically with significant reduction of CBZ levels in the blood.

**References**