

ERTAPENEM-INDUCED NEUROTOXICITY: ROLE OF PLASMA CONCENTRATION MONITORING

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BACKGROUND AND IMPORTANCE

- Carbapenems, such as ertapenem, are beta-lactam-type antibiotics used to treat a wide variety of infections.
- **Neurological disorders have been observed in patients during ertapenem treatment**
- Factors that contribute to this toxicity are not well defined and ertapenem plasma levels have not been taken into account.

AIM AND OBJECTIVES

Evaluate the relationship between ertapenem plasma concentrations and ertapenem-induced neurological toxicity.



MATERIAL AND METHODS

COHORT STUDY → TERTIARY CARE MEDICAL CENTER → OCTOBER 2019 - FEBRUARY 2021

Adult patients treated with ertapenem → minimum period of 72 hours → at least one concentration determination.

Favoring those with old age and comorbidities. Critical patients were excluded.

Modified KARCH-LASAGNA algorithm

Establish and categorize the relationship between ertapenem use and the appearance of any clinical signs or symptoms that might indicate neurotoxicity.

SCORE ≥ 6

NEUROTOXICITY

- High-resolution liquid chromatography system + UV/visible detector → analyze ertapenem blood samples.
- Non-parametric tests were performed to search for any difference between groups (neurotoxicity/non-neurotoxicity patients)

RESULTS

102 (53% male) patients. Median age of 72 years.

Ertapenem plasma concentration was analyzed at a mean of 6.4 days (± 4.1) since starting antibiotic administration.

- 13/102 patients (12.7%) presented **neurological disorders** during ertapenem treatment, mainly:

- Confusional state
- Drowsiness.

- We noted **3 cases of hallucinations** as well as 1 patient who presented epileptic seizure and finally died.

- Mean **ertapenem blood concentration** in patients who experienced neurotoxicity was 32.16 mcg/ml (95% CI 8 to 56.3) versus 14.63 mcg/ml (95% CI 11.4 to 17.8) for those who did not present.

- **A statistically significant difference was observed in the median ertapenem blood concentration between the two groups (18.66 mcg/ml neurotoxicity group versus 9.7 mcg/ml control group; p= 0.014).**

CONCLUSION AND RELEVANCE

The group of patients who presented neurological disorders had higher concentrations of ertapenem.

Therapeutic drug monitoring can help identify those patients with high risk for neurotoxicity.

More studies are needed to define which patients could obtain the greatest benefit from a close control of ertapenem blood concentration in order to prevent this neurotoxicity.

