A case of ciprofloxacin-induced acute polymorphic psychosis with a distinct deficit of the executive functions

Abstract

We present the case of a 45-year-old female patient who developed an acute polymorphic psychosis after treatment with the antibiotic ciprofloxacin. The patient showed a distinct neuropsychological deficit of the executive
function. Comparing the psychopharmacological features of ketamine and ciprofloxacine we hypothesize that ciprofloxacine leads to psychosis similar to a ketamine induced psychosis. Our case report is unique not only because fluorquinolone induced psychosis has a very low incidence, but although because we were the first in obtaining a detailed neuropsychological testing.

Introduction

We describe an iatrogenic induced acute polymorphic psychosis with strong persecutory delusions. From a clinical point of view the case of our patient underscores the importance of a detailed drug history, from a more psychopharmacological point we hypothesize that the ciprofloxacine-induced psychosis shares aspects with an NMDA-antagonist induced psychosis.

Side effects of fluorquinolones in the CNS are well known. However their incidence seems to be relatively small. Jüngst et al. describe an incidence of 0.89 % for CNS side effects, however they count non-psychiatric (Lahti et al. 869-72)complications like tremor or sedation, which seem to be the prominent symptoms in most of the cases. Hollweg et al.(Hollweg et al. 38-47) report three cases with a ciprofloxacine-induced psychosis among a population of 4189 patients seen by the liaison psychiatrist of a university hospital. A pubmed-search revealed a surprisingly small number of relevant case reports (search terms: paranoid psychosis ciprofloxacine) if we take into account that ciprofloxacine is one of the most used antibiotics for indications like cystitis or bronchitis (Hollweg et al. 38-47;McCue and Zandt 528-29;Mulhall and Bergmann 102-03;Mulhall and Bergmann 102-03;Reeves 930-31).

Case report

We present a unique case not only because of the very low incidence of acute polymorphic psychosis (McCue and Zandt 528-29) due to ciprofloxacine but also we did a thorough neuropsychological testing.

A 45-year-old female patient developed an acute polymorphic psychosis over the course of four weeks in a progredient manner. At the beginning stood a ciprofloxacine therapy because of cystitis. The patient took 500 mg ciprofloxacine for one week. At the end of the antibiosis she developed ideas of reference. At this time she was working in a fashion shop and thought of being observed by colleagues. Two weeks later the patient suffered from a lack of concentration and had an incoherent thinking. Her mood was very labile, often aggressive and she suffered a nervous "break-down" at her job. An emergency ambulance brought her to the university hospital of Mannheim, where she experienced the behaviour of the nurses and physicians as odd and bizarre. She left the hospital but was later brought to our psychiatric hospital because her boyfriend convinced her to seek treatment.

On admission the patient was alert, memory was unimpaired but there was a deficit in concentration. Her thinking was concrete and incoherent. She had ideas of reference and ideas of persecution. She experienced acoustic hallucinations and acoustic illusions. Her mood was labile and she behaved in a hostile way.

A neurological examination was normal. A MRT of the brain was without pathological findings, EEG, laboratory diagnosis and a lumbar puncture revealed no abnormalities. We did a neuropsychological testing of the executive functions. The patient showed a low verbal IQ (88), which is adequate for a German with eight years school education. The Wisconsin-Card-Sorting-Test, the Trail making-Test, the d2-Brickenkamp-Test and a verbal subset of the Wechsler-Memory-Scale test showed severe abnormalities of the executive functions. The Stroop test was within the normal range on the lowest limits.

Test	**Raw results**	**Percentage of the norm [%]**
WCST – correct concepts	7 points	43,8 (below average)
WCST – perseveration		64,3 (below average)
TMT A	35 sec	25 (low average)
TMT B	148 sec	<10 (below average)
Stroop – interference parameter	102 sec	62 (average)

Wechsel Memory Scale - numbers	6 (forward) / 5 (backward)	18 / 12 (low average)
d2 attention task (Brickenkamp)	295 points (entire achievement)	<7 (below average)
Premorbid Intelligence	IQ 88	

We treated the patient with 1 mg lorazepame per day until we completed our diagnostic procedures. Her BPRS dropped from 48 to 40 in this first week mainly due to a reduction in hostile affect. We started antipsychotic treatment with 15 mg aripiprazole. Within 9 days the BPRS dropped from 40 to 22 and the patient was distanced from the ideas of persecution. She started working at her former job again. Six months later, a psychiatric interview did not reveal any further psychotic symptoms and the patient was feeling fine.

Discussion

The case presented shows a strong temporal relation between the onset of the paranoid psychosis and the antibiotic course with ciprofloxacine. Ciprofloxacine is a fluorquinolone and this class of drugs shows some interesting psychopharmacological features. First, ciprofloxacine shows inhibiting properties at the GABAa-receptor and leads to an up regulation of glutamatergic neurotransmission. Other drugs, which act via up regulation of glutamatergic neurotransmission, are NMDA-antagonists like ketamine or phenycyclidine, which cause a so-called model-psychosis (Lahti et al. 869-72). A ketamine-induced psychosis shares many features with schizophrenia or acute polymorphic psychosis. Fluorquinolones show an up regulation of glutamatergic neurotransmission. Second, a recent fMRI study in healthy probands showed that ketamine induces a distinct deficit of the prefrontal cortex (Honey et al. 1203-14) , a deficit with parallels to the one seen in our patient. As a consequence of this, we hypothesize that ciprofloxacine induced a deficit in prefrontal mediated executive functions via enhanced glutamate neurotransmission.

Our case is a clinical hint for the hypothesis that ciprofloxacine gains its psychosis-inducing properties via a glutamate-induced disruption of frontal executive functions. From a clinical point of view it highlights the need of a better understanding of the central nervous side effects of common used antibiotics. Aripiprazole an antipsychotic with a new mechanism showed a fast onset of action and – considering the fast onset in our patient - seems to be a good choice for treatment of ciprofloxacine induced psychosis.

References

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