

# *A Rare Case Report of Levofloxacin Intravenous Drip for Anti-Infection-Induced Epilepsy in Rescuing the Schizophrenic Patient after Cardiacarrest*

**Cunbo Wu**

*Chongqing Mental Health Center, Gele Mmountain, Shapingba district, Chongqing, China*

**Keywords:** Levofloxacin, epilepsy, cardiacarrest, schizophrenic patient.

**Abstract:** Objective: To confirm whether levofloxacin is responsible for the seizure induced by cardiac arrest in elderly patients with schizophrenia. Methods: In the course of rescue, the blood cell analysis of emergency examination indicated infection, routine anti-infection treatment of levofloxacin injection after intravenous drip. Results: The second day morning after successful rescue about cardiacarrest, this elderly schizophrenic patient developed a tonic-clonic seizure. The main manifestations are loss of consciousness, clenched teeth, muscle rigidity, foaming at the mouth, convulsions and so on. Conclusion: Levofloxacin intravenous infusion should be carefully used in elderly patients. Levofloxacin intravenous infusion in elderly patients should be cautious, that it is very likely to induce seizures, or even life-threatening, resulting in unnecessary accidents.

## **1. Case Report**

The patient, a 71-year-old female, was admitted to the hospital at 2021-7-19 due to "talking to herself, laughing, and abnormal behavior for 24+ years". Past history: She suffered from type 2 diabetes, old tuberculosis, hyperlipidemia, lumbar degeneration, cerebral infarction, and constipation were not treated regularly. No special family history or personal history. Physical examination on admission: vital signs were stable. Cardiopulmonary and abdominal (-), no edema in both lower limbs, normal muscle strength in both upper limbs, level 4 muscle strength in both lower limbs, high muscle tension in both lower limbs, sluggish, no pathological reflex. Mental examination: clear consciousness, passive contact, few words, loose thinking, answer irrelevantly, talk ramblingly and its meaning is unknown, can not be adopt effective mental examination. Decreased will activity, obvious impairment of social and cognitive functions, usually confined to wheelchairs, apathetic, floppy, social function decline, daily life requires special assistance, no insight. Admission diagnosis: 1. Schizophrenia 2. Type 2 diabetes 3. Old tuberculosis 4. Hyperlipidemia 5. lumbar degenerative changes 6. old cerebral infarction 7. constipation.

Several months after the patient was admitted to the hospital, the patient's general condition was ok, usually sitting alone in the wheelchair, quiet, poor thinking, no autonomous speech, questions and answers should not be, occasionally humming in the side, do not know the meaning, in-depth communication difficulties. Emotional stability, no impulse hurtful words and deeds, emotional indifference, lazy and passive life, unable to take care of themselves, need the assistance of nurses, no insight.

At about 2021-12-7 19:40, she suddenly cried out, followed by loss of consciousness, stopped breathing, pale face, cardiac arrest, respiratory arrest, closed eyes, great artery pulse not touched, blood pressure cannot be measured. 19: 41 The doctor on duty immediately gave cardiopulmonary resuscitation (CPR) with heart pressure. After several minutes, the patient gradually opened his eyes and became agitated and noisy. His words were not clear and he did not know the meaning. Immediately give oxygen inhalation, establish venous channels, infusion support, ecg monitoring, blood oxygen saturation monitoring. Urgent examination of blood cell analysis, electrolytes, myocardial enzymes, myocardial injury markers, renal function and other guidance treatment. Immediately notify the second-line physician on duty, and notify the division director by phone. The patient has difficulty drawing blood, and the blood is small and difficult to draw. 20: 20 The patient was in a slightly stable mood, less agitated than before, restless supine, noisy, had to get up, temperature was measured at 36.6°C, blood glucose was 11.5mmol/ L, heart rate was 80 times/min by ecg monitoring, accidental premature ventricular beats, SO<sub>2</sub> was 97%, breath was 15 times/min, blood pressure was 128/77mmHg. The patient could not hear clearly on heart auscultation due to continuous noise, and no obvious dry and wet rales were observed on lung auscultation. Myocardial injury markers, myocardial enzyme spectrum, electrolytes were normal renal function, electrolyte 1 was roughly normal. Blood cell analysis + Hypersensitive C-reactive protein: The number of white blood cells was 17.25×10<sup>9</sup>/L, neutrophils 8.20×10<sup>9</sup>/L, lymphocytes 7.73×10<sup>9</sup>/L, and monocytes 0.97×10<sup>9</sup>/L, which were high, indicating the presence of inflammatory reaction in the body. According to the instructions of superior doctors, the number of white blood cells was 17.25×10<sup>9</sup>/L, neutrophils 8.20×10<sup>9</sup>/L, lymphocytes 7.73×10<sup>9</sup>/L, and monocytes 0.97×10<sup>9</sup>/L. At 22: 30, Levofloxacin injection was temporarily given 0.2g intravenous antiinfective therapy. Then consider: 1.TIA? Hypovolemic shock? 3. Epilepsy? 4. The infection? 5. Stress? (Additional blood cell analysis and urine routine examination are planned to confirm the diagnosis). Results: the patient's heartbeat and respiration recovered, consciousness recovered, vital signs stable, successful rescue. The patient slept soundly at night and was in stable condition under ecg monitoring.

On the second day morning, the patient was in bed. During ecg monitoring, he suddenly suffered from tetanic convulsion of limbs and trunk around 8:50 am, eyes and teeth were closed. Considering the possibility of epileptic seizures, he was given diazepam 10mg for symptomatic treatment temporarily. Another patient has a cough, more than the same before no special. Physical examination: the heart rate was 108 times/min, the rest of the vital signs were stable, the breath sounds of both lungs were rough, and the sound of wet rales was audible. The rest of the physical examination was the same as before. Mental examination as before. Blood cell analysis: white blood cell number 15.73×10<sup>9</sup>/L, neutrophil number 10.23× 10<sup>9</sup>/L, lymphocyte number 4.18×10<sup>9</sup>/L, monocyte number 1.15×10<sup>9</sup>/L. Hypersensitive C-reactive protein: hypersensitive C-reactive protein 1.06 mg/L, thought to be related to infection. Markers of myocardial injury: Myoglobin 138.53 ng/mL and creatine kinase isoenzyme MB. 5.82 ng/mL were high, which might be related to epileptic seizure and muscle contraction, and temporary follow-up observation was conducted. Bedside ecg showed sinus tachycardia (108 times/min). It is thought to be related to epileptic seizures. Blood routine examination suggested obvious infection. Considering lung infection, if cefoperazone sodium and sulbactam skin test was negative, the patient was transferred to the internal medicine department of our hospital for intravenous cefoperazone and sulbactam anti-infection treatment. So far, the vital signs are stable, mental symptoms are good, and no seizures have occurred. Current diagnosis: 1. Pulmonary infection 2. Epilepsy 3. Type 2 diabetes 4. Old tuberculosis 6. Hyperlipidemia 7. Lumbar degeneration 8. Old cerebral infarction 9. Constipation.

## 2. Discussion

This case patient is a schizophrenic elderly female, social function is complete recession, life cannot take care of herself, amalgamated a lot of body disease. Blood cell analysis suggests infection, sudden cardiac arrest is most likely infection-related. It is normal to give anti-infective treatment during the rescue. Meantime levofloxacin is the third generation of quinolones, which has the advantages of wide antibacterial spectrum, strong antibacterial activity, high concentration of drugs in tissues and cells, and is not used as skin test, convenient and widespread clinical application. Under the guidance of superior doctors, levofloxacin anti-infection treatment was given during the rescue. However, the seizure occurred on the second day after the successful rescue, which was most likely related to the intravenous infusion of levofloxacin on the last night of the rescue. In addition to levofloxacin anti-infection, no other drugs were used in the rescue, and levofloxacin has been reported to induce seizures. It may be because quinolones have certain lipid solubility and bind to  $\gamma$ -aminobutyric acid (GABA) receptor after crossing the blood-brain barrier, thus blocking the connection between GABA receptor and natural ligand, resulting in increased central nervous excitability [1]. and inducing central nervous system symptoms such as epilepsy. The mean final plasma clearance half-life of levofloxacin was 6-8h, and it could not be completely cleared in vivo at 1h. Therefore, the adverse reactions caused by levofloxacin cannot be excluded. According to the analysis of 296 cases of adverse reactions of levofloxacin by Wang Zhihong et al. [2], adverse reactions occurred within 1min at the earliest and 2 months after medication at the latest. The patient was old, had many diseases and had normal renal function. Although the drug dose was 0.2g intravenous infusion and the infusion speed was slow, the patient still had adverse reactions of seizures on the second day. The reasons were considered to be old age, low body weight, previous history of cerebral infarction, and levofloxacin injection.

In this case, the epileptic event induced by intravenous levofloxacin gives clinicians a major revelation. When elderly patients take quinolones such as levofloxacin, great attention should be paid to the occurrence of adverse reactions, and special attention should be paid to neurological symptoms, such as insomnia, irritability, epilepsy, etc. and the drug should be stopped in time to avoid serious consequences. Moreover, elderly people with cerebral arteriosclerosis, increase the cerebral vascular resistance, reduce cerebral blood flow, directly affect the cerebral energy reserves, as the growth of the age, reduced Numbers of brain cells, brain also reduce the number of bladder alkali receptors, cholinesterase activity decline, so the elderly on the central drug sensitive reaction, affecting the mental activity of drug sensitivity increases, Elderly patients are prone to adverse nervous system reactions. At the same time, the liver and kidney function of the elderly decreases, and the liver blood flow decreases with age, and the liver clearance rate decreases. In addition, the liver volume of the elderly decreases, and the enzyme activity of the liver microsomal drug metabolism decreases. The drug metabolism of the elderly is slower than that of the young, and the drug half-life is generally longer, and the drug metabolism and excretion function are reduced. With the increase of age, the number of nephrons decreases, the effective renal blood flow decreases, and the glomerular filtration rate decreases, so the half-life of drugs excreted through the kidney is prolonged, while the metabolism of levofloxacin through the kidney is mainly excreted by urine as prototype drugs, which leads to the prolonged time of drug storage in the body. [3, 4, 5,6] studies have shown that the half-life of drug elimination can be extended by more than 27h for patients with creatinine clearance rate  $< 20$  ml /min. Levofloxacin 500 mg, given continuously once a day, may form significant accumulation in the body from the third day of administration [7, 8, 9, 10], which is prone to cause adverse drug reactions.

However, for patients with epilepsy, we should pay attention to identify the side effects caused by drugs, or the neurological symptoms of the disease itself, so as not to mistreat. In this case, due to timely and correct treatment, the patient was pulled back from the brink of death and recovered

smoothly. As a clinician, doctors should be proficient in pharmacology and always pay attention to adverse drug reactions. When relevant situations occur, the doctors can correctly identify and make correct treatment in time, so as to do a better clinical job.

## References

- [1] Dai Z Y. (2004) *Practical anti-infection therapeutics*. People's Medical Publishing House, 81, 306.
- [2] Wang Z H, Zhang W W, and Feng Y F. (2011). Literature analysis of 296 cases of adverse reactions caused by levofloxacin. *Journal of Pharmacoepidemiology*, 20(8), 430-433.
- [3] Chen, Y. (2010). Analysis of neuropsychiatric symptoms caused by new-generation fluoroquinolones in the elderly. *Chinese Community Physicians* (11), 1.
- [4] Xu Z Q, He X M, Xiao W C. (2017). Clinical analysis of drug-induced encephalopathy in patients with maintenance hemodialysis. *Chinese Journal of Integrated Traditional and Western Nephropathy*, 18(11), 2.
- [5] Neame, M., King, C., Riordan, A., Iyer, A., Kneen, R., Sinha, I., & Hawcutt, D. B. (2020). Seizures and quinolone antibiotics in children: a systematic review of adverse events. *European journal of hospital pharmacy: science and practice*, 27(2), 60–64. <https://doi.org/10.1136/ejhpharm-2018-001805>
- [6] Scavone, C., Mascolo, A., Ruggiero, R., Sportiello, L., Rafaniello, C., Berrino, L., & Capuano, A. (2020). Quinolones-Induced Musculoskeletal, Neurological, and Psychiatric ADRs: A Pharmacovigilance Study Based on Data from the Italian Spontaneous Reporting System. *Frontiers in pharmacology*, 11, 428. <https://doi.org/10.3389/fphar.2020.00428>
- [7] Xu J F. (2008). *Population pharmacokinetics of levofloxacin: a pharmacodynamics study*. (Dissertation, Fudan University), 5.
- [8] Shi L Y. (2011). Clinical analysis of 18 cases of chronic renal failure complicated with antibiotic encephalopathy. *Chinese Journal of Practical Medicine*, 6(3), 183-184.
- [9] Kang, G., Min, S. H., Kim, J. K., & Kang, K. W. (2019). Association between the Levofloxacin Plasma Concentration and Neurological Adverse Events in an Elderly Patient. *Journal of clinical neurology* (Seoul, Korea), 15(4), 572–574. <https://doi.org/10.3988/jcn.2019.15.4.572>
- [10] Baik, S., Lau, J., Huser, V., & McDonald, C. J. (2020). Association between tendon ruptures and use of fluoroquinolone, and other oral antibiotics: a 10-year retrospective study of 1 million US senior Medicare beneficiaries. *BMJ open*, 10(12), e034844. <https://doi.org/10.1136/bmjopen-2019-034844>