Ototoxicity in Chinese Osteosarcoma Children Treated with Cisplatin

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Abstract

Objective: To evaluate the ototoxicity of cisplatin in Chinese children who were suffered from osteosarcoma.

Patients & Methods: Retrospective case series of Chinese children who were treated in a tertiary referral centre of Hong Kong. Data was based on hospital records of children who were suffering from osteosarcoma between 1994 and 2001. They all have cisplatin treatment with pre- and post-chemotherapy pure tone audiometry results.

Results: Sixteen patients fulfilled the inclusion criteria were studied. Nineteen percent had grade I hearing impairment even at baseline evaluation. Sixty-nine percent showed worsening of the hearing after cisplatin treatment. The hearing threshold was increased at 2000Hz after cisplatin, which was more clearly shown at 4000Hz and 8000Hz. The results were statistically significant with the p-value 0.011, 0.003 and 0.002 respectively.

Conclusion: Cisplatin would damage the hearing particularly at high frequency range (2000Hz, 4000Hz and 8000Hz). The hearing at low frequency range was relatively spare.

Key words
Cisplatin; Osteosarcoma; Ototoxicity

Introduction

Cisplatin, a DNA-damaging agent, is widely used as a chemotherapeutic agent for treatment of solid tumours such as neuroblastoma, medulloblastoma, hepatoblastoma, hepatocellular carcinoma (HCC) and osteosarcoma. On the other hand, cisplatin also induces a lot of side effects including nephrotoxicity, gastrointestinal toxicity, myelosuppression, and neurotoxicity such as ototoxicity.

For the mechanism of ototoxicity, cisplatin generates reactive oxygen species (ROS) and interferes with the antioxidant systems of cochlear sensory cells (inner and outer hair cells) and spiral ganglion cells, leading to the degeneration of the stria vascularis which result in sensorineural hearing loss. The sensorineural hearing loss begins at high frequencies. The incidence of auditory hair cell damage and hearing loss can be as high as 90% with patients undergoing cisplatin chemotherapy. As mammalian hair cells do not regenerate so such hearing loss is permanent.

Method of Study

We performed a retrospective chart review on a cohort of osteosarcoma patients treated with cisplatin from 1994 to 2001 in the Children Cancer Centre (CCC) of Prince of Wales Hospital (PWH). We included all Chinese patients with osteosarcoma treated with cisplatin. The exclusion criteria were patients with no baseline pure tone audiometry (PTA) evaluation before cisplatin treatment, patients with no follow-up PTA after cisplatin treatment, and patients underwent cranial radiotherapy treatment on top of cisplatin (as confronting factor for hearing loss). Data were collected under standard data registration sheet with information...