Sodium Thiosulfate for Protection from Cisplatin-Induced Hearing Loss In Children

Hepatoblastoma is the most common form of liver cancer in children, it usually diagnosed in children younger than 3 years. Cisplatin is the most active single agent used to treat hepatoblastoma (1), however cisplatin can damage the cochlea leading to a significant permanent hearing loss in over 60% of children; which will affect there speech, cognition and quality of life (2,3). Thus, there is a necessary need for an intervention that will protect children from cisplatin-induced hearing loss without decreasing from the effectiveness of cisplatin. Sodium thiosulfate combines with cisplatin to form a complex nontoxic to both normal and cancerous cells (2), it has been showed a protective effect against cisplatin-Induced hearing loss in pediatric hepatoblastoma(4).

A randomized controlled multicenter clinical trial over a period of 7 years, it published in 21 June, 2018, aimed to investigate the effectiveness of sodium thiosulfate in reducing the incidence and severity of cisplatin-related ototoxic effects without jeopardizing overall and event-free survival in children with hepatoblastoma. In this study 109 children between the ages of (1 month - 18 years) who had standard risk hepatoplastoma (≤3 involved liver sectors, no metastatic disease, and an alpha-fetoprotein level of >100 ng per milliliter) were randomly assigned to receive either cisplatin alone 80 mg/m^2 of body-surface area in a continuous intravenous 6-hour infusion for four preoperative and two postoperative courses at 14-day intervals, or with delayed administration of sodium thiosulfate 20 g/m^2 over 15 min (to be administered 6 hours after cisplatin chemotherapy IV) for four preoperative and two postoperative courses. Radical surgery was attempted after four courses or, if the tumor was considered to be unrespectable, postponed until the end of treatment. The primary end point was the absolute hearing threshold, as measured by pure tone audiometry, at a minimum age of 3.5 years. Hearing loss was assessed according to the Brock grade (on a scale from 0 to 4, with higher grades indicating greater hearing loss). The main secondary end points were overall survival and event-free survival at 3 years (5).

At a median of 52 months of follow-up, incidence of hearing loss occurred in 33% of the children in cisplatin plus sodium thiosulfate group, as compared to 63% of the children in cisplatin alone group, indicating a 48% lower incidence of hearing loss in the cisplatin-sodium thiosulfate group (P=0.002). The relative risk of any hearing loss with cisplatin–sodium thiosulfate treatment was 48% lower than with cisplatin alone. There was no significant difference in the rates of event-free survival or overall survival between the two groups (5).

In conclusion, the addition of sodium thiosulfate administered 6 hours after cisplatin chemotrapy in children with standard-risk hepatoblastoma resulted in a significantly lower incidence of cisplatin-induced hearing loss in children, without a decrease in the effectiveness of cisplatin, and without jeopardizing overall or event-free survival. Further studies are needed to show this protective effect in other types of cancer.

References:

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