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ORIGINAL ARTICLE

Cancer treatment in determination of hearing loss☆,☆☆

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Abstract
Introduction: Chemotherapy and radiotherapy in oncology have repercussions in hearing health, and can damage structures of the inner ear. These repercussions usually, result in a bilateral and irreversible hearing loss.
Objective: To identify sensorineural hearing loss cases with complaints of tinnitus and difficulty in speech understanding and investigate their relationship with the types of chemotherapy and radiotherapy the patients received.
Methods: Cross-sectional, clinical, observational, analytical, historical cohort study of 58 subjects treated in a public hospital in the state of Sergipe, diagnosed with neoplasia. The subjects were submitted to anamnesis, conventional pure tone audiometry, and speech recognition threshold.
Results: Of the 116 ears, 25.9% presented sensorioneural hearing loss characterized by changes in high frequencies. There was a positive correlation between hearing loss and the association of chemotherapy and radiotherapy ($p = 0.035$; $R = 0.196$). The auditory complaint analysis shows that most of the subjects had tinnitus and speech understanding difficulty, even with a normal auditory threshold.
Conclusions: Cancer treatment causes hearing loss, associated with the administration of chemotherapy and radiotherapy. Cyclophosphamide increased the risk of causing hearing loss. Complaints of tinnitus and speech understanding difficulty were observed.

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PALAVRAS-CHAVE
Neoplasia;
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Tratamento oncológico na determinação das alterações auditivas

Resumo
Introdução: O tratamento quimioterápico e radioterápico na oncologia tem repercussão na saúde auditiva e pode lesar estruturas da orelha interna. Ocasiona perda auditiva, geralmente bilateral e irreversível.
Objetivo: Identificar casos de perda auditiva sensorioneural e sua relação com a média de sessões de quimioterapia e radioterapia, com queixas de zumbido e dificuldade de entendimento da fala, bem como sua relação com medicamentos quimioterápicos.
Método: Estudo de coorte histórica com corte transversal, clínico, observacional, analítico e retrospectivo em 58 sujeitos de um hospital público de Sergipe diagnosticados com neoplasia. Realizou-se anamnese, avaliação audiológica tonal convencional e pesquisa do limiar de reconhecimento de fala.
Resultados: Das 116 orelhas; 25,9% apresentaram perda auditiva sensorioneural caracterizada por alterações nas frequências agudas. Observou-se correlação significativa entre perda auditiva e associação da quimioterapia e radioterapia (p = 0,035; R = 0,196). Na análise das queixas auditivas, verificou-se que a maioria apresentou zumbido e dificuldade de entendimento de fala, mesmo com limiares auditivos normais.
Conclusões: O tratamento oncológico gera perda auditiva, que foi determinada pela associação da quimioterapia e radioterapia. Ciclofosfamida aumentou as chances de gerar perda auditiva. Verificou-se presença de queixas de zumbido e dificuldade de entendimento da fala.

Introduction

Currently, cancer is considered a public health problem with high prevalence. There is a projection of 27 million new cases for the year 2030 worldwide and 17 million deaths from the disease. In Brazil, estimates for the year 2014/2015 report approximately 580,000 new cases of the disease. Among the most prevalent forms, non-melanoma skin cancer, prostate, breast, colorectal, lung, and stomach cancers prevail.[1]

The basic modalities in cancer treatment involve surgery, chemotherapy, and radiotherapy. Currently, the combination of chemotherapy and radiotherapy has improved patient survival. However, none of these treatment modalities is free of side effects. Among their effects, hearing loss caused by ototoxicity, can be documented.[2–4]

In recent years, the number of studies reporting the influence of chemotherapeutic agents on hearing function has increased. The drugs employed belong to different classes, and some of them – aminoglycosides, antineoplastic agents, antibiotics, nonsteroidal anti-inflammatory drugs, diuretics and antihypertensives – are considered to be ototoxic drugs. Drugs included in the platinum group are the most devastating, generating auditory symptoms such as tinnitus and hearing sensitivity change.[2,4,5] It has also been observed that vincristine, doxorubicin, gemcitabine, cyclophosphamide, oxaliplatin, and farmorubicin[6] also are ototoxic.

Radiotherapy can also damage the auditory organ. This therapeutic modality promotes tumor cell destruction by its ionizing radiation beams. A pre-calculated dose of radiation is applied to tumor cells during a specified time period, in a volume of tissue that includes the tumor. Hearing loss is most commonly found in the treatment of head and neck tumors. Although there are few studies focused on the side effects of radiotherapy on hearing health, the literature shows a wide variation in the incidence of ototoxicity.[3,7]

In both treatments, the higher concentration of toxic substances in the body is able to reach the organ of Corti and sensory epithelia of the posterior labyrinth, through the labyrinthine fluids. These substances compromise mainly the outer hair cells and can lead to cochlear symptoms; however, vestibular disorders may arise in a slow or insidious way, even after the end of treatment. Usually, hearing loss is bilateral, irreversible, associated with tinnitus and is high-frequency in audiometric configuration.[3,5,8]

Studies investigating hearing in oncologic patients using conventional audiometric frequencies, report variable symptoms. It is common to observe tinnitus, difficulty understanding conversation in noisy environments, and changes in speech discrimination.[9]

Studies in this area also report that the hearing loss caused by ototoxic substances is often underestimated. Even in the presence of a hearing disorder, patients only report hearing complaints in specific situations, such as in noisy environments. Other patients only exhibit partial understanding of a message, which makes it more difficult for relatives to detect the hearing loss.[10]

Studies on oncology and hearing health sought to promote early detection of hearing impairment and to implement preventive measures in order to improve the quality of life of this population. This research was specific; its objectives were to identify cases of sensorineural hearing loss and their relationship with chemotherapy and radiotherapy session means, and with tinnitus and speech understanding