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ORIGINAL ARTICLE

Otoacoustic Emissions in Children Treated With Gentamicin in a Secondary Hospital☆

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KEYWORDS
Hearing loss;
Gentamicin;
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Abstract
Introduction: The National Commission for the Early Detection of Hearing Loss (CODEPEH) recommends the re-evaluation of hearing in children who have suffered any potentially harmful event, such as the prescription of ototoxic antibiotics such as gentamicin. The evoked otoacoustic emissions (EOAE) are a good method for assessing the integrity of cochlear functionality.
Material and method: A prospective study is presented, including 92 children who were treated with intravenous gentamicin for septic risk/sepsis or urinary tract infection. The children underwent serial EOAE: on admission, at the end of treatment and one month later (if altered on discharge).
Results: In the end, none of the subjects were affected by the treatment.
Conclusion: Gentamicin appears to be a safe antibiotic in treatments lasting <10 days and at the doses described. EOAE are an inexpensive, fast, non-invasive and reliable method to check for gentamicin ototoxicity. This could save in the determination of drug levels.

PALABRAS CLAVE
Sordera;
Gentamicina;
Ototoxicidad;
Otoemisiones acústicas

Otoemisiones en los niños tratados con gentamicina de un hospital comarcal

Resumen
Introducción: Las recomendaciones de la Comisión Nacional para la Detección Precoz de la Hipoacusia (CODEPEH) aconsejan re-valorar la audición de aquellos niños que hayan sufrido algún evento potencialmente dañino para la audición como es la utilización de antibióticos ototóxicos como la gentamicina. Las otoemisiones evocadas son un buen método de evaluación de la integridad de la función coclear.

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Material y método: Se presenta un estudio prospectivo que incluye a 92 niños, sin otros factores de riesgo auditivo, en los que se pautó tratamiento con gentamicina intravenosa por riesgo séptico/sepsis o infección urinaria y en los que se realizaron otoemisiones seriadas: al ingreso, al finalizar el tratamiento y al mes del alta (si estaban alteradas).
Resultados: Ningún sujeto presentó otoemisiones alteradas al final del seguimiento.
Conclusión: La gentamicina parece un antibiótico seguro en tratamientos con una duración <10 días y a las dosis descritas. Las otoemisiones son un método barato, rápido, incruento y fiable para comprobar la posible ototoxicidad por gentamicina. Su realización podría ahorrar la determinación de niveles del fármaco.

Introduction

In 2010[1] the Joint Committee on Infant Hearing (JCIH) and the National Commission for the Early Detection of Hearing Loss (CODEPEH) recommended the re-evaluation of hearing in children (especially those under one month old) who had suffered any potentially harmful event to their hearing, such as the use of ototoxic antibiotics, as this was an added risk factor to the reason for their admittance and to other treatments required for their condition.

Gentamicin is an aminoglycoside which is frequently used as a first line antibiotic in neonatal sepsis and urinary tract infections. Despite its unquestionable usefulness, for many years its ototoxic and nephrotoxic potential has also been a known factor. Previous studies have reported that the ototoxicity of aminoglycosides ranges from between 2% and 25%.[2,3]

Objectives

The main objective was to determine the incidence of ototoxicity through evoked otoacoustic emission registration (EOAE) associated with treatment with gentamicin in newborns and infants, with no other deafness risk factors (Table 1), in patients diagnosed with sepsis or septic risk, and with urinary tract infections.

The secondary objectives were to describe the patient characteristics and antibiotic treatment (dose, duration and levels in blood).

Material and Method

Inclusion Criteria

A prospective study which included all children, without any other hearing loss risk factors, who had been admitted to a regional hospital between 2014 and 2017, where treatment with intravenous gentamicin had been administered due to septic risk/sepsis or urinary tract infection and in which seried otoacoustic emissions had been made in accordance with protocol.

Exclusion Criteria

No knowledge of hearing test prior to admittance and at discharge.

Data Analysis

Otoacoustic emission registration was proposed for all the children in the sample prior to the initiation of treatment and a second evaluation prior to hospital discharge. If the registration was pathological on discharge, the study was repeated in the external surgery one month later.

The study variables were the results of the bilateral otoacoustic emissions.

If for any reason it was not possible to carry out otoacoustic emission on admittance, the result of the test at birth was accepted as valid, provided that it had been carried out at least one month previously.

The personal variables collected were: gender, age at birth, weight at birth and at admittance to hospital, hearing loss risk factors, creatinine, diagnosis, antibiotics, dose, days of treatment and gentamicin levels.

The data base of the paediatric service was used in compliance with the centre's confidentiality and with authorisation from the research committee.

Data treatment used an Access 2003 data base, with an Excel 2003 (Microsoft®) spreadsheet and the SPSS 20.0 (IBM®) statistical programme.

Material

Bilateral EOAE tests were made with an automatic neonatal filtering device (AccuScreen Madsen, GN Otometrics®) with the following characteristics:

- Method: average of weighted noise and significant signal peak count.
- Stimulus: non lineal sequence of clicks.
- Intensity: 70–84 dB SPL (45–60 dB HL).
- Frequency: 60 Hz.
- Range: 1.5–4.5 kHz.

The gentamicin doses used in the neonatal patients were those recommended by Neofax[4] and were between 4.5–7.5 mg/kg/day for the remainder of patients in accordance with the recommendations of the Spanish Agency of Medicines.[5]

Levels of gentamicin in serum were quantified by kinetic immunoturbidimetry of microparticles in a Cobas 8000® (Roche Diagnostics SLU®) autoanalyser. The measurement