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REVIEW ARTICLE

Neoplastic meningitis. Review of a clinical series ☆

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Abstract
Introduction: The increase in the ageing population in the last decades has led to an increased frequency of cancer-associated complications. Among these, neurological disorders stand out, as they appear in 10-30% of patients with systemic neoplasia. Neoplastic meningitis accounts for 4-15% of patients with solid tumours and it has a poor prognosis. The objective of this paper is to describe the clinical, imaging and prognostic characteristics as well as cerebrospinal fluid findings in a series of neoplastic meningitis.
Background and development: We performed a retrospective review of all patients admitted to the Hospital Universitario of Gran Canaria Dr. Negrín with clinical suspicion of neoplastic meningitis between 1990 and 2008.

We selected 37 patients with an average age ranging from 15 to 75 years old. A total of 81.8% of the cases in which a primary tumour was found were associated with solid tumours (24.2% were located in the breast, and 24.2% in the lung). The most frequent sign of cranial nerve dysfunction was dyplopia, which was observed in 32.4% of the cases. The average survival rate after diagnosis was 87.9 days (12.6 weeks). The cerebrospinal fluid cytology was positive in 46.4% of the cases.
Conclusion: Neoplastic meningitis is a severe complication of both solid and haematological tumours. We stress the importance of maintaining a high level of suspicion to achieve early diagnosis, since the average survival probability for neoplastic meningitis patients is low.

PALABRAS CLAVE
Meningitis carcinomatosa;
Meningitis neoplásica;

Meningitis neoplásica. Revisión de una serie hospitalaria

Resumen
Introducción: El progresivo envejecimiento de la población en las últimas décadas ha provocado un aumento en la frecuencia de aparición de las muchas complicaciones que

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Líquido cefalorraquídeo;
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se asocian al cáncer. Entre ellas destacan las neurológicas, que aparecen en un 10-30% de los pacientes con neoplasias sistémicas. La meningitis neoplásica aparece en un 4-15% de los pacientes con tumores sólidos y se asocia a un mal pronóstico. El objetivo de este trabajo es describir las características clínicas, licuorales, de imagen y pronósticas en una serie de meningitis neoplásica.

Fuentes y desarrollo: Se realizó una revisión retrospectiva de todos los pacientes ingresados en el Hospital Universitario de Gran Canaria Dr. Negrín con sospecha de meningitis neoplásica entre los años 1990 y 2008. Se seleccionaron 37 pacientes, con un rango de edad entre los 15 y los 75 años. De los 33 casos en los que se identificó un tumor primario, 27 (81,8%) estaban asociados a tumores sólidos (24,2% de mama y 24,2% de pulmón). La diplopia fue la manifestación de disfunción de nervios craneales más frecuente, observándose en 12 casos (32,4%). La supervivencia media tras el diagnóstico fue de 87,9 días (12,6 semanas). La citología del líquido cefalorraquídeo fue positiva en 12/26 casos (46,4%).

Conclusión: La meningitis neoplásica es una complicación grave de los tumores tanto sólidos como hematológicos. Es necesario mantener un alto nivel de sospecha que permita establecer un diagnóstico precoz, puesto que la supervivencia media en los pacientes con meningitis neoplásica es baja

Introduction

Progressive ageing of the population over the last few decades has caused a significant increase in the incidence of different types of cancer in our society.[1-3] At the same time, their treatment has improved, prolonging survival after diagnosis.[4] This has increased the appearance of many complications associated to this disease. Neurological complications among cancer patients stand out, as they appear in 10%-30% of cases.[5,6]

Neoplastic meningitis (NM) is the infiltration of the meninges by tumour cells, which are spread through the cerebrospinal fluid (CSF).[7,8] It was first described by Eberth in 1870.[9] A relatively common complication in systemic cancers, it appears in 3%-15% of patients with solid tumours (carcinomatous meningitis) and in 5%-15% of patients with haematological tumours (lymphomatous meningitis and leukemic meningitis).[10-17]

This paper is to describes the clinical, imaging and prognostic characteristics as well as cerebrospinal fluid findings in a series of NM cases.

Material and methods

We performed a retrospective review of all patients admitted to the Hospital Universitario de Gran Canaria Dr. Negrín with clinical suspicion of NM between 1990 and 2008. This is a tertiary hospital that covers a health area of approximately 450,000 inhabitants.

All patients admitted to the Neurology Department were given a discharge report, which is stored on a computerised database (FILEMAKER PRO version 5.5®). All admittances during the study period were selected and reviewed, including all patients admitted with suspected NM, according to the criteria set out by the authors of this paper (please see further on). Patients admitted to other departments were found using the hospital Coding Department. A search was performed using the terms "neoplastic meningitis," "carcinomatous meningitis", "meningeal carcinomatosis", "leptomeningeal carcinomatosis", "lymphomatous meningitis" and "leukemic meningitis".

All patients initially selected were reviewed by two of the authors. In all cases selected, we reviewed epidemiological data (age and gender), clinical data (whether there was fever or not, headache, neck stiffness, nausea or vomiting, cranial nerve abnormalities, consciousness impairment or other clinical focus and/or seizures), oncological data (whether there was a known primary tumour and its location), laboratory values (basic blood tests, biochemistry and erythrocyte sedimentation rate), CSF parameters (cytobiochemistry, microbiological analysis and cytology) and neuroimaging technique results (computerised tomography [CT scan] and brain magnetic resonance imaging [MRI] for every case). We specifically looked for diagnosis through culture, serology or polymerase chain reaction, in both blood and CSF, of aerobic and anaerobic bacteria, *mycobacteria, Treponema pallidum* and neurotropic virus (human immunodeficiency, Epstein-Barr, cytomegalovirus, herpes simplex and varicella-zoster viruses). In cases where fungi detection techniques had been carried out, these results were also collected. Disease evolution was reviewed in all cases.

Carcinomatous meningitis diagnosis was based on clinical data, cerebrospinal fluid and neuroimaging data. Neoplastic meningitis was diagnosed as the following: 1) presence of neoplastic cells in the CSF; 2) CSF cellularity >10 leukocyte count, with negative microbiological studies and findings in the brain MRI or CT scan compatible with neoplastic meningitis; 3) CSF cellularity>10 leukocyte count, with decreased CSF glucose (<50% plasma glucose) and/or high protein (protein in the CSF> 45mg/dl), as long as the aforementioned microbiological studies were negative and there was a previous history of malignant neoplasm or diagnosis of it during admittance or follow-up.