



“Assessment of cognitive aging in patients with localized colon cancer receiving adjuvant chemotherapy”

Mimenza Alvarado Alberto Jose, Mateos Soria Abigail, Soto Pérez de Celis Enrique, Aguilar Navarro Sara.

NeuroGeriatric Program, Department of Geriatrics, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City.



Introduction

With the availability of new and effective cancer treatments, challenges arise in managing complications in cancer survivors. One example is colon cancer, which, in clinical stages II and III, has a 5-year survival rate of 78% with surgical treatment and adjuvant chemotherapy. Today, we know that up to 45% of patients with localized colon cancer present with cognitive impairment at the time of diagnosis. Along with these findings, little research has been conducted on the effect of chemotherapy on the cognitive function of these patients, as this phenomenon has been most extensively studied in breast cancer, where it has been described that up to 45% of patients who have received treatment experience some effect on cognitive function after treatment. These impairments have been linked to multiple mechanisms (immunological, inflammatory, chemotherapy, psychiatric disorders, genetic predisposition, the procoagulant state, and alterations in cerebral microcirculation) as possible mechanisms associated with cancer-related cognitive decline. However, most of these studies have not been explored in patients with colon cancer, and the results are variable even in patients with breast cancer. There is limited evidence regarding hemodynamic alterations in cerebrovascular function in cancer patients and their possible association with cognitive decline.

Objetive

The objective of the study was to evaluate the function of the cerebral microvasculature and cognitive function in patients diagnosed with colon cancer pre- and post-treatment with chemotherapy.

Methods

A prospective, observational study was conducted in patients diagnosed with colon cancer, candidates for surgery and adjuvant chemotherapy (fluoropirimidina monodroga o fluoropirimidina más oxaliplatino), at the INCMNSZ (National Institute of Medical Sciences and Nutrition Salvador Zubirán). Twenty-four patients with stage II-III colon cancer at diagnosis and no prior diagnosis of cognitive impairment were included. All patients underwent sociodemographic data collection, cognitive screening assessment, transcranial Doppler ultrasound (recording mean, peak systolic, and diastolic velocities), pre- and postchemotherapy apnea tests, routine laboratory tests, and cytokine levels [IL-1, IL-2, IL-6, IL-8,IL-10, TNF-alpha].

Results

The average age was 66 (+/-) 6 years, 64% were women, and the average years of education was 8. No cognitive impairments were identified in the screening tests (MoCA, MMSE). The cognitive assessment test (NEUROPSI) showed poorer cognitive performance due to impairments in executive functions (attention, concentration), p < .005, without meeting the criteria for a major neurocognitive disorder. Transcranial Doppler ultrasound showed a decrease in peak systolic and diastolic velocities both before and after chemotherapy in the middle cerebral artery (MCA): .87 (0.88-.75), p < .005.

The E3/E3 hozygous genotype was the most frequent (68%). Elevated levels of interleukin-6 and interleukin-8, as well as tumor necrosis factor-alpha, were observed. Table 1 shows the main findings in the clinical parameters.

Conclusions:

Our study demonstrates that there are no cognitive alterations suggestive of a cancer-related disorder (mild cognitive impairment or dementia); however, cognitive alterations were observed in the domains of executive function (attention and concentration). Furthermore, alterations in vascular dynamics suggest that cancer and chemotherapy treatment affect vascular function, changes that could predispose to future cognitive impairment, reinforcing the possibility of chemobrain. Inflammation and the effects of chemotherapy are likely to compromise cerebral blood flow. Furthermore, cognitive assessment in patients with colon cancer is important, and post-treatment evaluations could identify patients at risk of cognitive decline. Long-term follow-up and long-term follow-up studies are essential.

This project was funded by the Secretariat of Education, Science, Technology and Innovation (SECTEI) of Mexico City

Table 1.- Sociodemographic characteristics and findings in cognitive and vascular function

Characteristics	Mean	Pre-Chemotherapy value	Post-Chemotherapy value	P
Age (mean)	66 (+/-) 6	NA	NA	
Sex	64%	NA	NA	
Education (years)	8 años	NA	NA	
MMSE	28 (+/- 1)	28	27	NS
MoCA	27 (+/- 1.5)	27	27	NS
NEUROPSI	120	121	126	<0.05
Nutritional status (%)			NA	
Normal	60%			
Malnutrition risk	30%			
Malnutrición	10%			
Colon Cancer				
Stage II	9	NA	NA	
Stage III	15	NA	NA	
Transcraneal Doppler				
VM LMCA pre apnea	69 cm/seg	70 cm/seg	58 cm/seg	<0.05
VM RMCA post apnea	73 cm/seg	75 cm/seg	68 cm/seg	<0.01
Apnea index LMCA	.87	0.88	0.75	<0.001
Inflammatory markers (pg/ml)				
IL-1		22	19.6	NS
IL-2		32.2	27.6	NS
IL-6		46.6	43.3	<0.05
IL-8		100.6	72.3	<0.03
IL-10		12.7	13.1	NS
TNF-alfa		180.6	123.7	<0.01
APOE genotype %				
4/4	3%			NA
3/4	6%			
3/3	68%			
2/3	23%			

VM: velocidad media, RMCA: right middle cerebral artery, LMCA: left middle cerebral artery, TNF: tumoral necrosis factor, NA: not applicable