Medicina Universitaria. 2016;18(71):98–104

MEDICINA UNIVERSITARIA
www.elsevier.es/rmuanl

REVIEW ARTICLE

Bases and foundations of the treatment of peritoneal carcinomatosis: Review article

J.F. Castro-Mesta[a,*], J.F. González-Guerrero[a], P. Barrios-Sánchez[b], G. Villarreal-Cavazos[a]

[a] *Oncology Service at the ''Dr. José Eleuterio González'' University Hospital at the UANL, University Center Against Cancer, Monterrey, Mexico*
[b] *Sant Joan Despí Moisès Broggi Hospital, Barcelona, Spain*

Received 11 December 2015; accepted 9 June 2016
Available online 25 July 2016

KEYWORDS
Peritoneal carcinomatosis;
HIPEC;
Cytoreductive surgery;
Sugarbaker;
Hyperthermic intraperitoneal chemotherapy

Abstract Peritoneal carcinomatosis refers to a shedding or tumor that spreads to the peritoneal serosa and structures of the abdominal cavity. It is an entity with a poor prognosis. Several conditions can cause this, the most common being colon, rectum, ovary, stomach or appendix cancers, including peritoneal pseudomyxoma, among others. The abdominal cavity invasion is considered a clinical stage IV. For a long time life expectancy of this entity was very short. With the advent of meticulous techniques in cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) the prognosis of patients has changed. In some conditions, these procedures are standard treatments. CRS is a very important prognostic factor; leaving a less residual disease in the patient, the evolution will be better. The HIPEC starts immediately after the surgical event. The hyperthermia increases the cytotoxic effect of antineoplastic drugs. Numerous studies have appeared in medical literature wherein the clear improvement in survival of the affected population is demonstrated. It is essential that a multidisciplinary team participates in the decision for the best treatment option and the maximum clinical benefit of the patients.

* Corresponding author at: Universidad Autónoma de Nuevo León, Hospital Universitario ''Dr. José Eleuterio González'' Servicio de Oncología, Centro Universitario Contra el Cáncer, Av. Madero y Gonzalitos SN, Mitras Centro, CP 64460, Mexico.
E-mail address: jcastro_mesta@yahoo.com.mx (J.F. Castro-Mesta).

http://dx.doi.org/10.1016/j.rmu.2016.06.001

Introduction

Peritoneal carcinomatosis (PC) refers to the shedding, implantation and dissemination of a tumor, either localized or massive, to the peritoneal serosa, as well as the adjacent structures of the abdominal cavity. Its presence indicates a clinical stage IV. It is usually associated with gynecological tumors and tumors of the digestive tract.[1–3] The exact incidence of PC as a primary site and as a recurrent site is not known with any certainty, since most analytic and imaging studies used to monitor different pathologies do not allow for the detection of said dissemination in initial studies. Numbers vary according to the pathology; the most representative is colon cancer. Estimations suggest that initial recurrence in the peritoneum after a surgery with curative intentions is 10–20%. Peritoneal dissemination occurs in 40–70% of total recurrences and only 5–8% present a disease strictly confined in the peritoneum. Considering all patients with the inclusion of all original pathologies, medical literature shows that 15% of patients arrive with PC at first and 35% die of intraperitoneal recurrence.[4] Up to a few years ago, this entity had had an adverse prognosis with a fatal outcome within months.[5] However, the evolution of the disease can be changed with an excellent full cytoreductive surgery (CRS) and the emergence of intraperitoneal chemotherapy (IPCT). Life expectancy used to be very limited and dependant on the base pathology: between 3 and 6 months for gastric base PC,[4,6] 11–21 months for colon/rectal PC and 14–24 months for ovarian PC, on average. The variant linked to peritoneal pseudomyxoma has shown better survival rates, due to the tumor's biology and its response to multimodal treatment. In all the previously mentioned cases, CRS and IPCT have increased these numbers.

Today, peritoneal affection is being considered as a locoregional dissemination, thus generating the idea of performing metastasectomies in said entity with the purpose of leaving patients disease-free. In the late 80s, Dr. Sugarbaker developed a treatment with a radical approach, consisting of a combination of CRS and IPCT, the latter in its early post-operative modality (EPIC *early postoperative intraperitoneal chemotherapy*), and in cases requiring hyperthermia (HIPEC *hypertermic intraperitoneal chemotherapy*). The key objective of the radical approach is to completely eliminate the visible disease through CRS and EPIC or HIPEC, and to eradicate non-visible tumor residues. CRS ought to be thorough in order to release adherences, in addition to retreating tumor implantations, so that chemotherapy, once administered, is distributed homogeneously amongst the intra-abdominal organ surfaces.[7,8]

During the last decades, CTIP and CRS have been significantly revolutionized, thus resulting in favorable results in patient survival rates, which had not been achievable in previous years.

Physiopathology and the plasmatic peritoneal barrier

Cancers in the abdomen spread via three different routes: haematogeneous, lymphatic and celomic. The latter led to the hypothesis that in eliminating this type of dissemination, the risk of extension of the disease would decrease and free-of-recurrence survival rate would increase. Peritoneal liquid goes from the pelvis to the diaphragm and is defined by the reflections of the peritoneum. Intraperitoneal seeding through ascites is one of the most significant forms of peritoneal metastasis and the leading cause of PC. Regardless of the dissemination mechanism, tumor cells spreading to the peritoneal cavity do so in different ways: through gravity, peristalsis and/or negative pressure of the diaphragmatic muscles.[2,9] Once the tumor cells adhere, they penetrate the mesothelial monolayer and initiate the PC process. The peritoneal tissue provides a source that is rich in nutrients, growth factors and chemokines, leading to a favorable environment for tumor cell proliferation.[9] The plasmatic peritoneal barrier maintains a positive gradient of chemotherapy, causing medications with a high molecular weight to remain in the abdominal cavity for a longer period of time, allowing for a greater exposure of tumor cells to the medications, compared to the intravenous route.[1,4,10]

Diagnosis

Different techniques are used in diagnosis, such as imaging studies like ultrasounds, CAT scans, NMR scans and PET/CT positron emission tomographies with fluorodeoxyglucose ^{18}F. Nevertheless, these studies have their limitations. They are usually used more in staging and for non-resectable disease assessment.[4] CAT scan sensitivity for PC diagnosis ranges between 41 and 93% with a specificity between 79 and 96%. CAT scans can prove previously established imaging patterns, including the ''omental cake'' which represents fat implants, thickening and heterogeneity, subcapsular implants, nodular lesions, associates and mesenteric fat tissue tumor infiltration.[2]

There are different systems to measure PC. The most utilized is the peritoneal carcinomatosis index (PCI), which is based on the peritoneal nodules' size and quantitative distribution. The abdominal cavity is divided into 13 regions and the volume of the disease is determined in every region (Fig. 1). After a thorough surgical inspection, the extension of the disease is measured in relation to every region, assigning them a number (score from 0 to 39). PCI has a prognosis value in addition to estimating the possibility of full cytoreduction. A series published a survival rate at 5 years of 50% for PCI < 10, 20% for PCI 10–20 and 0% for PCI > 20.[5,11,12]

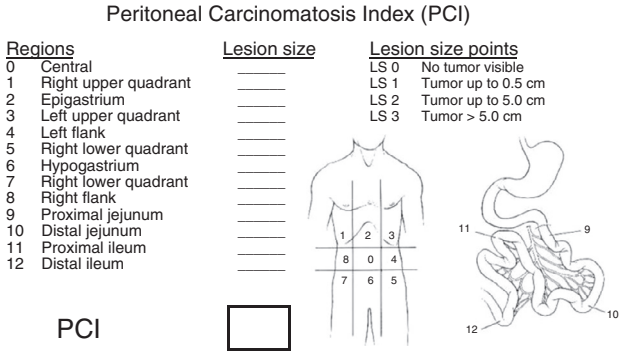

Figure 1 Abdominopelvic regions. Peritoneal carcinomatosis index.