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Short Commentary

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Artificial Nutrition in Patients undergoing Cytoreductive Surgery and HIPEC

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Abstract

Aim: Nutrition's impact on the surgical outcome has been established in various surgical specialties. However, data addressing the nutritional considerations following Cytoreductive Surgery (CRS) and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) are scarce. We present our experience in nutritional management in our patients underwent CRS+HIPEC.

Methods: A retrospective analysis of 1350 patients who underwent CRS+HIPEC for peritoneal malignancy the last 20 years.

Results: From 1350 patients 42.9% are male and 57.1% women with a mean age of 61.4 years old (range 18-80).

The tumor locations are gynecological cancers 48.1%, appendiceal cancer and pseudomyxoma peritonei 16.3%, colorectal cancer 15.9%, gastric cancer 8.1%, mesothelioma 4.8% and rare tumors 6.6%. Preoperative nutritional support received 40.7% for two weeks due to malnutrition. The 30 days mortality rate was 3% and the morbidity rate 31%. The median duration of TPN was 9 days for the 82.1%.

Three main groups remains in artificial nutrition for more than 4 weeks, the patients with short bowel syndrome, the patients with functional gastrointestinal problems due to adjuvant treatment after (CRS+HIPEC) as systemic chemotherapy or radiotherapy.

Conclusion: All patients of our study require artificial nutrition in order to eliminate preoperatively the malnutrition due to cancer and postoperative to achieve complete cytoreduction.

Most important factor of nutritional support is to improve outcome in special groups of postoperative conditions such as enterocutaneous fistulas and short bowel syndrome.

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Introduction

Cytoreductive Surgery (CRS) combined with Hyperthermic Intraperitoneal Chemotherapy (HIPEC) was developed and popularized for peritoneal metastasis for primary and/or secondary metastases in peritoneal cavity from different tumors [1-3]. Many patients due to cancer causing anorexia and metabolic imbalance, due to the mechanical effect of tumor masses with subsequent malabsorption and obstruction and the iatrogenic effect of applied chemotherapies, radiotherapies or previous operations [4].

Malnutrition is proven to be a risk factor for postoperative morbidity and mortality in a variety of major surgeries [5,6]. Nutritional support is a key component in the optimal management of patients with peritoneal malignancy. The nutrition strategy must be adopted for all patients undergoing CRS and HIPEC, with Total Parenteral Nutrition (TPN) commenced the day after surgery [7] gradually increasing and parenteral nutrition is continued until oral intake is adequate.

The national of this strategy is based on gastro-intestinal organs resection, peritonectomies and HIPEC with a resultant prolonged illness.

We present our retrospective analysis of 1350 cases in the last 20 years.

Patients and methods

We retrospectively reviewed collected nutrition date for all patients who had CRS and HIPEC for the treatment of peritoneal malignancy over a 20 years period.

A total of 1350 patients underwent CRS+HIPEC.

Results

From the total 1350 patients with peritoneal metastasis 580 are male (42.9%) and 770 are women (57.1%). The mean age was 61.4 years old (range 18-80). The location of primary tumor are ovarian other gynecological cancer in 650 cases, 110 are gastric cancer, 215 colorectal cancer, 65 peritoneal mesothelioma, 220 appendiceal cancer and pseudomyxoma peritonei and 90 from other rare tumors.

The (Figure 1) presents the flow-sheet of nutritional problems and support of each one. 550 patients are BMI≤20 mg/m^2 and a preoperative nutritional management of 2 weeks of total parenteral nutritional are required to achieved an ideal nutritional performance status prior the CRS+HIPEC. The 30 day mortality rate was 3% and the morbidity rate was 31%.

Nutritional support of patients with CRS+HIPEC (2005-2023)

From a total of 1309 (excluded the 41 postoperative deaths), 200 patients remains with short bowel syndrome (15.3%) which by definition means that the remain small bowel is less than 120 cm with presence of less than 50 cm of colon/or with an ileostomy pouch.

The main reason of short bowel syndrome is the aggressive cytoreduction in order to eliminate all the macroscopic tumor volume. The mean length of the remaining small bowel was 105 cm (range 80-150). Mean hospitalization was 37 days vs 12 in other patients with CRS+HIPEC (p<0.002).

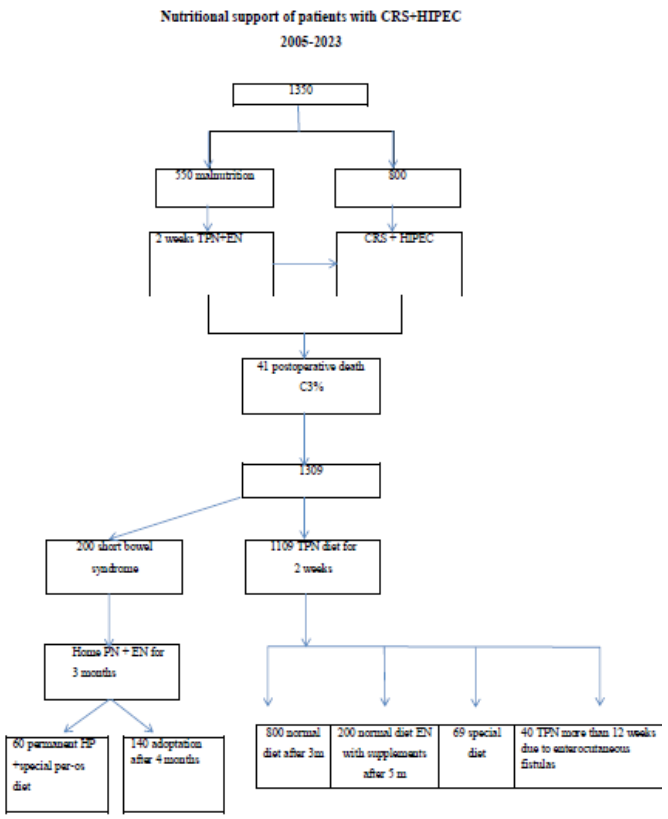

Figure 1: Nutritional support of patients with CRS+HIPEC 2005-2023. TPN: Total Parenteral Nutrition; EN: Enteral Nutrition; HPN: Home Parenteral Nutrition.

Progressively the daily ileostomy output increased at the 3th to 4th week after operation as a result of oral feeding and decreased at the 5 week due to special oral intake, sandostatin analogue and possible intestinal adaptation. The main ileostomy output at 6 months after CRS+HIPEC was 640±140 ml/daily vs 1590±210 at the first month after CRS+HIPEC (p<0.001).

The overall morbidity and mortality rate was the same as in patients without extensive resection. The impact of short bowel syndrome on median overall survival was very important, as the survival in SBS was 28.6 months versus 41.2 months in other CRS+HIPEC patients (p<0.001).

These results explained due to more amounts if intra-abdominal tumor volume (PCI≥20) and that means more aggressive biological behavior and stage of primary tumor [8].

The main target of nutritional support to these cases is to avoid malabsorption, chronic diarrhea or high ileostomy output, dehydration and electrolyte abnormalities. We perfused daily 2 lit of TPN plus special per-os diet for 3 to 4 months. As the bowel adepts wearing from parenteral nutrition may became feasible (Figure 1).

From remain 1109 patients (84.7%) the artificial nutrition with TPN + per-os diet continuous for 2 weeks. After this time period, 40 patients continuous TPN for 3 months (3.6%) due to enterocutoneous fistula which the spontaneous closure rate was 85% and the remain are re-operated after 3 months for fistula correction.

The majority of the patients, 800 (59.3%) returns to the normal diet with +/- enteral supplements after 3 months of recovery. Two hundred patients (18%) return to the normal diet 5 months after CRS+HIPEC and the main cause of this approach is the postoperative needs of systemic chemotherapy.

Finally 69 patients (5.1%) remain the TPN twice the week and special per-os diet due to gastrointestinal malabsorption from previous treatments (radiotherapy or immunotherapy).

All these data are presented in (Figure 1).

Discussion

There is no agreed consensus as to the best route for nutritional support after CRS and HIPEC. Many controversial recommendations advised the studies were needed to explore and define the best option of delivery perioperative nutrition in this unique patient group. Patients with Peritoneal Metastasis (PM) may be candidates for TPN preoperatively as malnutrition often results not only from metabolic effects of tumor burden but also from difficulties in enteral feeding caused by complications secondary to peritoneal involvement such as malignant bowel obstruction and/or ascites [9-11]. In our group 40.7% of our patients require pre-operative nutritional support for two weeks with TPN and enteral feeding due to malnutrition, to decrease the risk of postoperative complications and mortality.

The objective to evaluate the effect of artificial nutrition (TPN or/+ EN) versus no nutritional support on OS in patients with PM demonstrates in a number of trials a significant survival benefit in favor of TPN [12].

Clinically patients on oncological therapy are considered distinct from patients no longer receiving treatment, nutritional support may improve or maintain their general condition permitting them to receive further therapy or allow waiting for gut function to be restored [13].

The most important thing in our study is the benefit in the postoperative period in our patients undergoing extensive splanchnic (bowel+peritoneal) work in CRS and HIPEC procedures. Firstly, very few patients were able to tolerate oral intake before the 8th to 10th postoperative day. This effect is due to expensive surgical procedures and intraperitoneal chemotherapy plus hyperthermia which produce prolong paralytic ileus and gastrointestinal dysfunction.

In our study the majority of our patients received TPN for 10 days and then oral intake after dietician observation and consultation. Three months after CRS+HIPEC the 69% of CRS+HIPEC patients received oral intake without any nutritional support with TPN, only a small number of them (7.4%) received enteral nutrition supplements together with normal oral intake (Figure 1). These results agree with recent studies [14]. Prolonged TPN in our group are patient with enterocutaneous fistulas (3.6%) which achieved spontaneous closure in 85% of the cases after 12 weeks of TPN [15,16].

From all patients, 60 of them (4.4%) are remain in permanent home parenteral nutrition due to short bowel syndrome with TPN administration (2000 ml) for 3 days every week together with special food oral intake [17].

In short bowel syndromes there are three phases of intestinal function, the post- operative hypersecretion, the adaption phase and finally the maintenance/stabilization phase [18].

Declarations

In conclusion our study suggests that preoperative administration of artificial nutrition is a protective factor against postoperative major morbidity and mortality in patients with peritoneal metastasis following cytoreductive surgery plus HIPEC. Despite the consensus on the importance of nutrition in HIPEC patients, there appears to be a profound underutilization on nutritional specialist and doctors in the patients' management which may have in impact on their surgical outcome.

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