



Peritonectomy and hyperthermic intraperitoneal chemotherapy: Cost analysis and sustainability

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Abstract

Background: Malignancies of the peritoneum remain a challenge in any hospital that accepts to manage them, due not only to difficulties associated with the complexity of the procedures involved but also the costs, which – in Italy and other countries that use a diagnosis-related group (DRG) system – are not adequately reimbursed.

Material and methods: We analyzed data relative to 24 patients operated on between September 2010 and May 2013 with special regard to operating room expenditure, ICU stay, duration of hospitalization, and DRG reimbursement. The total costs per patient included clinical, operating room, procedure, pathology, imaging, ward care, allied healthcare, pharmaceutical, and ICU costs.

Results: Postoperative hospital stay, drugs and materials, and operating room occupancy were the main factors affecting the expenditure for cytoreductive surgery and hyperthermic intraperitoneal chemotherapy. We had a median hospitalization of 14 days, median ICU stay of 2.4 days, and median operating room occupancy of 585 min. The median expenditure for each case was € 21,744; the median reimbursement by the national health system € 8,375.

Conclusions: In a DRG reimbursement system, the economic effort in the management of patients undergoing peritonectomy procedures may not be counterbalanced by adequate reimbursement. Joint efforts between medical and administration parties are mandatory to develop appropriate treatment protocols and keep down the costs.

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Keywords: Peritonectomy; Hyperthermic intraperitoneal chemotherapy; Cost analysis; Diagnosis-related group

Introduction

Peritoneal malignancies are a considerable challenge for a surgical team and the hospital as a whole. These diseases – once seen as preterminal, with a very poor prognosis and limited life expectancy – have gained increasing interest from surgeons who have adopted a locoregional approach instead of (or in addition to) conventional systemic

treatments, using peritonectomy techniques (cytoreductive surgery; CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC).¹

For some diseases, such as malignant mesothelioma (MM)² and pseudomyxoma peritonei (PMP),³ CRS + HIPEC has become the procedure of choice over the last years. Its role in secondary malignancies deserves further research. Many studies (including a randomized trial)⁴ attest to the effectiveness of CRS + HIPEC in the treatment of peritoneal carcinomatosis from colorectal cancer (CRC). In epithelial ovarian cancer (EOC) the role of HIPEC is more controversial, but there should be no

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more doubt about the benefit of a more extensive surgical policy to remove all visible disease.⁵

Such extension of the indications for peritonectomy has led to a progressive increase in centers carrying out the procedure; however, CRS + HIPEC is characterized by a lengthy surgical procedure, the need for intensive care unit (ICU) stay, a high rate of complications, and long hospitalization.

On the other hand, in Italy and other countries having a healthcare system based on diagnosis-related groups (DRG), peritonectomy procedures have not been assigned to a specific group and do not get adequate reimbursement. It is therefore very difficult for a hospital that accepts the economic weight of the procedure to establish an adequate startup program, which is key to avoiding possible pitfalls.

In this paper we expound our cost analysis of this challenging procedure.

Materials and methods

We started our program of CRS + HIPEC in September 2010. From this date until May 2013, we operated on 24 patients essentially for four kinds of diseases: MM, PMP, CRC and EOC. In Table 1 we summarize the characteristics of the patients.

We have checked all costs of each admission, with special regard to:

1. Operating room (OR) expenditure
2. ICU stay

Table 1
Clinical characteristics of 24 patients with peritoneal surface malignancies.

	n°
Sex	
Male	6 (25%)
Female	18 (75%)
Age, years	
median (range) – male	49.5 (26–64)
median (range) – female	56.2 (39–71)
Disease	
EOC	9 (37.5%)
PMP	7 (29.2%)
CRC	6 (25%)
MM	2 (8.3%)
ECOG performance status	
0	8 (33.3%)
1	12 (50%)
2	4 (16.7%)
median score	0.8
Previous surgery	
None	5 (20.8%)
Biopsy	11 (45.8%)
1 Abdominal region dissected	7 (29.2%)
2–5 Abdominal regions dissected	1 (4.2%)
Previous systemic chemotherapy	
Yes	18 (75%)
No	6 (25%)
PCI	
median (range)	10 (1–13)

3. stay on the ward and overall duration of hospitalization
4. pre- and post-hospital stay
5. DRG reimbursement

The OR costs collected by the nurses were reported to the Management Control Unit for elaboration and comparison with other data.

Surgical procedure

The patients included in this study were treated according to institutionally approved protocols with written informed consent. Eligibility requirements included a diagnosis of peritoneal surface malignancies treatable with CRS + HIPEC procedures; maximum age 70 years; no significant comorbidities; maximum performance status (ECOG) 2; liver metastasis only in case of CRC and only if totally removable; peritoneal disease amenable to complete/near-complete cytoreduction at preoperative computed tomography.

All operations were carried out by the same surgical team, using the peritonectomy procedures established by Sugarbaker¹; in Table 2 we list the surgical procedures. A midline laparotomy incision was performed, following which the volume and extent of disease were assessed using the Peritoneal Cancer Index (PCI). This involves an assessment based on the number of lesions and the lesion size to

Table 2
Peritonectomy procedures data.

	n°
Sites of surgery	
Pelvis	22 (91.7%)
Greater omentum	22 (91.7%)
Lesser omentum	22 (91.7%)
Right upper quadrant	13 (54.2%)
Left upper quadrant	12 (50%)
Performed surgery	
Total abdominal hysterectomy with bilateral salpingo-oophorectomy	12 (50%)
Cholecystectomy	11 (45.8%)
Splenectomy	11 (45.8%)
Protective ileostomy	8 (33.3%)
Appendectomy	7 (29.2%)
Sigmoidectomy	7 (29.2%)
Right colectomy	6 (25%)
Glisson's capsule resection	5 (20.8%)
Small bowel resection	2 (8.3%)
Partial gastrectomy	1 (4.2%)
Completeness of cytoreduction	
No visible residual tumor	21 (87.5%)
Residual tumor <2.5 mm	2 (8.3%)
Residual tumor >2.5 mm and <25 mm	1 (4.2%)
Residual tumor >25 mm	0 (0%)
Blood loss, ml	
median (range)	900 (300–2000)
Blood product consumption, unit	
Red blood cells – median (range)	2 (0–8)
Fresh frozen plasma – median (range)	3 (1–8)

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