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Laparoscopic staging of peritoneal surface malignancies

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Abstract

Background: The Peritoneal Cancer Index (PCI) may be used in the intraoperative evaluation of peritoneal surface malignancies to estimate the feasibility of peritonectomy with intraperitoneal hyperthermic chemotherapy perfusion. Although radiologic imaging techniques detect liver and other distant metastases, they do not accurately image small cancer implants on small bowel and its mesentery, thus making a CT-PCI classification impossible.
Results: We used videolaparoscopy to stage 97 cases of peritoneal carcinomatosis, and achieved full laparoscopic PCI assessment in 96/97 cases, while only 2/96 cases were understaged. In all our cases where peritonectomy followed diagnostic laparoscopy, we found good correlation between the open surgery data and the laparoscopic PCI. There was no mortality and no neoplastic colonization at the trocar port site. We excluded patients from peritonectomy if the staging laparoscopy showed a massive involvement of their small bowel or mesentery.
Conclusion: Laparoscopy is a useful tool in peritoneal surface malignancies; it allows direct visualization even of small cancer nodules and provides a reliable assessment of the feasibility of peritonectomy.

Keywords: Videolaparoscopic; Peritoneal

Introduction

It is difficult to determine the extent of carcinomatosis because none of the modern radiologic imaging techniques is reliable in showing the degree of involvement of abdominal viscera.[1] Sonographic or CT imaging fails to provide any certainty regarding the degree of involvement of the small bowel and its mesentery.[2,3] The neoplastic tissue, as it grows on the peritoneal surfaces, conforms to their normal contours, thus mimicking healthy tissues and making radiologic imaging of small or moderate volume disease impossible.

CT is sometimes useful with mucinous carcinomatosis as it can quantify and locate the large mucus masses produced by pseudomyxoma.[4] Also, it can image segmental obstruction of the small intestine and therefore reveal the invasive character of a neoplasm. It can show tumor masses larger than 1–2 cm on the small bowel surface or directly adjacent to its mesentery, and therefore the tumor's lack of compliance with the phenomenon of redistribution. Also, CT is required to rule out extra-abdominal metastases. With the traditional diagnostic methods, about 15% of patients with peritoneal surface malignancies can be excluded from peritonectomy because of distant metastases.[5]

Video laparoscopic surgery (VLS) exploration of the abdominal cavity supplements the information provided by the imaging techniques and provides full and unimpeded view of the small bowel serosa, so biopsy specimens can be accurately harvested. VLS increases the exclusion rate to more than 35% as a result of the information it provides about the degree of involvement of the small bowel serosa and mesentery.[6] If carried out by surgeons skilled and knowledgeable of both VLS and peritoneal carcinomatosis treatments, a complete laparoscopic PCI is available. Thus a laparoscopic PCI and an estimate of the completeness of cytoreduction score can be obtained prior to the surgical intervention. VLS thereby provides information regarding the selection of patients for cytoreductive surgery plus intraperitoneal chemotherapy.

We reviewed the international literature and found no reports on the routine use of diagnostic laparoscopy in the

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staging of peritoneal carcinomatosis. This method entails a small risk of complications, which is in contrast to exploratory surgery where high mortality (20–36%) and morbidity (12–23%) rates are observed in diagnostic laparotomies performed in advanced tumor case series.[1]

Materials and methods

Abdominal cavity exploration

Once the Hasson trocar is in place, the ascites is completely emptied. Cytology samples should be taken under direct vision. Highly mucinous carcinomatoses sometimes require a 10 mm trocar in port II, so that a larger suction cannula can be used. Adhesiolysis should be performed prior to the staging procedure. In peritoneal surface malignancies where the histopathological findings are unknown or doubtful, it is mandatory to harvest multiple biopsy specimens from the parietal, diaphragm, omental and pelvic cavity lesions. In cases where the presence of liver metastases or the involvement of suprahepatic veins is suspected, intraoperative ultrasound imaging through the laparoscope may be helpful.

Sector assessment

To determine whether the patient undergoing VLS is a candidate for peritonectomy, the laparoscopic PCI should be determined on the basis of the distribution and size of the neoplastic nodules. To accomplish this the operating table will be moved into at least 4 positions: steep anti-Trendelenburg + left tilt, steep anti-Trendelenburg + right tilt, steep Trendelenburg + left tilt, and steep Trendelenburg + right tilt.

Results

From August 2000 to December 2004 we performed 97 diagnostic VLS procedures in patients with peritoneal surface malignancies (Table 1). All the patients had undergone at least one prior laparotomy. The mean time needed for a diagnostic and staging VLS procedure was 30 min (range: 15–45 min).

In one patient with gastric cancer, access to the abdominal cavity was not impossible because of thick cancerous adhesions between the small bowel loops and the abdominal wall. The patient was subjected to midline laparotomy, but the disease was not resectable because of the massive involvement of the small intestine loops tightly adherent to the abdominal wall.

In 93 cases 2 trocars (10 mm and 5 mm, respectively) were sufficient to carry out the procedure, whereas in 4 cases it was necessary to add a third 10 mm trocar to gain full view of the abdominal cavity due to neoplastic adhesions located along the midline.

In 34 cases the peritoneal surface malignancy was due to ovarian tumor, in 3 to neoplasm of the uterine cervix, in 21 to gastric tumor, in 7 to mesothelioma, in 17 to a recurrent colorectal neoplasm, in 8 to a pseudomyxoma peritonei, in 3 to abdominal sarcomatosis and in 4 the carcinosis was secondary to a primary breast tumor.

In 2 cases VLS understaged the carcinomatosis (mesothelioma and gastric cancer), and on laparotomy, massive infiltration of the pancreas was detected, which made peritonectomy impossible. In all the remaining cases, the VLS cancer index was confirmed by the PCI determined at surgical exploration. Sixteen patients were excluded from surgical exploration due to massive infiltration of the small bowel or of its root seen by VLS.

Complications

No major complications occurred, and no neoplastic seeding was detected at trocar sites.[3] In 2 cases (2.06%) subcutaneous suppuration was observed at the first trocar site; it was treated with topical antibiotic therapy, and it subsided within 7 days.

Discussion

Preoperative diagnostic procedures on peritoneal carcinoses are required to answer the following crucial

Table 1
Videolaparoscopic staging of peritoneal surface malignancies

Pathology	Cases	Diagnostic VLS	VLS not feasible	Under-staging	Trocar site infection	Two trocars	Three trocars
Ovary	34	34				34	
Uterus	3	3				3	
Stomach	21	20	1	1	1	18	3
Mesothelioma	7	7		1		7	
Colon–rectum	17	17			1	16	1
Pseudomyxoma	8	8				8	
Sarcoma	3	3				3	
Breast	4	4				4	
Total	97	96	1	2	2	93	4
%	100	98.96	1.03	2.06	2.06	95.87	4.12

questions. What is the extent of carcinomatosis? Is peritonectomy feasible or is it not possible because the small bowel mesentery is infiltrated? Are the pancreas and/or vessels involved as assessed by ultrasound with laparoscopy probe? Is the histopathology of the primary tumor or peritoneal surface malignancy clearly established?

A study by Denzen and coworkers reports that diagnostic VLS detected peritoneal carcinosis in 100% of the treated cases, whereas only 47.8% had been revealed by a CT scan previously performed on the same patients.[7] Denzen used minilaparoscopy to perform diagnostic VLS because his goal was to determine if carcinomatosis was present or absent. We believe that to achieve a reliable prognostic assessment of carcinomatosis, a 10 mm port should be used; this makes it possible to use a laparoscopic ultrasound probe to complete staging and to harvest biopsy specimens of significant size. Thus, the histopathological diagnosis of the carcinosis can be reached and immunohistochemical typing can be determined.

In conclusion, VLS in peritoneal carcinomatosis was possible in nearly all patients and gave reliable information in 98%. The degree of accuracy of the procedure depends on the operators' experience and on their being fully knowledgeable of the PCI system. The procedure should be carried out by the same team who is treating peritoneal surface malignancy to judge whether operation is feasible and if complete cytoreduction can be achieved.

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