



# Risk of definitive stoma after surgery for peritoneal malignancy in 958 patients: Comparative study between complete cytoreductive surgery and maximal tumor debulking

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## Abstract

**Introduction:** Complete cytoreductive surgery (CRS) can achieve cure or long-term survival in selected patients with peritoneal malignancy. In selected patients, due to extensive disease, complete tumour removal is impossible and optimal strategy may be maximal tumour debulking (MTD). We analysed the stoma related outcome in a series of patients undergoing surgery in a National Peritoneal Malignancy Referral Centre.

**Methods:** All patients who underwent CRS, with or without, intra-operative hyperthermic intraperitoneal chemotherapy (HIPEC) between 1994 and 2012 were included. Data was collected prospectively in an institutional database and analysed retrospectively.

**Results:** CRS was performed in 958 patients (female: 595, male: 363) of whom 781 (81.5%) had a primary appendix tumour, 63 (6.6%) had a colorectal primary, 47 (4.9%) peritoneal mesothelioma, 38 (4%) an ovarian tumour and 29 patients (3%) other tumours. Complete CRS was achieved in 72% (693/958).

Overall 352/958 (37%) had a stoma, which was permanent in 165/958 (17.2%). The median time interval from CRS to reversal of stoma was 4.4 months (range: 1.4–13.8). Stomas were created in 113/265 (42.6%) at MTD (permanent:  $n = 105$  (93%), temporary:  $n = 8$  (7%)), and 239/693 (34.5%) at complete CRS (permanent:  $n = 60$  (25%), temporary:  $n = 179$  (75%)) ( $p = 0.020$ ). All temporary stomas in the 168/693 (24.4%) of patients who had complete CRS were subsequently reversed.

**Conclusion:** To achieve complete CRS for peritoneal malignancy a stoma is often required and in a proportion this will be permanent. Overall over one third had a stoma at surgery with almost half subsequently reversed.

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**Keywords:** Peritoneal malignancy; Pseudomyxoma peritonei; HIPEC; Complication; Ileostomy; Stoma reversal

## Introduction

Peritoneal malignancy most commonly is secondary to intra-abdominal organ malignancy though less frequently may be primary peritoneal tumours. Peritoneal malignancy represents a broad spectrum of disease, ranging from low grade “borderline malignant” mucinous appendiceal

tumours (entitled: pseudomyxoma peritonei syndrome (PMP)), to peritoneal metastasis of colorectal origin with less favourable outcomes.<sup>1,2</sup>

The optimal treatment for patients with resectable peritoneal malignancy is now considered to entail complete cytoreductive surgery (CRS) in order to remove all visible tumour cells combined with hyperthermic intra peritoneal chemotherapy (HIPEC).<sup>3</sup> In selected patients with PMP with wide-spread disease, where complete CRS is not feasible, maximal tumour debulking (MTD) may palliate abdominal symptoms and improve quality of life.<sup>4</sup> However, MTD has no real place in patients with other peritoneal

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malignancies such as those with colorectal peritoneal metastases.

Recent studies revealed promising results, showing that a combined treatment of CRS and HIPEC could achieve good long-term survival in selected patients with peritoneal malignancy.<sup>5,6</sup> These techniques are particularly favourable in patients with low-grade epithelial appendiceal tumours with 10 year survival in the region of 80%, if complete cytoreduction is achieved.<sup>7</sup>

However, CRS and HIPEC are associated with considerable morbidity and occasional mortality. A recent systematic review reported a mortality rate of 0–17% and an overall rate of major complications ranging from 0 to 52%.<sup>8</sup>

In addition, due to extensive surgical procedures including multiple bowel resections, a number of patients require either a permanent or temporary stoma. Interestingly, to the author's knowledge there is no study published particularly focussing on the need for permanent or temporary stoma creation and the reversal rates in those with a defunctioning stoma in patients who undergo CRS and HIPEC.

This present analysis aimed to investigate the stoma related outcome in a large series of patients undergoing CRS for peritoneal malignancy.

## Patients and methods

Overall, 959 consecutive patients (female: 595, male: 363) with peritoneal malignancy underwent CRS with, or without, HIPEC in a National Peritoneal Malignancy Referral Centre between 1994 and 2010. The median age was 56 years (range: 18–84).

The main indication for surgery was a primary appendix tumour in 781 (81.5%) patients. Additionally 63 (6.6%) patients had a colorectal primary, 47 (4.9%) peritoneal mesothelioma, 38 (4%) an ovarian tumour and 29 patients (3%) had other miscellaneous tumours.

Patients were divided into 2 groups: One group had complete CRS and other group underwent maximal tumour debulking as complete tumour removal was not achievable.

There were two main reasons for a stoma:

1. an end stoma (generally an ileostomy) usually with a low Hartman's procedure to achieve complete tumour removal or maximal debulking or
2. a proximal defunctioning ileostomy routinely created to defunction a colo-rectal or occasionally a coloanal anastomosis.

The indication for a permanent stoma was generally due to the extent of the disease. Additionally older age, general health and co-morbidity and impaired sphincter function were taken into account in the decision making process.

A permanent stoma was defined as a planned permanent stoma at the primary operation or any stoma at primary

surgery not subsequently reversed though classified initially as a defunctioning “temporary” stoma.

All data were collected prospectively in a custom designed institutional database and analysed retrospectively.

Stoma-related outcome was assessed and defined as the prevalence of stoma creation at the time of initial CRS and as the number of patients with a defunctioning stoma, who subsequently had stoma reversal. In addition, we recorded early (<30 days) postoperative complications following reversal of stoma.

The standard technique for stoma reversal was a hand-sewn end to end extra mucosal anastomosis with 3.0 absorbable sutures.

## Results

Complete CRS was achieved in 72% (693/958) of the patients, and 28% ( $n = 265$ ) had a maximal tumour debulking.

In the 693 patients who had complete CRS, 239/693 (35%) received a stoma (loop ileostomy:  $n = 164$  (68.7%), end ileostomy:  $n = 69$  (28.9%), loop colostomy:  $n = 4$  (1.7%), end colostomy:  $n = 2$  (2.1%)). Overall 168/693, (24.4%) of patients had a planned temporary stoma and all underwent subsequent reversal.

In the group who had maximal tumour debulking, 113 (43%) patients required a stoma at the index operation ((loop ileostomy:  $n = 13$  (11.5%), end ileostomy:  $n = 95$  (84.1%), end colostomy:  $n = 5$  (4.4%)). In this maximal tumour debulking group 13 had a planned temporary stoma but only 8/13 (62%) patients underwent subsequent stoma reversal, whereas in the remaining 5 patients the stoma remained permanent predominantly due to tumour progression (Table 1).

Overall in the whole experience 352/958 (37%) patients had a stoma, which was permanent in 165/958 (17.2%).

The median time interval from CRS to reversal of stoma in those who had reversal was 4.4 months (range: 1.4–13.8). Altogether, 181/352 (51%) patients had a planned temporary stoma which was reversed in 97% ( $n = 176$ ) of the patients.

There were 6 colorectal anastomotic strictures in patients with stoma. Four required re-do anterior resection and 2 were managed with dilatation under general anaesthesia.

Table 1  
Number of stoma creations and reversals in patients with CRS or MTD.

Procedures/stomas/	<i>N</i>	Stomas	Stoma reversed reversal
CRS	693 (72%)	239 (35%)	179 (75%)
MTD	265 (28%)	113 (43%)	8 (7%)
Total	958	352 (37%)	187 (53%)

Values are given as numbers and absolute frequencies (%).

CRS – Complete cytoreductive surgery; MTD – Maximal tumour debulking.

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