



Outcome of a Series of Patients with Pseudomyxoma Peritonei Undergoing Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy at a Tertiary Cancer Centre in India

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ABSTRACT

INTRODUCTION: Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is now the standard of care for the treatment of pseudomyxoma peritonei (PMP). **MATERIALS AND METHODS:** This is a retrospective study of a consecutive series of patients with PMP treated in our institute from July 2012 to July 2016, with CRS and HIPEC. CRS consisted of standard peritonectomy procedures while Mitomycin-C was used for HIPEC at a dose of 30-35 mg/m², circulated in the peritoneal cavity admixed in peritoneal dialysate fluid for a duration of 60 or 90 minutes, while maintaining a temperature of 41 to 42 degrees Celsius throughout, using the closed technique. **RESULTS:** A total of 13 patients with PMP were treated during this time period. The median age of the patients was 55 years (range was 36 to 68 years). The median peritoneal cancer index (PCI) score was 30 (range 0-39). Completeness of cytoreduction (CC) score CC0 was achieved in 8 cases and CC1 in 5 cases. The median duration of surgery was 13 hours (range 6-17 hours). The median blood loss was 1500 ml (range 200 to 9400 ml). The median duration of stay in the ICU was 6 days (range 0 to 20 days) whereas the median duration of hospital stay was 16 days (range 10 to 54 days). Overall morbidity rate was 61.54% with grade III and IV Clavien-Dindo morbidity seen in 23.08% cases. There was only one 30-day postoperative mortality (7.69%). 84.62% patients are alive without recurrence after a median follow up of 25 months (range 1-57 months). **CONCLUSION:** CRS and HIPEC for PMP is a complicated procedure that should be done in specialized centres, in which case it is associated with acceptable morbidity and mortality and good oncological outcomes.

Keywords : Pseudomyxoma peritonei; cytoreductive surgery; HIPEC; peritoneal cancer index

INTRODUCTION

Pseudomyxoma peritonei (PMP) is a rare form of peritoneal carcinomatosis, affecting 1 person per million per year¹ and is characterized by progressive collection of intra-abdominal extracellular mucinous material ("jelly belly"). It almost always originates from a primary appendiceal tumor with varying degrees of malignancy². Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is now the standard of care for the treatment of pseudomyxoma peritonei (PMP).

MATERIALS AND METHODS

This is a retrospective study of a consecutive series of patients with PMP treated in our institute from July 2012 to July 2016, with CRS and HIPEC. CRS consisted of standard peritonectomy procedures³ while Mitomycin-C was used for HIPEC at a dose of 30-35 mg/m², circulated in the peritoneal cavity admixed in peritoneal dialysate fluid for a duration of 60 or 90 minutes, while maintaining a temperature of 41 to 42 degrees Celsius throughout, using the closed technique. HIPEC was performed using the Exiper unit (Menfis division, MEDICA S.P.A). The peritoneal cancer index (PCI) was calculated by dividing the abdomen into 13 regions, namely central (0), right upper (1), epigastrium (2), left upper (3), left flank (4), left lower (5), pelvis (6), right lower (7), right flank (8), upper jejunum (9), lower jejunum (10), upper ileum (11) and lower ileum (12). A lesion size score (LS) was assigned for each of this region, which was any of LS 0 (no tumour seen) or LS1 (tumour up to 0.5 cm) or LS2 (tumour from 0.5 to 5.0 cm) or LS3 (tumour more than 5.0 cm or confluent nodules). The sum of the LS scores for each region was the total PCI score. At the completion of the cytoreductive surgery, a completion of cytoreduction (CC) score was assigned. CC0 meant no visible residual tumour,

CC1 indicated residual tumour of not more than 2.5 mm, CC2 implied residual tumour of 2.5 mm to 2.5 cm and CC3 was assigned for residual tumour of 2.5 cm or more³. After CRS and HIPEC, no adjuvant therapy was given. The follow up protocol for the patients included clinical examination and serum CEA estimation every 3 months for the first 3 years, then every 6 months for the next 2 years and then annually. CT scan of abdomen and pelvis was done annually for 2 years.

RESULTS

A total of 13 patients with PMP were treated during this time period. 10 patients had disseminated peritoneal adenomucinosis (DPAM); the other three had peritoneal mucinous carcinomatosis (PMCA)⁴. The median age of the patients was 55 years (range was 36 to 68 years). Eleven patients were females and 2 were males. The median peritoneal cancer index (PCI) score was 30 (range 0-39). Completeness of cytoreduction (CC) score CC0 was achieved in 8 cases and CC1 in 5 cases. The median duration of surgery was 13 hours (range 6-17 hours). The median blood loss was 1500 ml (range 200 to 9400 ml).

The median duration of stay in the ICU was 6 days (range 0 to 20 days) whereas the median duration of hospital stay was 16 days (range 10 to 54 days). Overall morbidity rate was 61.54% with grade III and IV Clavien-Dindo morbidity seen in 23.08% cases. Pulmonary complications were seen in 7 patients (53.85%). One patient had cardiac complication in the form of persistent hypotension. Two patients (15.38) developed neutropenia and required G-CSF injections. There was only one 30-day postoperative mortality (7.69%). Another patient died on the 54th post-operative day due to respiratory failure. The remaining 11 patients (84.62%) are alive without recurrence after a median follow up of 25 months (range 1-57 months).

DISCUSSION

A complete cytoreduction in a case of less invasive malignancy like PMP includes CC0 (no grossly visible residual tumour) and CC1 (residual tumour not more than 2.5 mm) cytoreduction. The achievement of a complete cytoreduction is important for decreasing the incidence of recurrence⁵. The same has been achieved in all the 13 patients of the present series irrespective of the PCI scores, with a median of 30/39. The rationale for HIPEC is the intraperitoneal delivery of chemotherapy results in regional dose intensification with minimal systemic side effects^{6,7} and the purported role of hyperthermia is to potentiate the cytotoxic effect of the chemotherapeutic agent and enhance its tissue penetration, besides having a cell-killing effect on the malignant cells by itself^{8,9}.

The overall survival at 12 months for our series is 84.62%. Major morbidity (Clavien-Dindo III and IV) was seen in 3 patients (23.08%). The results achieved in our study are comparable to reported series worldwide.

In a retrospective analysis of 1000 consecutive patients from 1994 to 2014 undergoing CRS an HIPEC for PMP in a UK National Peritoneal Malignancy Unit, after a median follow up of 36 months, the reported 5 year and 10 year overall survival in those patients who had complete cytoreduction was 87.4% and 70.3% respectively. In those patients who did not have a complete cytoreductive surgery, the 5 year and 10 year overall survival was 39.2% and 8.1% respectively. The treatment related 30 day mortality was 0.8% and 15.2% major post-operative morbidity rate¹⁰. Another retrospective study of the multi-institutional registry of Peritoneal Surface Oncology Group International (PSOGI) which included 2298 patients of PMP treated with CRS and HIPEC between 1993 to 2011, with a median follow up of 36 months, the reported 5 year and 10 year overall survival was 74% and 63% while the incidence of major morbidity was 24% and 30-day mortality was 2%. They also reported a 59% fifteen year overall survival¹¹. A retrospective study from 18 French centres treating 301 patients with PMP using CRS and HIPEC between 1993 and 2007, after a mean follow up of 88 months, reported 5 year OS of 73% while the incidence of major morbidity was 40% and a 4.4% 30-day mortality¹².

CONCLUSION

CRS and HIPEC for PMP is a complicated procedure that should be done in specialized centres, in which case it is associated with acceptable morbidity and mortality and good oncological outcomes.

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