



Porta hepatis peritonectomy and hepato–celiac lymphadenectomy in patients with stage IIIC–IV ovarian cancer: Diagnostic pathway, surgical technique and outcomes

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HIGHLIGHTS

- Incidence of PH/HCL disease in patients with ovarian cancer is 14.3%.
- The combination of CT scan and exploratory laparoscopy can identify 100% of ovarian cancer patients with PH-HCL disease.
- The surgery is safe and effective and contributes to 90% complete resection.
- No complication was specifically related to the PH/HCL.

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ABSTRACT

Objective. To report the surgical technique of ovarian cancer resection at the porta hepatis (PH) and hepato–celiac lymph nodes (HCL). To assess surgical and survival outcomes. Define the accuracy of an integrated diagnostic pathway.

Methods. Patients with FIGO stage IIIC–IV ovarian cancer that underwent Visceral–Peritoneal Debulking (VPD). Data of patients with disease at the PH/HCL during VPD were extracted from our database. The CT scan findings were compared with the exploratory laparoscopy. Accuracy of CT scan, intra- and post-operative morbidity, rate of complete resection (CR), disease free and overall survival are reported.

Results. Thirty one patients out of 216 (14.3%) had tumor at the PH and/or HCL. In 8 patients out of 31 (25.8%) it was only found with the aid of the exploratory laparoscopy. CR was achieved in 28 patients out of 31 (90.3%). Pathology confirmed disease in the PH/HCL specimens of all but one patient. Overall morbidity relating to the VPD was 29.2%. No complication was specifically related to the PH/HCL. Median disease free survival was 19 months and median overall survival was 42 months.

Conclusion. PH/HCL surgery was required in 15% of patients with FIGO stage IIIC–IV. The surgery was feasible, safe and significantly contributed to CR. CT scan failed to identify the disease in 31% of the patients. CT and laparoscopy correctly identified all patients.

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1. Introduction

Epithelial ovarian cancer (EOC) is the leading cause of death from gynaecologic malignancy in the western world. It accounts for 4% of female cancers with 225,000 new cases worldwide each year [1]. In Europe, 65,538 new cases were diagnosed and 42,704 women died of

the disease in 2012 [2]. The majority of ovarian cancers present in advanced stages and are treated by debulking surgery and platinum based chemotherapy. Several retrospective and prospective studies confirmed improved survival in patients who have complete resection (CR) defined as no visible residual disease [3–10]. To achieve CR, extensive upper abdominal procedures are warranted. These involve diaphragmatic peritonectomy with or without pleurectomy, partial liver resection, cholecystectomy, splenectomy with or without distal pancreatectomy and resection of the tumor at the porta hepatis [4–6]. Strong evidence suggests that upper abdominal procedures improve the survival rates regardless of the time of the debulking [6–12]. Most of

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these procedures have previously been described. So far only a few studies [13–16] have reported on the resection of metastatic tumors at the porta hepatis (PH) and lymphadenectomy of the hepato-celiac lymph nodes (HCL). Since 2009 we offer Visceral Peritoneal Debulking (VPD) to patients with stage IIIC/IV ovarian cancer, including surgery of the PH/HCL. The aim of this paper is to investigate a diagnostic pathway integrating the CT scan with an exploratory laparoscopy. We also describe the surgical technique of EOC resection at the porta hepatis (PH) and hepato-celiac lymph nodes (HCL). We report the surgical and survival outcomes, the rate of CR and the accuracy of CT scan and laparoscopy in identifying tumor in this area.

2. Material and methods

This study reports the results of a Service Evaluation Protocol approved by the Oxford University Hospital Trust (number 3264). We use a Departmental Ovarian Cancer Surgical Database to record, monitor and audit surgical data. All consecutive patients with FIGO stage IIIC/IV EOC from Oxford University Hospital, Istituto Clinico Humanitas (ICH, Milan, Italy), Fondazione San Raffaele Giglio (Cefalù, Palermo, Italy) who were candidates for VPD between January 2009 and May 2014 were included in this analysis. Initial policy was to offer primary surgery followed by platinum based chemotherapy. After the publication of the EORTC trial (6), in October 2011, all patients were recruited into the neo-adjuvant chemotherapy pathway. Patients with progressive disease on chemotherapy were not offered VPD. The triage process elected patients to VPD if: 1. the performance status (PS) was scored as ASA < 3 at pre-operative assessment, 2. CT review showed no lung or multiple parenchymal liver metastases, and 3. Exploratory laparoscopy demonstrated no small bowel serosal disease or porta hepatis encasement (Table 1). The patients were divided into group 1 if they had primary VPD (before October 2011) and group 2 if they had neo-adjuvant chemotherapy (after October 2011). The PS and the inclusion/exclusion surgical criteria were the only factors considered when deciding to offer surgery to the patients. The goal of the VPD was a complete resection (CR) of all visible tumor. All patients had the CT scan reviewed at the Multi-disciplinary team (MDT) meeting and underwent an exploratory laparoscopy at time of VPD. The exploratory laparoscopy was performed using a 10 mm port for the camera and one or two additional 5 mm trocars (Karl Storz, Tuttlingen, Germany) to manipulate organs or for adhesiolysis. Two hundred sixteen consecutive patients with presumed or histologically confirmed stage IIIC–IV EOC were candidates for VPD. Thirty one patients out 216 (14.3%) were identified from our data base to have disease at the PH and/or HCL. The CT scan and laparoscopy findings, the operation and clinical notes and the histology report were reviewed for the study group. The PH/HCL surgery was performed if the CT scan or exploratory laparoscopy revealed enlarged lymph nodes (> 1 cm) or macroscopic disease at the PH. A routine lymph node dissection was not performed in the absence of enlarged lymph nodes. Likewise, the PH was always visually explored during the VPD but no routine dissection was undertaken if no clear

disease was present. The primary endpoints were the safety and efficacy of the procedures and the survival outcomes. The safety was based on the morbidity rate (number of patients with complications within 90 days/total patients in the study group) and the mortality rate (number of patients that succumbed within 90 days/total patients in the study group). We used the Clavien–Dindo classification for morbidity. The efficacy was measured as the number of patients in whom CR was achieved. Finally we evaluated the accuracy of the CT scan in identifying PH/HCL disease and whether the exploratory laparoscopy could improve the detection rate. The data were analysed using the chi-square test or Fisher's exact test for categorical variables or proportional differences and the Student's *t*-test for continuous variables. Kaplan–Meier analyses were used to determine disease free survival (DFS) and overall survival (OS). A *P* value < 0.05 was considered statistically significant.

2.1. Anatomy and surgical technique

In normal anatomy, the PH corresponds to the area of the liver where the portal triad (hepatic artery, portal vein and bile duct) enters and leaves the liver. For the sake of this study we also include the hepato-duodenal ligament (HDL) and the hepato-gastric ligament (HGL) under the denomination of PH. The HDL and the HGL are part of the lesser omentum (LO) a double fold of peritoneum connecting the stomach and duodenum to the liver. The HDL is wrapped around the portal triad with the portal vein lying dorsal to the proper hepatic artery and the bile duct that runs laterally and caudally. The HCL are located along the hepatic, gastro-duodenal and common hepatic artery, dorsally to the hepatic artery and portal vein, between the portal vein and the inferior vena cava. Disease of the PH was approached after the supracolic omentectomy. At this stage, with the gastro-epiploic arcade sealed and the stomach lifted, the duodenum and pancreas were exposed. Usually the first step was to pass through the Winslow foramen a vessel loop to encircle the HDL. The aim was to apply traction and to achieve vascular control. In order to fully display the PH, the HCL and omental bursa, the descending portion of the duodenum was mobilized with a Kocher maneuver. The omental bursa was fully displayed by elevation of the large curvature of the stomach, by mobilization or resection of the lesser omentum and by medial traction of the small curvature of the stomach. The extent of the disease involving the PH, the lesser omentum and the HCL was finally assessed. Surgery started with the peritonectomy (Fig. 1). The peritoneum of the HDL was opened in a tumor free area; the hepatic artery and the bile duct were displayed. The peritonectomy usually extended between the lateral aspect of the duodenum and the intra-hepatic portion of the round ligament. To tackle disease on the dorsal peritoneum of the PH, a gentle pull medially was applied with the vessel loop and the peritoneum resected with dissection from the dorsal aspect of the portal vein. Once the anatomic structures of the porta hepatis were displayed, the resection of enlarged palpable lymph nodes (Fig. 2) started in a retrograde fashion: from the bifurcation of the proper hepatic artery towards the gastro-duodenal and right gastric artery, separating the area between the portal vein and the IVC, along common hepatic, splenic and up to the left gastric and the celiac artery. Occasional retro-portal lymph nodes were resected paying attention to the left gastric and rarely the inferior mesenteric vein if found to drain in to the portal rather than in the splenic vein (Fig. 3).

3. Results

During the study period, 216 patients with stage IIIC–IV EOC were candidates for VPD. One hundred six patients were in group 1, 110 in group 2. Macroscopic disease was found at the PH/HCL area in 31 patients out of 216 (14.3%). Patients' and tumor characteristics are reported in Table 2. Eighteen patients out of 31 (58%) were in group 1, 13 patients (42%) in group 2 (*P* = 0.606). The incidence of macroscopic PH/HCL disease was 16.9% in group 1 and 11.8% in group 2 (*P* = 0.34).

Table 1
Inclusion/exclusion criteria for VPD.

<i>Inclusion criteria</i>
<ul style="list-style-type: none"> • Histology proven or suspected stage IIIC–IV ovarian cancer • Performance status < 2 • Post-chemotherapy patients: stable disease or response at 3 or 6 cycles
<i>Exclusion criteria</i>
<ul style="list-style-type: none"> • Pre-operative o CT scan: lung metastases, 3 or more liver segments involvement, disease progression following chemotherapy • Intra-operative o Explorative Laparoscopy or laparotomy: diffuse small bowel serosal deposits, porta hepatis encasement

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