



## Short- and mid-term outcomes of robotic-assisted total mesorectal excision for the treatment of rectal cancer. Our experience after 198 consecutive cases

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### Abstract

**Background:** Robot-assisted total mesorectal excision is a safe alternative for rectal cancer treatment. Nevertheless, substantial data is still missing. Our aim was to assess the perioperative and oncological outcomes of the routine use of the robotic-assisted approach for rectal cancer treatment.

**Patients and methods:** 198 Consecutive robotic rectal resections were performed between January 2011 and April 2015 in patients with stage I–IV disease. We prospectively evaluated peri and postoperative data, pathological findings and mid-term oncological outcomes.

**Results:** 36 Abdominoperineal Amputations, 28 High Anterior Resections, 131 Low Anterior Resections and 3 Hartmann operations were performed. Mean age, ASA, BMI and distance from anal verge were respectively 67.5 years, ASA II, 26.95 kg/m<sup>2</sup> and 5.9 cm. 71.2% Patients received neoadjuvant therapy. Mean OR time was 294 minutes. Conversion occurred in 4.5%. Mean postoperative stay was 8 days. 36 Patients required blood transfusion with a mean of 162 ml. Complications Clavien III–IV were 12.1%. 8 complete responses were observed, 50 UICC class I, 84 class II, 51 class III and 13 class IV. Mean lymph node harvested were 11.7. Mean distal margin was 3.3 cm. 11 Circumferential margins were affected in UICC class III–IV patients. Postoperative mortality was 0.5%. Local recurrence was observed in 5% patients. Median follow-up was 27.6 months.

**Limitations:** Single institution descriptive study.

**Conclusions:** The routine use of robotic assisted laparoscopic surgery may help to achieve lower conversion rates with lower ventral hernia rates and similar oncological outcomes using a minimally invasive approach in a non-selected group of patients with non-selected rectal tumours.

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**Keywords:** Rectal cancer; Robotic total mesorectal excision

### Introduction

Rectal cancer demands a multidisciplinary treatment in which radiation, chemotherapy and surgery are combined depending on the local extension and the presence or absence of distant metastasis.<sup>1</sup>

Surgery is the core part of the treatment and open total mesorectal excision (TME) is the gold standard technique.<sup>2</sup>

This technique has a high level of complexity, mainly in male patients with narrow pelvis, a high body mass index (BMI) or tumours located in the medium or lower part of the rectum.<sup>3</sup> TME performed by minimally invasive surgery is more complex and technically demanding, but presents the same oncological results and could present some benefits in terms of post surgical comfort, surgical site infection, intra-operative blood loss and less ventral hernias.<sup>4–7</sup> Indeed, the minimally invasive approach has progressively gained worldwide acceptance substantially due to favourable

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perioperative outcomes and, more recently, has been proven also to be associated with rates of locoregional recurrence, disease-free and overall survival similar to those of open surgery.<sup>8</sup> Robotically assisted laparoscopic TME presents all the benefits of minimally invasive surgery with a higher intraoperative cost than conventional laparoscopy,<sup>9</sup> but could overcome some of the difficulties of conventional laparoscopic surgery mainly in male patients with locally advanced disease located in the mid-low third of the rectum when a sphincter sparing procedure is performed. These could be thanks to the characteristics of the da Vinci<sup>®</sup> surgical system (Intuitive Surgical, Sunnyvale, CA, USA) in terms of three dimension high definition image, ergonomics and manoeuvre capability of the instruments (Endowrist<sup>®</sup>).<sup>10</sup>

Robot-assisted resections of rectal cancer have been proven to be a valid option to treat patients with rectal cancer in a minimally invasive approach with a significantly lower conversion rate compared with conventional laparoscopy. The real advantages of the robotic assisted approach in the field of perioperative outcomes remain controversial.<sup>11</sup>

Regarding the oncological adequacy of this approach, substantive data are still lacking in the medical literature, with little evidence from single case series reporting the initial experiences.<sup>12–15</sup> COLOR II clinical trial is a study that tries to validate these good results in rectal cancer treatment with conventional laparoscopic surgery<sup>4,8,16</sup> and the ROLARR clinical trial will try to define the differences between conventional laparoscopic surgery and robotically assisted laparoscopic surgery in the treatment of rectal cancer.<sup>17</sup>

## Patients and methods

We present a retrospective observational study of prospectively collected data from our institution colorectal cancer database. This study was approved by the Institutional Review Board of Hospital Universitario “Marques de Valdecilla” and conducted according to the principles of good clinical practice. Informed consent for minimally invasive approach was obtained from all patients.

A total of 198 consecutive robotically assisted rectal resections were performed between January 2011 and April 2015. Preoperative, peri and postoperative data as well as anatomopathological findings and mid-term oncological outcomes were assessed.

All patients were preoperatively studied following our Institution guidelines for rectal cancer with a clinical examination, endoscopy, Thoraco-Abdomino-Pelvic CT Scan, Pelvic MRI and tumour markers (CEA, CA19.9 and PSA). In those cases where the tumour was located in the low or mid rectum a rectal ultrasound (US) was performed, and in those with disseminated disease suspected but not confirmed at the CT Scan, a PET-Scan was performed.

Following our Institution guidelines, patients with locally advanced rectal cancer diagnosed by US/MRI (>T3 or >N1) and without contraindication for

chemoradiation (CRT) received long term CRT consisting of radiation therapy with a total of 50.4 Gy and oral Capecitabine during the period of radiotherapy. Those without locally advanced disease were scheduled for surgery. Patients that had received treatment were scheduled for surgery 8–10 weeks from the end of CRT.

The only inclusion or exclusion criterion to perform the surgery with a robotically assisted laparoscopic approach was that the patient was fit to tolerate a high abdominal pressure. Patients with severe cardiorespiratory disease were excluded. There were no exclusions in terms of BMI, location or extension of the tumour. All procedures were performed with a curative intention.

All patients received antibiotic (Cefoxitin 2gr iv) and thromboembolic prophylaxis, and those in which it was planned to perform an anastomosis received oral mechanical bowel preparation.

Five surgeons in our colorectal unit performed the reported robotically assisted procedures, although the majority were performed by two surgeons (84.3% of the cases). All cases were performed with a da Vinci Si Surgical System (Intuitive Surgical, Sunnyvale, CA, USA).

A robotic total mesorectal excision was performed in all cases with tumour in the mid-low rectum (location of the tumour 0–10 cm from anal verge) and partial mesorectal excision was performed in upper rectum tumours (10–15 cm from anal verge). Splenic flexure mobilization and high ligation of the mesenteric vessels were routinely performed in those cases in which the anastomosis was planned at less than 10 cm above the dentate line. Splenic flexure mobilization was performed with robotic assistance by one surgeon (Dual/Single Dock Robotic technique) and with conventional laparoscopic technique by the rest of the surgeons (Hybrid technique). Trocar and OR Setup were as shown in figures (Figs. 1–3). Abdominoperineal excision was performed in cases with tumour infiltration of anal sphincter or in cases with preoperative fecal incontinence.

International Study Group of Rectal Cancer Grading System for Anastomotic Leaks was used to classify leakages.<sup>18</sup>

Loop ileostomy was performed in those patients with a low anastomosis or with previous long course CRT.

Statistical analysis was performed with IBM SPSS Statistics Release 20.0.0. Log-rank was used for mean study and Kaplan–Meier for survival study.

## Results

### Preoperative data

198 Consecutive robotically assisted resections for rectal cancer were performed between January 2011 and April 2015.

Mean age was 67.5 years (range 38–91 years). Sex distribution was 132 male patients (71.7%) and 56 female (28.3%). Mean ASA was II (range I–IV). Mean BMI was

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