

# Robotic Assisted Laparoscopic Colectomy

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### Abstract

Robotic surgery has evolved over the last decade to compensate for limitations in human dexterity. It avoids the need for a trained assistant while decreasing error rates such as perforations. The nature of the robotic assistance varies from voice activated camera control to more elaborate telerobotic systems such as the Zeus and the Da Vinci where the surgeon controls the robotic arms using a console. Herein, we report the first series of robotic assisted colectomies in Ireland using a voice activated camera control system.

### Introduction

Laparoscopic surgery is rapidly establishing itself as the standard approach to a variety of gastrointestinal conditions. Recognised benefits include shorter length of stay,<sup>1-4</sup> reduced post operative pain, earlier restoration of bowel function and improved cosmesis compared to open surgery. However, it involves a significant learning curve. Major technical disadvantages include: loss of dexterity involved in operating long instruments, exaggerated physiological tremor, fewer degrees of freedom of movement, two dimensional images and reduced tactile feedback.<sup>5</sup> Robotic surgery has been developed worldwide to compensate for some of the limitations of human dexterity.<sup>6,7</sup> Different platforms exist to control the camera including: (1) VIKY Robot 'Endo-Control Medical': moves the laparoscope according to the surgeons instruction (voice activated and foot controlled). (2) Assistâ : a manually controlled mechanical arm locks the laparoscope and an additional grasper in the desired position. (3) The Zeus system and the Da Vinci system: the operator controls robotic arms using a console.

The endocontrol system used in the current study consists of a motorized scope holder placed directly on the patient's abdomen (Figure 1). It is sufficiently small to be placed directly on the operating room table without interfering with other instruments being used. It provides a stable platform thereby eliminating some of the natural physiological tremor associated with hand held manipulation. It allows 3 degrees of freedom and axial translation for zooming. This could eliminate the need for a trained assistant or conversely allow the trainer to manipulate the camera while the resident performs the case. The system is voice-controlled or activated by an accessory foot pedal. Herein, we describe three consecutive robotic assisted laparoscopic colectomies.

### Case 1

A 69 year old lady presented with intermittent right sided abdominal pain, vomiting and diarrhoea. Colonoscopy revealed a caecal tumour. A staging CT revealed no evidence of metastatic spread. She underwent a robotic assisted laparoscopic right hemicolectomy. A pneumoperitoneum was established using the Hassan open technique at the umbilicus and a 10mm port was introduced. The base plate was fixed and the scope placed in position. (Figure 1) Following identification of the tumour the hemicolectomy was completed in a step wise fashion with initial control, ligation and division of the ileocolic artery and a medial to lateral dissection. Operative time was 2.5 hours. She was discharged on the third postoperative day.

Figure 1: Illustration of the robotic device grasping the laparoscope

### Case 2

A 70 year old man was referred with symptomatic anaemia. His haemoglobin was 5.8g/dl. A CT scan demonstrated multiple hepatic lesions suggestive of metastatic disease. Endoscopy confirmed a right sided tumour which was biopsy proven. Following multidisciplinary discussion he underwent a robotic assisted right hemicolectomy to control bleeding from the primary. Operative time was 2 hours. He made a favourable recovery.

### Case 3

An 83 year old man presented with anaemia. Colonoscopy confirmed a caecal tumour. Histology confirmed adenocarcinoma. He had no metastases on abdominal imaging. He underwent a robotic assisted right hemicolectomy. Operative time was 2 hours. He made a favourable recovery and was discharged home on the sixth postoperative day.

### Discussion

Over the last decade many developments have occurred in the field of robotic surgery. The advantage of the Endocontrol robotic platform described in the current series is that it provides a stable platform for the camera thereby eliminating the physiological tremor involved with human camera manipulation. Once trained with the device, it is likely that a single operator could perform complex laparoscopic procedures without the need for an assistant to guide the laparoscope. In our series there were no intra or postoperative complications associated with the usage of the device. Further studies are necessary to evaluate the Endocontrol system in terms of adaptability and possible ergonomic benefit in other colorectal procedures.

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