

# ROBOTIC SURGERY IN THE TREATMENT OF RECTAL CANCER - IMPLEMENTATION IN BULGARIA AND EARLY CLINICAL RESULTS

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## INTRODUCTION

At present, the standard treatment of rectal cancer requires a multimodality approach. It includes preoperative radiotherapy, surgical removal of the tumor with total mesorectal excision (TME), and postoperative chemotherapy. Conventional open surgery is the most frequent surgical approach. Laparoscopic surgery is not a standard surgical procedure for the treatment of rectal cancer (1). The difficult anatomy of the pelvis, the two dimensional view to the surgical field, unstable camera, loss of eye-hand coordination and the enhancement of the physiological tremor lead to a number of technical difficulties, a long learning curve and a high conversion rate in treatment of rectal cancer (2).

Minimallyinvasive surgery has dramatically changed since the introduction of the robotic surgical systems into the practice (3). This type of a system was created for precise dissection in narrow spaces like the pelvis. Three dimensional view of the operative field, instruments with high level of mobility, recreating the wrist's movements, a filter for the physiological tremor and better ergonomics are a part of the advantages of robotic surgery over laparoscopic surgery (4-5). Better visualization and high degree of instruments movements can lead to

better dissection during TME (6). Currently some comparative studies have demonstrated a lower conversion rate for robotic surgery compared to conventional laparoscopic surgery in the treatment of rectal cancer (7-8). Other studies report faster recovery of sexual and urinary function after robotic surgery (9). This is the reason for many authors to believe that robotic surgery can overcome the limitations of conventional laparoscopic surgery in the treatment of rectal cancer. Robotic surgery can also significantly increase the percentage of minimally invasive procedures and improve the quality of rectal cancer surgery.

## AIM

The aim of our study was to present the initial results after implementation of robot-assisted rectal resection for rectal cancer in Bulgaria.

## MATERIALS AND METHODS

In the period of 09.04.2014 to 04.10.2015 the first robot-assisted rectal resections for rectal cancer in Bulgaria were performed in the University Hospital "G. Stranski" Pleven by teams of the Department of Surgical Oncology and the Department of Suppurative-septic

Surgery and Coloproctology. The DaVinci S and DaVinci Si Robotic systems were used in all of the operations. All patients had clinically, endoscopically and histologically verified rectal adenocarcinoma. Preoperative staging was performed by computer tomography and magnetic resonance imaging. In all cases the operations started with diagnostic and staging laparoscopy. Information about gender and age, stage of disease, previous surgery, preoperative radiotherapy, and also about the robotic system, used for the operation is presented in Table 1 for each patient.

## RESULTS

Palliative rectal resection was performed in two patients in fourth stage of disease with lung metastases. Abdomino-perineal rectal extirpation by Quenu-Milles was performed in one patient with rectal cancer at 2 cm from the anal verge. Rectal resection by Hartmann was carried out in one case. In all other cases anterior rectal resection with TME and simultaneous recovery of the gastrointestinal tract was performed. In all surgeries 5 trocars were used - 1 for the robotic camera, 3 for the robotic hands and 1 for an additional conventional

laparoscopic instrument. There was no need for the placement of additional trocars. There was no case of conversion to conventional surgery. No intraoperative complications were registered in this study. Perioperative results are shown on table 2.

Postoperative results are presented in table 3. In all cases negative resection margins were registered (proximal, distal and circumferential). The average number of harvested lymph nodes was 6.9. Pathological evaluation of the quality of TME was performed in all cases. There was no case of incomplete TME. The patients were discharged on 6-th postoperative day on the average. The mean hospital stay was 6.4 days. In one patient postoperative bleeding occurred 24 hours after surgery. The patient was treated conservative. Suppuration of the abdominal incision for specimen extraction developed in another. The infection was treated locally and system intravenous antibiotics for 10 days. One year after surgery a patient referred to the hospital with a postoperative hernia at the site of incision for specimen extraction. One patient died 8 months after surgery. The patient in 4-th stage of disease and had refused postoperative chemotherapy.

Table1. Patient data

Patient	Gender	Age	Location	TNM	ASA	Previous surgery	Preoperative Radio therapy	Robotic system
1	M	78	Distal sigmoid	T3N0M1		No	No	Si
2	M	75	Rectal/10cm from DL	T3N0M1		No	No	S
3	F	69	Rectal/10cm from DL	T2N0M0		No	No	S
4	F	70	Rectal/11cm from DL	T3N1M0		No	No	S
5	F	55	Rectal/6cm from DL	T1N0M0		Yes	Yes	S
6	M	78	Rectal/12cm from DL	T2N0M0		Yes	Yes	S
7	M	72	Recto-sigmoid	T1N0M0		Yes	No	Si
8	M	81	Rectal/12cm from DL	T3N0M0		No	No	S
9	M	67	Rectal/2cm from DL	T3N0M0		No	Yes	Si

Legend: DL-dentate line, M-male, F-Female, RT-radiotherapy, S – da Vinci S system, Si-da Vinci Si system

Table 2. Perioperative results

Patient	Total operative time (minutes)	Time for docking (minutes)	Number of ports	Drainages	Conversion	Type of operation
1	340	30	5	1	No	RRA
2	330	35	5	1	No	Hartmann
3	320	40	5	0	No	RRA
4	330	35	5	1	No	RRA
5	460	30	5	1	No	RRA
6	300	30	5	1	No	RRA
7	270	25	5	1	No	RRA
8	310	30	5	1	No	RRA
9	300	25	5	2	No	APR

Legend: RRA - anterior resection of the rectum, APR - abdominoperineal resection of the rectum

Table 3. Postoperative results

Patient	Resection margins	Harvested lymph nodes	Quality of TME	Stomia	Discharged (POD)	Hospital stay (days)	Early postoperative complications	Late complications
1	Negative	8	Excellent	None	4	5	None	None
2	Negative	8	Excellent	Colostomy	5	7	Bleeding	Died
3	Negative	5	Excellent	None	5	7	None	None
4	Negative	7	Excellent	None	7	10	None	PO hernia
5	Negative	4	Excellent	Ileostomy	5	7	None	None
6	Negative	3	Excellent	None	8	10	None	None
7	Negative	9	Excellent	None	10	15	Suppuration	None
8	Negative	10	Excellent	None	7	9	None	None
9	Negative	8	Excellent	Colostomy	7	9	None	None

Legends: POD-postoperative day, PO-postoperative, TME-total mesorectal excision

## DISCUSSION

Laparoscopic surgery is associated with many technical difficulties for TME. This is why it is not a standard procedure for treatment of rectal cancer. Some authors report that robotic surgery is comparable to conventional open surgery regarding the surgical and early oncologic results, but it has all the advantages of minimally invasive surgery (10). These facts were confirmed by the initial results of the present study, because four of the cases had previous

abdominal surgery and despite our minimal experience with robotic surgery the robotic dissection was successfully accomplished in all cases with no need of conversion. The first results - negative resection margins, no intraoperative and perioperative complications suggest that robotic surgery can overcome the technical difficulties during conventional laparoscopic surgery and can shorten the learning curve significantly. In fact, the authors carried out a careful preoperative selection of the first cases

– the first four patients had a tumor localized in the distal sigmoid colon and the upper third of the rectum. The aim was achieving a shorter learning curve. Despite all the advantages of robotic surgery, the experience with this kind of surgery is still minimal. One of the main disadvantages of robotic surgery is the cost. However, the effect on the total health care cost and economy is still not completely clarified. There are studies on the cost itself but not on cost-effectiveness and more research is necessary in this field (10). Another disadvantage is the longer operative time in robotic surgery because of the need for docking time. By developing new techniques and gaining more experience with robotic surgery this disadvantage can be overcome (11). In a large meta-analysis on minimally invasive surgery, Darzi et al. suggest that during the next decade the development of minimally invasive surgery will be based on the robotic surgical systems (12).

## CONCLUSION

The initial results of this study for robotic surgery in rectal cancer are encouraging and comparable to those in literature by other authors highly experienced in minimally invasive surgery. Further research is needed for evaluation of the late oncologic results and economic effects.

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