

Robotic Versus Laparoscopic Sigmoid Resection for Diverticular Disease: A Single-Centre Experience of 106 Cases

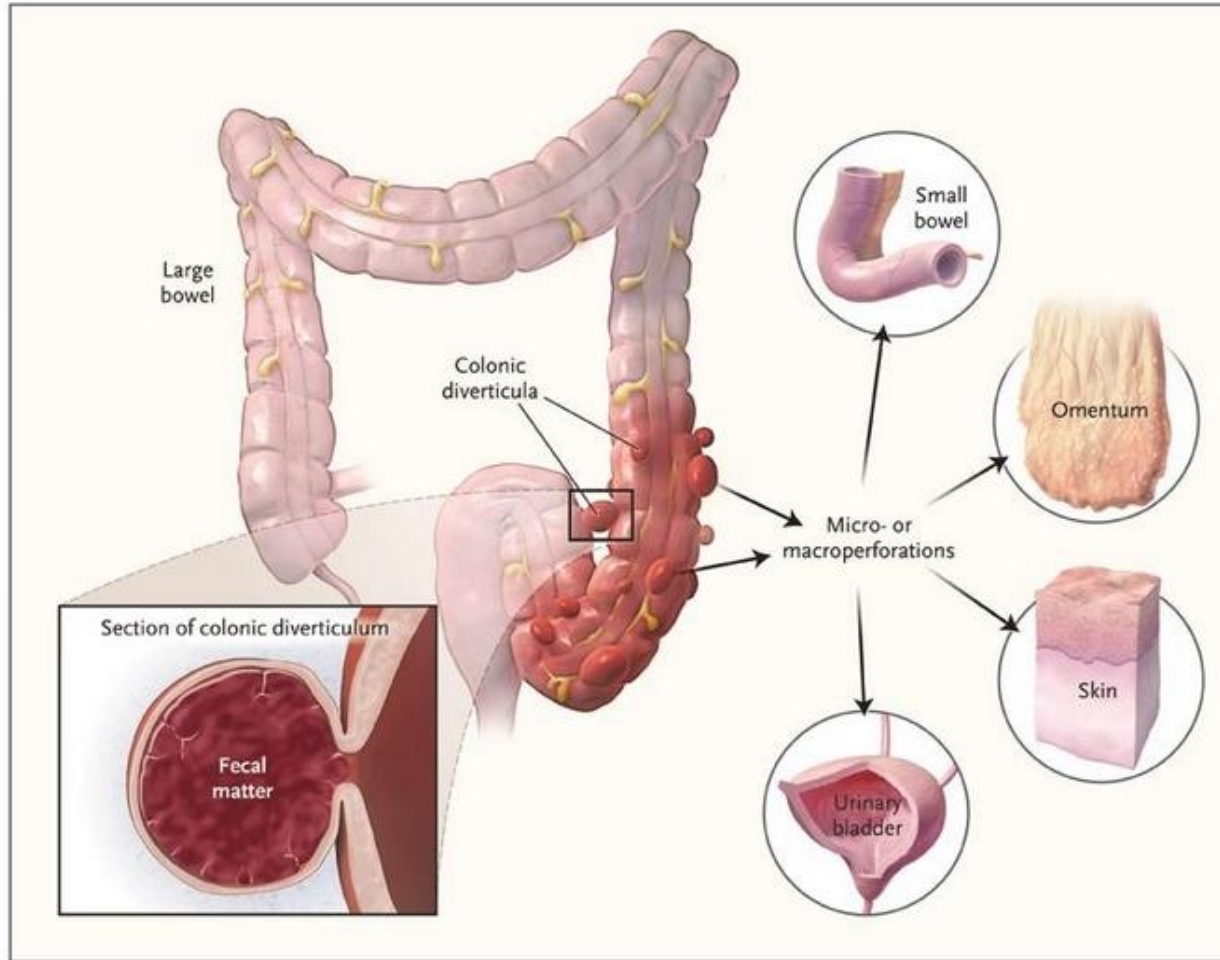
Lt. Colonel Christian Beltzer, MD

Presenter has no relevant financial or non-financial interests to disclose.

This continuing education activity is managed and accredited by AffinityCE in collaboration with AMSUS. AffinityCE and AMSUS staff as well as Planners and Reviewers, have no relevant financial or non-financial interests to disclose.

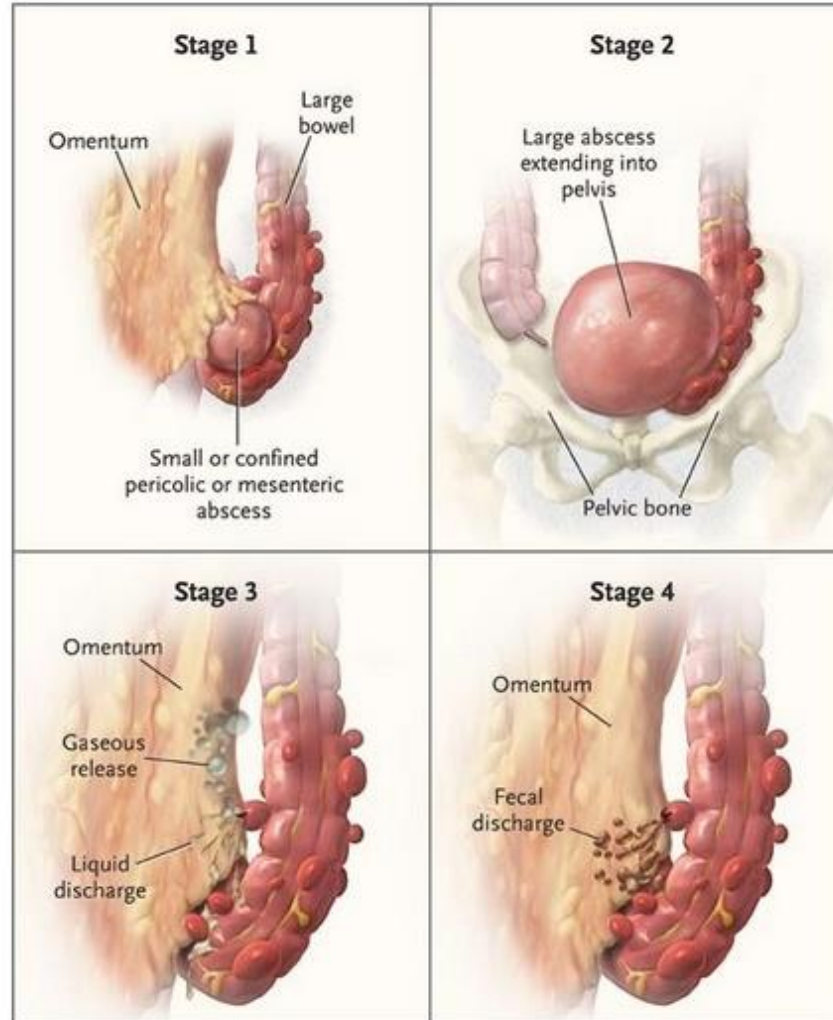
Commercial Support was not received for this activity

- describe the value of robotic assisted surgery for sigmoid resection
- define the role of robotic assisted surgery compared to laparoscopic surgery
- interpret the educational aspects of robotic surgery for a surgical department



Jacobs DO, NEJM, 2007

Hinchey–Classification, 1978



Jacobs DO, NEJM, 2007

TABLE 1. CLASSIFICATION OF DIVERTICULAR DISEASE

<i>CDD type</i>	<i>Definition</i>
0	Asymptomatic diverticulosis
1	Acute uncomplicated diverticulitis
1a	Diverticulitis without peridiverticulitis
1b	Diverticulitis with phlegmonous peridiverticulitis
2	Acute complicated diverticulitis
2a	Microabscess (≤ 1 cm)
2b	Macroabscess (≥ 1 cm)
2c	Free perforation
2c1	Purulent peritonitis
2c2	Fecal peritonitis
3	Chronic diverticular disease
3a	SUDD; localized symptoms, laboratory test (calprotectin): optional
3b	Relapsing diverticulitis without complications; signs of inflammation (laboratory tests): present, cross-sectional imaging: indicates inflammation
3c	Relapsing diverticulitis with complications (stenosis, fistula, conglomerate tumor)
4	Diverticular bleeding

Hinchey I - IV

CDD, Classification of Diverticular Disease; SUDD, Symptomatic uncomplicated diverticular disease.

Source: Lembcke.¹⁷

RANDOMIZED CONTROLLED TRIALS

Laparoscopic Sigmoid Resection for Diverticulitis Decreases Major Morbidity Rates: A Randomized Control Trial

Short-term Results of the Sigma Trial

Bastiaan R. Klarenbeek, MD, Alexander A. Veenhof, MD,* Roberto Bergamaschi, MD, PhD, FRCS,†
Donald L. van der Peet, MD, PhD,* Wim T. van den Broek, MD, PhD,* Elly S. de Lange, PhD,*
Willem A. Bemelman, MD, PhD,‡ Piet Heres, MD,§ Antonio M. Lacy, MD, PhD,¶
Alexander F. Engel, MD, PhD,|| and Miguel A. Cuesta, MD, PhD**

- major complications laparoscopic vs. open 9.6 % vs. 25 % ($p = 0.03$)
- laparoscopic patients with less pain (visual analog scale 1.6; $p = 0.0003$)
- conversion rate (laparoscopic to open surgery) 19.2 %

The American Journal of Surgery (2010) 200, 144–161

The American
Journal of Surgery®

Review

Elective laparoscopic sigmoid resection for diverticular disease has fewer complications than conventional surgery: a meta-analysis

Muhammad Rafay Sameem Siddiqui*, M.S. Sajid, S. Qureshi, E. Cheek, M.K. Baig

Department of Colorectal Surgery, Worthing Hospital, Registrar, Washington Suite, North Wing, Worthing, West Sussex, BN11 2DH, United Kingdom

- 2.383 patients included
- laparoscopic resection with fewer surgical site infections, blood transfusions and ileus rates compared to open surgery

- **standard surgical approach** for the treatment of recurrent, uncomplicated and complicated diverticular disease
- in diverticular disease, **conversion rates** from 5.2 % (1), 19.2 % (2) and 26 % (3) have been reported

- 1) Royds, J., et al., Dis, 2012
- 2) Klarenbeek, B.R., et al., Ann Surg, 2009
- 3) Hassan, I., et al., Surg Endosc, 2007

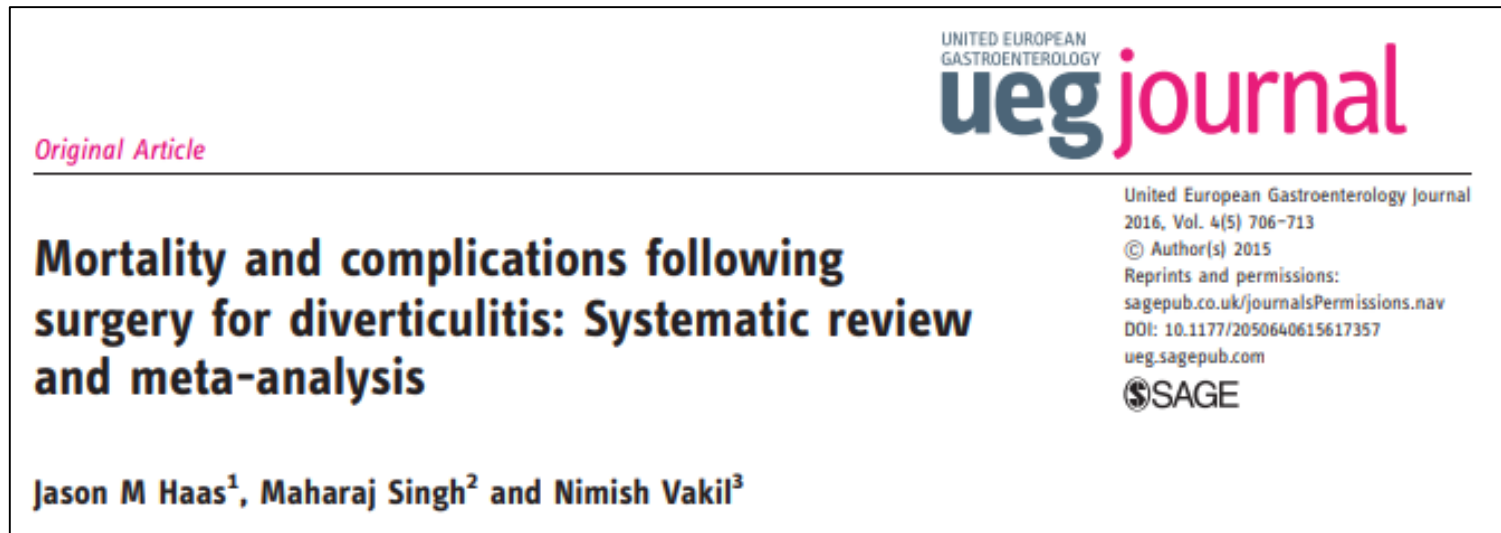
ORIGINAL ARTICLE

Outcomes and Costs of Elective Surgery for Diverticular Disease

A Comparison With Other Diseases Requiring Colectomy

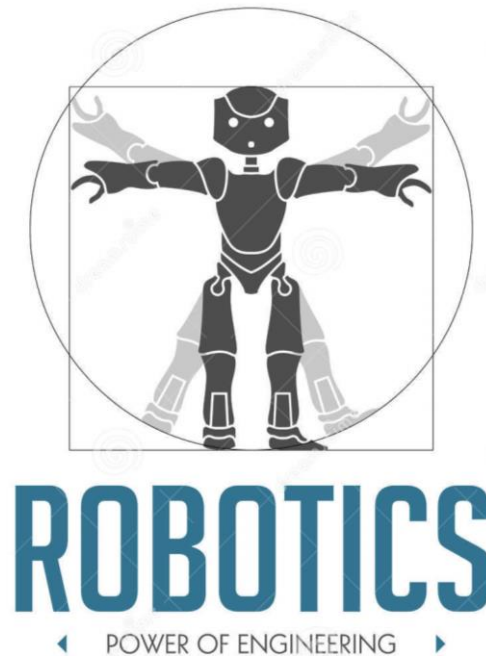
Kyle J. Van Arendonk, MD; Kevin M. Tymitz, MD; Susan L. Gearhart, MD;
Miloslawa Stem, MS; Anne O. Lidor, MD, MPH

- sample of US hospital admissions from 2003 – 2009
- 74.879 patients included
- to compare outcomes of resections for colon cancer (CC), **diverticular disease (DD)** and inflammatory bowel disease (IBD)
- *“Despite undergoing the same procedure, **patients with DD have significantly worse and more costly outcomes after elective colectomy** compared with patients with CC...”*
- patients with DD: ostomy-placement = 7.55 %

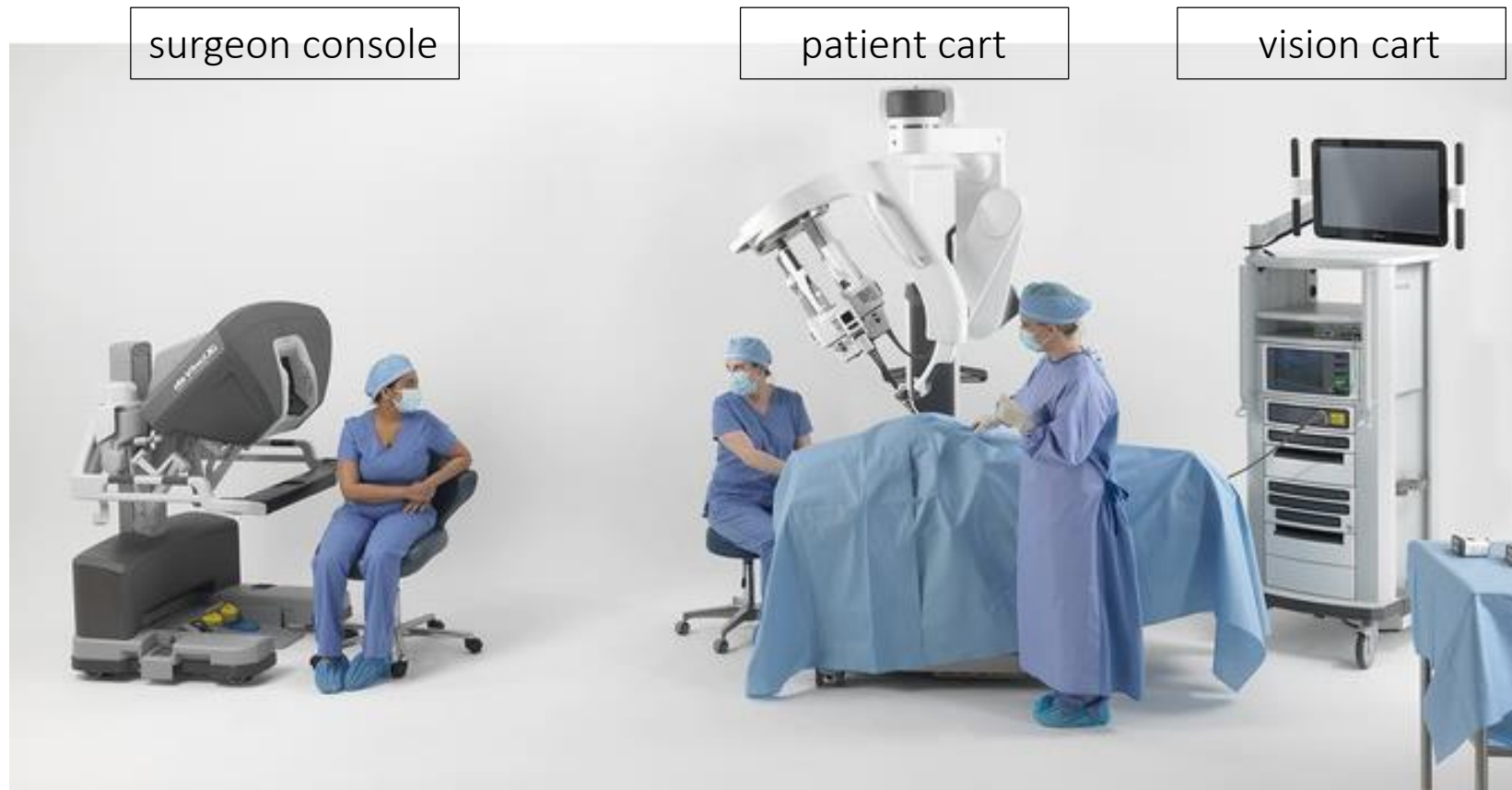


- overall reported post-operative complication rate of 32.64 %
- complication rate in emergent surgery of 53.6 %
- complication rate in elective surgery of 22.5 %
- complication rate laparoscopic approach 22.5 % versus open approach 41.3 %

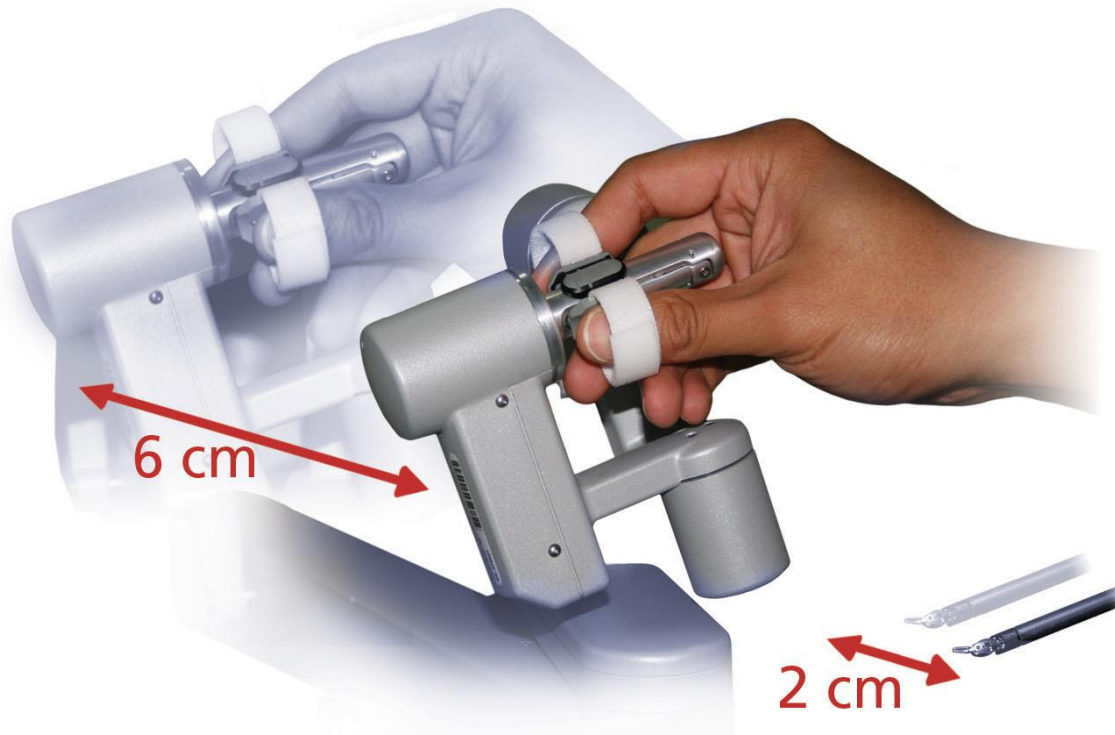
Can robotic surgery improve outcome in sigmoid resection for diverticular disease??



da Vinci Xi[®] surgical platform

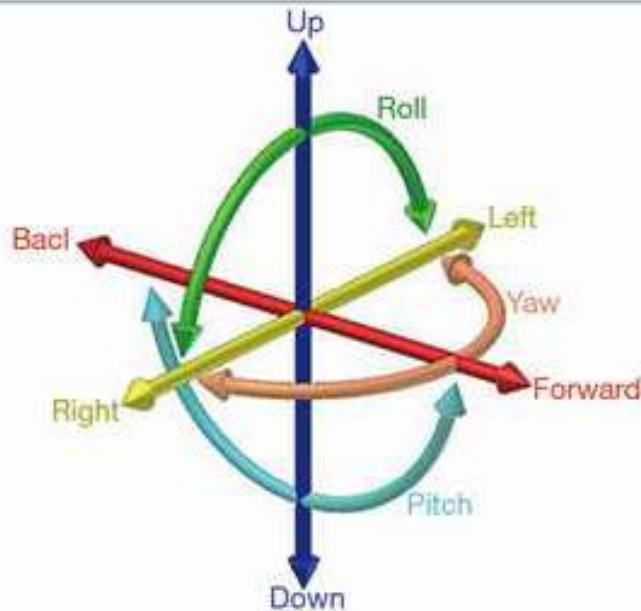


da Vinci Xi[®] – technical advantages

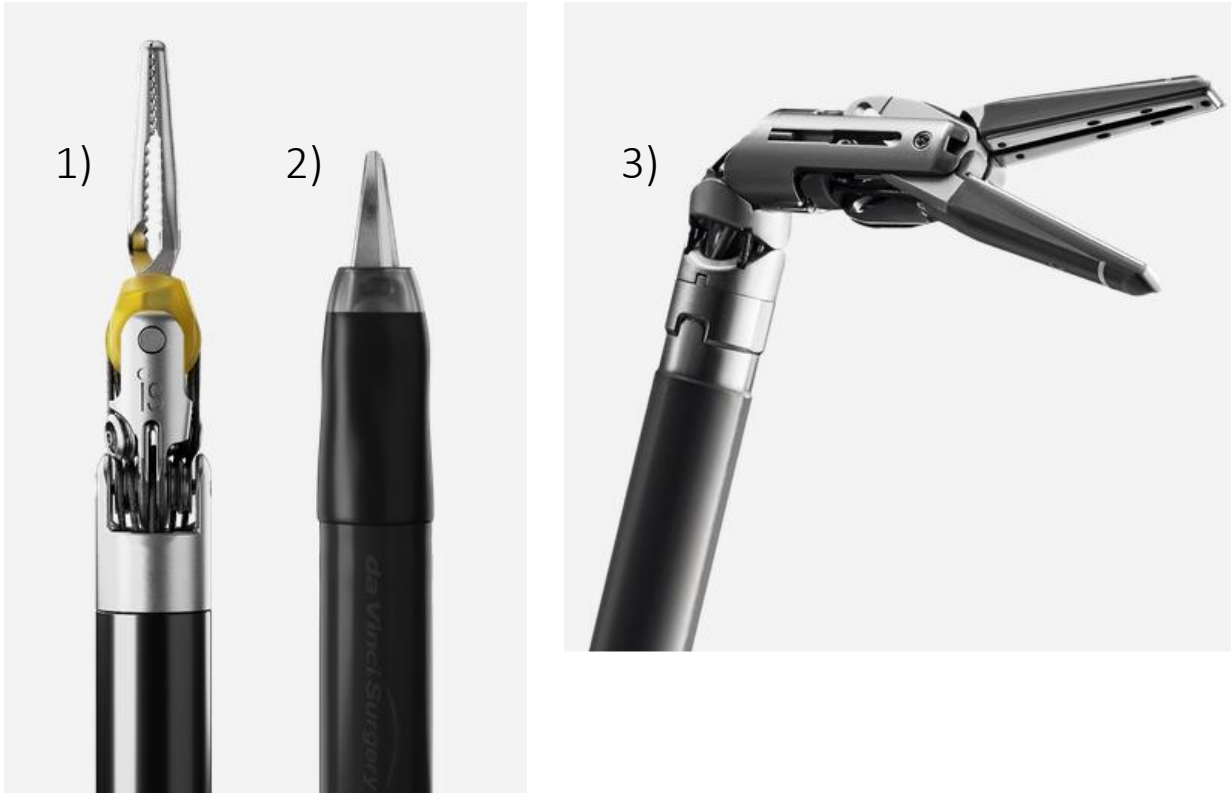


hand-to-instrument ratios and tremor reduction for **enhanced precision**

- **endowrist technology** – inspired by the human hand - with 7 degrees of freedom
- enhanced vision (3DHD), precision and control compared to laparoscopy



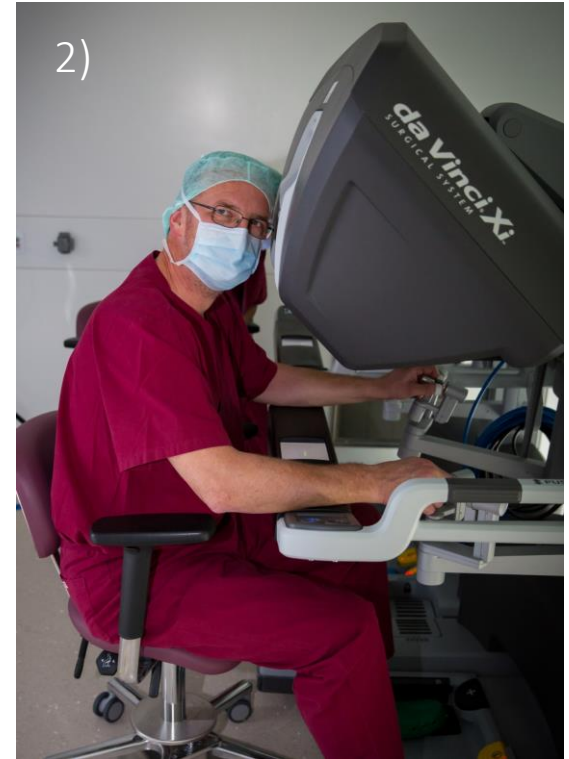
da Vinci Xi[®] – surgical instruments



1) bipolar forceps, 2) monopolar hook, 3) vessel sealer (bipolar)



1) patient card and 1st assist directly at the patient

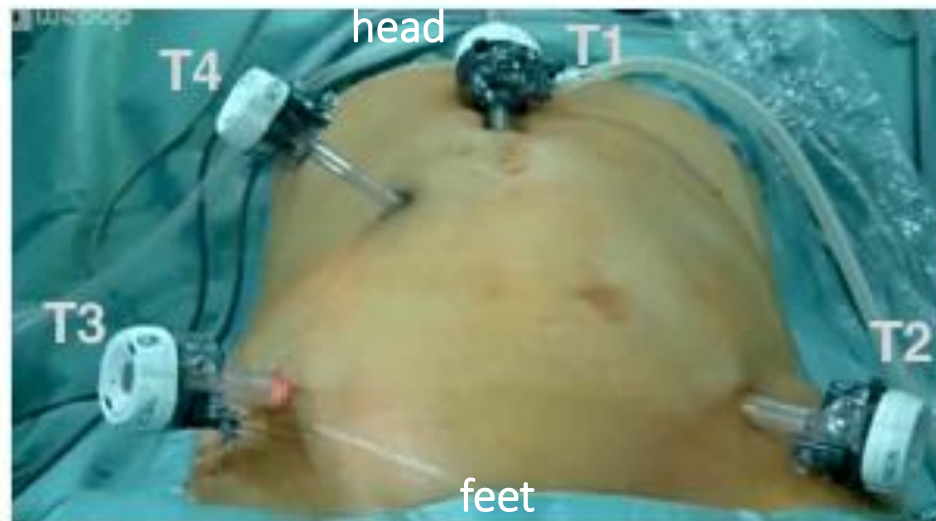


2) surgeon at surgeon console, distant to patient

- a **retrospective analysis** was conducted of all **laparoscopic (group 1; n = 46)** and **robotic (group 2; n = 60)** sigmoid resections for diverticular disease at our institution from Oct 2013 to Nov 2018
- **indications** for sigmoid resection were uncomplicated, complicated, or recurrent **diverticular disease** in both groups
- demographics, characteristics, operative measures, and complications of both groups were assessed

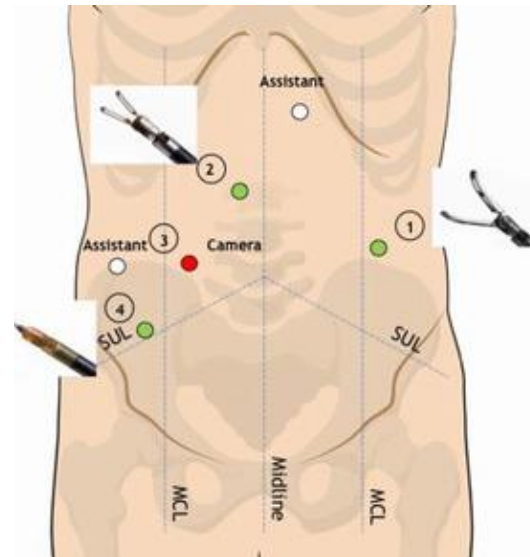
Laparoscopic Sigmoid Resection

- all laparoscopic procedures were performed by consultants of the surgical department
- laparoscopic operations were conducted in the **lithotomy position**, using **four trocars** (four 12mm trocars)



Robotic Sigmoid Resection

- all robotic procedures were performed by **two experienced colorectal surgeons** with the da Vinci Xi[®]-system
- **lithotomy position**, robot docked over the patient's right side, **five-trocar-technique** (one 12 mm camera trocar, three 8 mm trocars, one 12 mm assistant trocar)



- the bowel was divided with a **linear stapler** in the upper rectum (Echelon-Flex™, Ethicon)
- all sigmoid specimens were extracted using an **Alexis wound protector** (Applied Medical), either through a Pfannenstiel incision or an incision in the left iliac fossa
- end-to-end or side-to-end **anastomosis** was performed using a **29 mm EES Circular Stapler** (Ethicon)

- there were no significant differences in **type of diverticular disease** between both groups
- patients in the robotic group received an **oral antibiotic bowel preparation** (OABP) significantly more often (43.3 % vs 13 %, $p = 0.001$)

TABLE 2. DEMOGRAPHICS AND CLINICAL CHARACTERISTICS OF PATIENTS WITH LAPAROSCOPIC AND ROBOTIC SIGMOID RESECTIONS

	<i>Laparoscopic sigmoid resection, n=46 (43%)</i>	<i>Robotic sigmoid resection, n=60 (57%)</i>	P
Age; mean ± SD (years)	59.3 ± 11.8	60.0 ± 11.0	.92
BMI; mean ± SD (kg/m ²)	26.13 ± 4.1	27.06 ± 4.5	.27
Gender; n (%)			.72
Female	20 (43.5)	24 (40)	
Male	26 (26.5)	36 (60)	
ASA; n (%)			.72
1	2 (4.3)	2 (3.3)	
2	30 (65.2)	38 (36.3)	
3	14 (30.4)	20 (33.3)	
Smoking; n (%)	14 (30.4)	14 (23.3)	.66
Diabetes mellitus type 2; n (%)	2 (4.3)	5 (8.3)	.41
Previous abdominal surgery; n (%)	25 (54.3)	24 (40.0)	.17
Mechanical bowel preparation; n (%)	38 (82.6)	43 (71.7)	.19
OABP; n (%)	6 (13.0)	26 (43.3)	.001
CDD type; n (%)			.387
1a	1 (2.2)	1 (1.7)	
1b	12 (26.1)	10 (16.7)	
2a	11 (23.9)	13 (21.2)	
2b	3 (6.5)	8 (13.3)	
2c	1 (2.2)	2 (3.8)	
3a	4 (8.7)	4 (6.7)	
3b	7 (15.2)	5 (8.3)	
3c	3 (6.5)	9 (15.0)	
Not classified	3 (6.5)	8 (13.3)	

ASA, American Society of Anesthesiologists; BMI, body mass index; CDD, Classification of Diverticular Disease¹⁷; OABP, oral antibiotic bowel preparation; SD, standard deviation.

there were **no significant differences** between the laparoscopic and robotic group with regard to:

- need for stoma/ostomy (4.3 % vs 6.7 %, $p = 1.0$)
- operative time (118 min. vs 130 min., $p = 0.23$)
- perioperative blood transfusion (4.3 % vs 1.7 %, $p = 0.58$)
- conversion rate (0 % vs 1.7 %, $p = 0.36$)

TABLE 3. OPERATIVE MEASURES FOR LAPAROSCOPIC VERSUS ROBOTIC SIGMOID RESECTIONS

	<i>Laparoscopic sigmoid resection, n=46 (43%)</i>	<i>Robotic sigmoid resection, n=60 (57%)</i>	P
Conversion rate; n (%)	0	1 (1.7)	.36
Bowel extraction site; n (%)			.002
Pfannenstiel incision	8 (17.4)	31 (51.7)	
Incision left iliac fossa	30 (82.6)	29 (48.3)	
Need for stoma; n (%)	2 (4.3)	4 (6.7)	1.0
Operative time; mean ± SD (minutes)	118 ± 36.8	130.4 ± 42.4	.23
Intraoperative and postoperative blood transfusion; n (%)	2 (4.3)	1 (1.7)	.58
Epidural catheter; n (%)	32 (69.6)	44 (73.3)	.67

there were **no significant differences** between the laparoscopic and robotic group with regard to:

- Surgical Site Infections (SSI) (6.5 % vs 6.7 %, $p = 1.0$)
- Anastomotic leakages (AL) (6.5 % vs 6.7 %, $p = 1.0$)
- Overall complications (30.4 % vs 30 %, $p = 0.8$)
- Re-Operations < 30 days (15.2 % vs 8.3 %, $p = 0.27$)
- Mortality (0 % vs 1.7 %, $p = 1.0$)

TABLE 4. INCIDENCE OF POSTOPERATIVE COMPLICATIONS AND MEASURES FOR LAPAROSCOPIC VERSUS ROBOTIC SIGMOID RESECTIONS

	<i>Laparoscopic sigmoid resection, n = 46 (43%)</i>	<i>Robotic sigmoid resection, n = 60 (57%)</i>	P
Anastomotic leakage; n (%)	3 (6.5)	4 (6.7)	1.0
SSSI; n (%)	3 (6.5)	4 (6.7)	1.0
DSSI; n (%)	1 (2.2)	2 (3.3)	1.0
Reoperation <30 days; n (%)	7 (15.2)	5 (8.3)	.27
Death; n (%)	0	1 (1.7)	1.0
Clavien-Dindo			.8
I	0	1 (1.7)	
II	4 (8.7)	8 (13.3)	
III A	2 (6.5)	3 (5.0)	
III B	7 (15.2)	5 (8.3)	
IV	0	1 (1.7)	
Need for intravenous analgesics; mean ± SD (days)	2.1 ± 2.8	3.0 ± 6.3	.21
Length of postoperative ileus; mean ± SD (days)	2.8 ± 1.6	2.2 ± 6.3	.01

DSSI, deep surgical site infection; SD, standard deviation; SSSI, superficial surgical site infection.

- robotic sigmoid resection for diverticular disease had an **almost similar outcome** as laparoscopic resection
- in our study robotic resection, regardless of all technical advantages, was not beneficial for patients compared to laparoscopic resection
- until today there are **no prospective, randomized, multicenter-trials** comparing robotic and laparoscopic approach for sigmoid resection

JAMA | **Original Investigation**

Effect of Robotic-Assisted vs Conventional Laparoscopic Surgery on Risk of Conversion to Open Laparotomy Among Patients Undergoing Resection for Rectal Cancer The ROLARR Randomized Clinical Trial

David Jayne, MD; Alessio Pigazzi, PhD; Helen Marshall, MSc; Julie Croft, BSc; Neil Corrigan, MSc; Joanne Copeland, BSc; Phil Quirke, FMedSci; Nick West, PhD; Tero Rautio, PhD; Niels Thomassen, MD; Henry Tilney, MD; Mark Gudgeon, MS; Paolo Pietro Bianchi, MD; Richard Edlin, PhD; Claire Hulme, PhD; Julia Brown, MSc

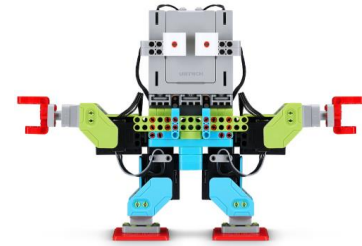
RESULTS Among 471 randomized patients (mean [SD] age, 64.9 [11.0] years; 320 [67.9%] men), 466 (98.9%) completed the study. The overall rate of conversion to open laparotomy was 10.1%. The overall CRM+ rate was 5.7%. Of the other 8 reported prespecified secondary end points, including intraoperative complications, postoperative complications, plane of surgery, 30-day mortality, bladder dysfunction, and sexual dysfunction, none showed a statistically significant difference between groups.

End Point	No. With Outcome/Total No. (%)		Unadjusted Risk Difference (95% CI), %	Adjusted Odds Ratio (95% CI)	P Value
	Conventional Laparoscopy	Robotic-Assisted Laparoscopy			
Conversion to open laparotomy	28/230 (12.2)	19/236 (8.1)	4.1 (-1.4 to 9.6)	0.61 (0.31-1.21)	.16
CRM+	14/224 (6.3)	12/235 (5.1)	1.1 (-3.1 to 5.4)	0.78 (0.35-1.76)	.56

CONCLUSIONS AND RELEVANCE Among patients with rectal adenocarcinoma suitable for curative resection, robotic-assisted laparoscopic surgery, as compared with conventional laparoscopic surgery, did not significantly reduce the risk of conversion to open laparotomy. These findings suggest that robotic-assisted laparoscopic surgery, when performed by surgeons with varying experience with robotic surgery, does not confer an advantage in rectal cancer resection.

→ no difference in outcome between laparoscopic and robotic rectal resection

- one or two dedicated **robotic surgeons**
- impact on **laparoscopic expertise** for other surgeons of department???
- robotic procedures available for treatment of **emergencies** at night??



Journal of Laparoendoscopic & Advanced Surgical Techniques, Ahead of Print |

Robotic Versus Laparoscopic Sigmoid Resection for Diverticular Disease: A Single-Center Experience of 106 Cases

Christian Beltzer ✉, Lisa Knoerzer, Robert Bachmann, Steffen Axt, Hartmut Dippel, and Roland Schmidt

Published Online: 21 Aug 2019 | <https://doi.org/10.1089/lap.2019.0451>

If you would like to earn continuing education credit for this activity, please visit: <http://amsus.cds.pesgce.com>

Hurry, CE Certificates will only be available for 30 Days after this event!