IS ROBOTIC SURGERY THE STANDARD OF CARE FOR COLORECTAL CANCER?

SOUTH FLORIDA
GI CANCER SYMPOSIUM

April 11-12, 2025

The Diplomat Beach Resort | Hollywood, Florida

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Assistant Professor, Surgery
Global Center for Integrated Colorectal Surgery & IBD Interventional Endoscopy
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COLUMBIA

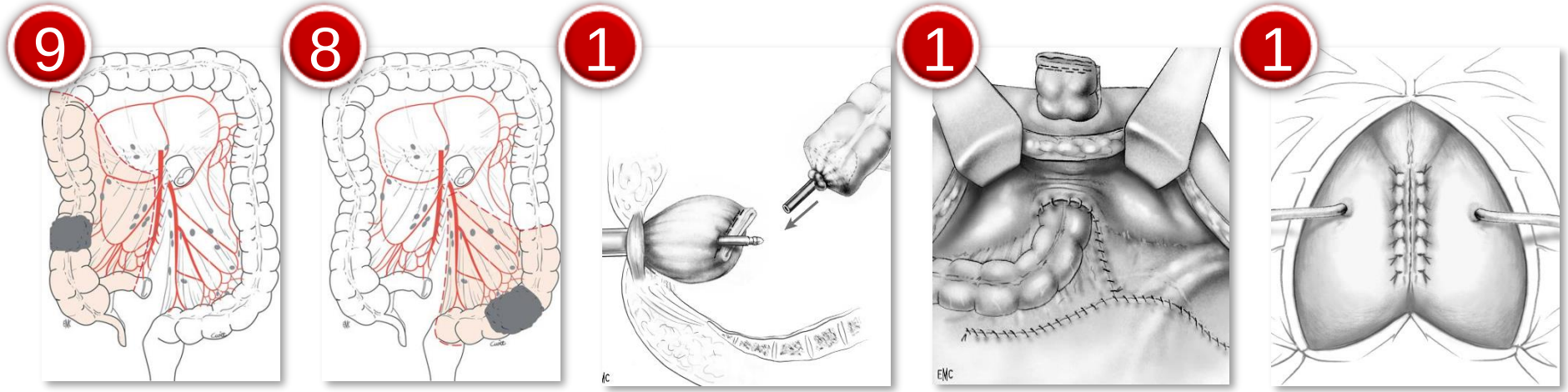
NewYork-Presbyterian

SURGICAL Laparoscopy Endoscopy & PERCUTANEOUS TECHNIQUES

Surg Laparosc Endosc. 1991 Sep;1(3):144-50.

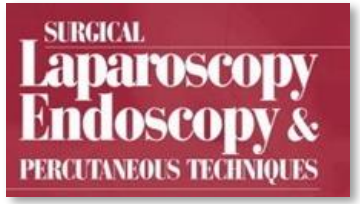
Minimally invasive colon resection (laparoscopic colectomy).

Jacobs M, Verdeja JC, Goldstein HS.



12/20 for cancer

… Although laparoscope-assisted colonic surgery may still be considered a procedure in **evolution**, we feel that in time it has the potential to be as popular as laparoscopic cholecystectomy.



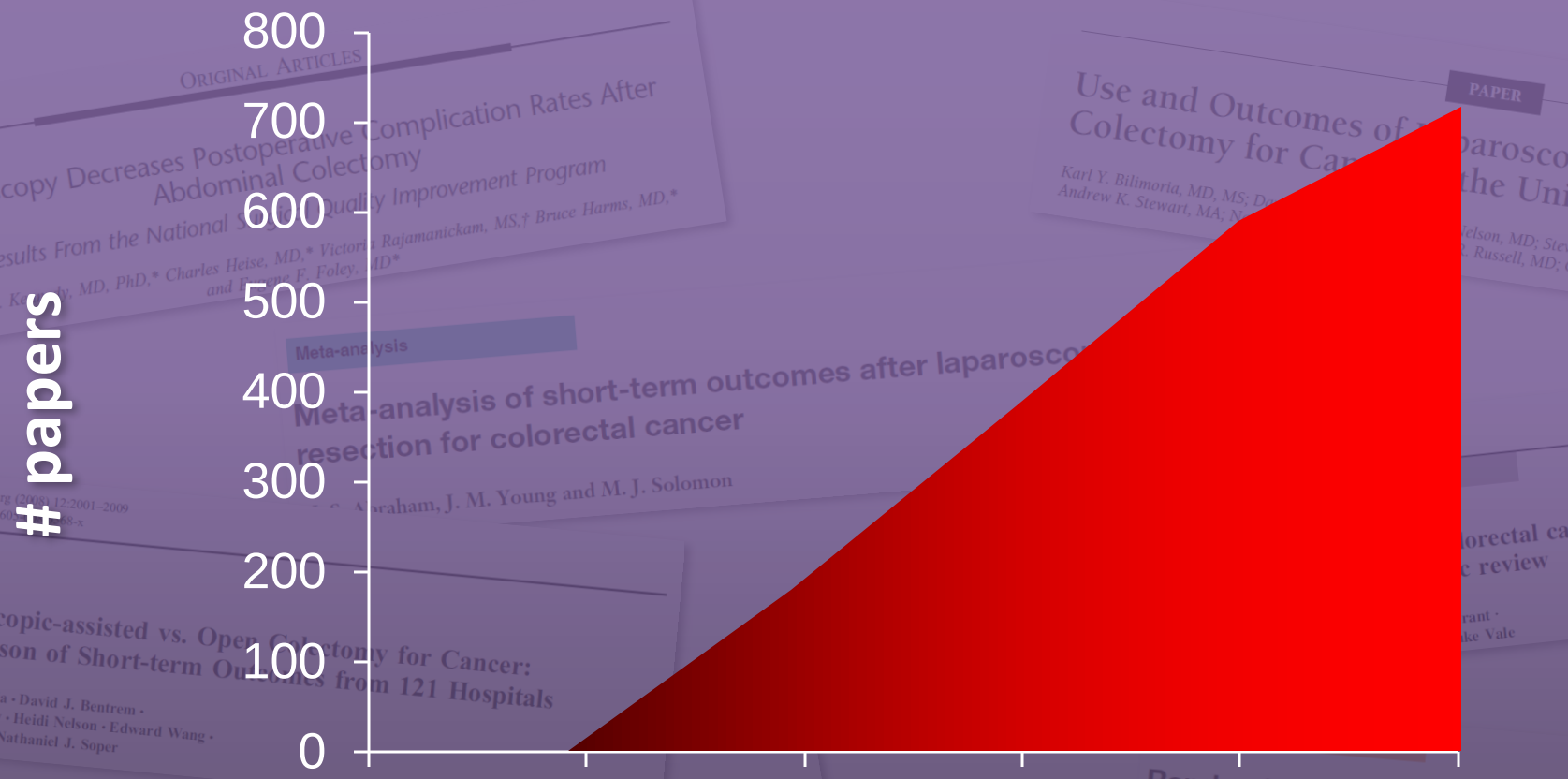
Surg Laparosc Endosc. 1991 Sep;1(3):144-50.

Minimally invasive colon resection (laparoscopic colectomy).

Jacobs M, Verdeja JC, Goldstein HS.

Revolution

?


800
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papers
1980-84
1985-90
1991-95
1996-00
2001-05
2006-10

World J. Surg. 23, 397–405, 1999

WORLD
Journal of
SURGERY

Laparoscopic Surgery of the Colon and Rectum

Hiroshi Tomita, M.D., Peter W. Marcello, M.D., Jeffrey W. Milsom, M.D.*

Whether a resection for colorectal carcinoma is performed as an open procedure or laparoscopically, the same principles applied to an oncologic resection must apply here.

	Barcellona	COST-SG	COLOR	MRC-Classic
Lymph node retrieval (Median)	L 11.1 O 11.1	L 12 O 12	L 10 O 10	L 12 O 13.5
Positive margin	NR	NR	L 2 O 2	L 7 O 5
OR Time (min)	L 142 * O 118	L 150 * O 95	L 145 * O 115	L 180 * O 135
Conversion rate	11	21	17	25
LOS	L 5.2 * O 7.9	L 5 * O 6	L 8.2 * O 9.3	L 9 O 9
Morbidity rate	L 10.8 * O 28.7	L 21 O 20	L 21 O 20	L 26 O 27
Mortality	L 0.9 O 2.9	L 0.5 O 1	L 1 O 2	L 4 O 5

* = p<0.05

Cochrane Database of Systematic Reviews 2005, Issue 2.

The Cochrane Library Evidence for healthcare decision-making

InterScience

Short term benefits for laparoscopic colorectal resection

Wolfgang Schwenk[1], Oliver Haase[2], Jens J. Neudecker[3], Joachim M Müller[4]

25 randomized controlled trials 3526 patients

	Pro Laparoscopy	*Pro Laparotomy*
Blood loss (-72 cc)	✓	
Pain (-8 to -12 mm on a 100 mm VAS for pain)	✓	
Pulmonary function (0.38-0.56 L on p.o. day 1 and 3)	✓	
Operative time		✓
Duration of p.o. ileus (-1,0 day)	✓	
Hospital stay (-1.4 days)	✓	
QoL (until the 30th postoperative day)	✓	
Surgical morbidity (wound infection and p.o ileus)	✓	
General postoperative complications	=	

	Barcellona	COST-SG	COLOR	MRC-Classic
Port site mets (%)	L 0.9 O 0	L 0.9 O 0.5	L 1.3 O 0.4	L 2.5 O 0.6
Local recurrence (%)	L 6.6 O 13.7	L 2.3 O 2.6	L 4.7 O 4.8	L 7.3 O 6
Disease free survival (%)	L 83 O 73	L 69.2 O 68.4	L 7[illegible] O 76.2	L 67.7 O 66.3
Overall survival (%)	L 82 O 74	L 74.6 O 76.4	L 81.8 O 84.2	L 68.4 O 66.7

p=NS

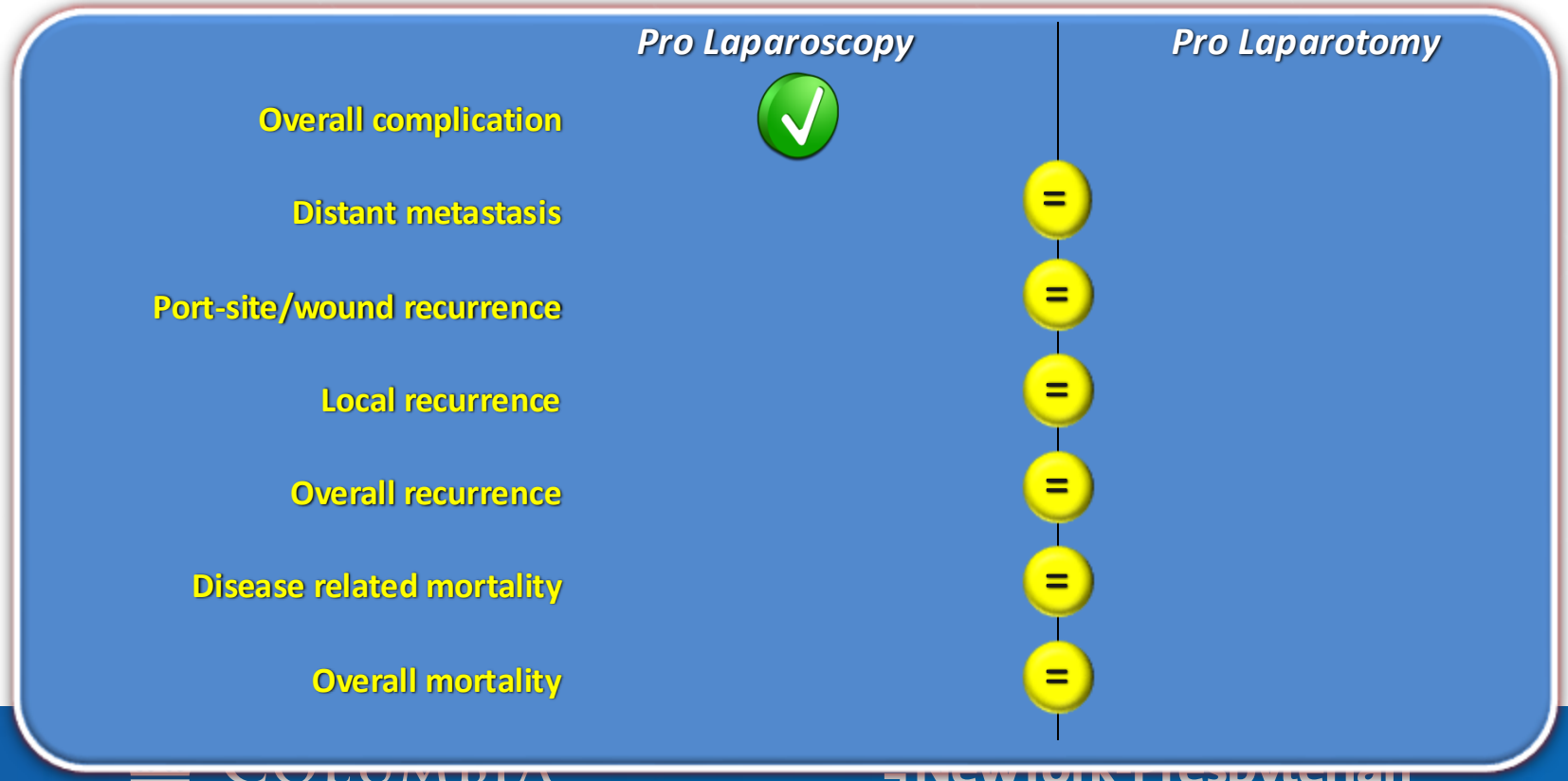
Med Oncol
DOI 10.1007/s12032-010-9549-5
Published online: 11 May 2010

ORIGINAL PAPER

A meta-analysis of laparoscopy compared with open colorectal resection for colorectal cancer

Yanlei Ma · Zhe Yang · Huanlong Qin · Yu Wang

15 randomized controlled trials 4207 patients



	MRC-Classic	Leung et al	Braga et al	Zhou et al	Araujo et al
Accrual Years	1996-2002	1993-2002	NR	2001-2002	1997-2000
Subjects	L 253 O 128	L 203 O 200	L 83 O 85	L 273 O 140	L 13 O 15
LN retrieved (mean)	p=ns	L 11.1 O 12.1	L 12.7 O 13.6	NR	**L 5.5 *** **O 11.9**
Morbidity/Mortality	L 47/NS O 37/NS	L 19.7/0.6 O 22.5/2.4	L 28.9/1 O 40/1	**L 6.1/0 *** **O 12.4/0**	L 69/0 O 46.7/0
Conversion rate	34% Morbidity 93%	23.2%	7.2%	NR	0
Follow-up (months)	36.8	L 52.7 O 49.2	53.6	NR	47.2
Local recurrence	L 9.7 O 10.1	L 6.6 O 4.4	L 4 O 5.2	NR	L 0 O 13
Survival OS/DFS	L 74.6/ 70.9 O 66.7/ 70.4	L 77.2/ 75.3 O 76.5/ 78.3	p=ns	NR	NR

p=NS

* = p<0.05

Cochrane Database of Systematic Reviews 2006, Issue 4.

Laparoscopic versus open total mesorectal excision for rectal cancer

Stephanie Breukink[1], Jean-Pierre Pierie[2], Theo Wiggers[3]

The Cochrane Library Evidence for healthcare decision-making

48 studies, 4224 pts

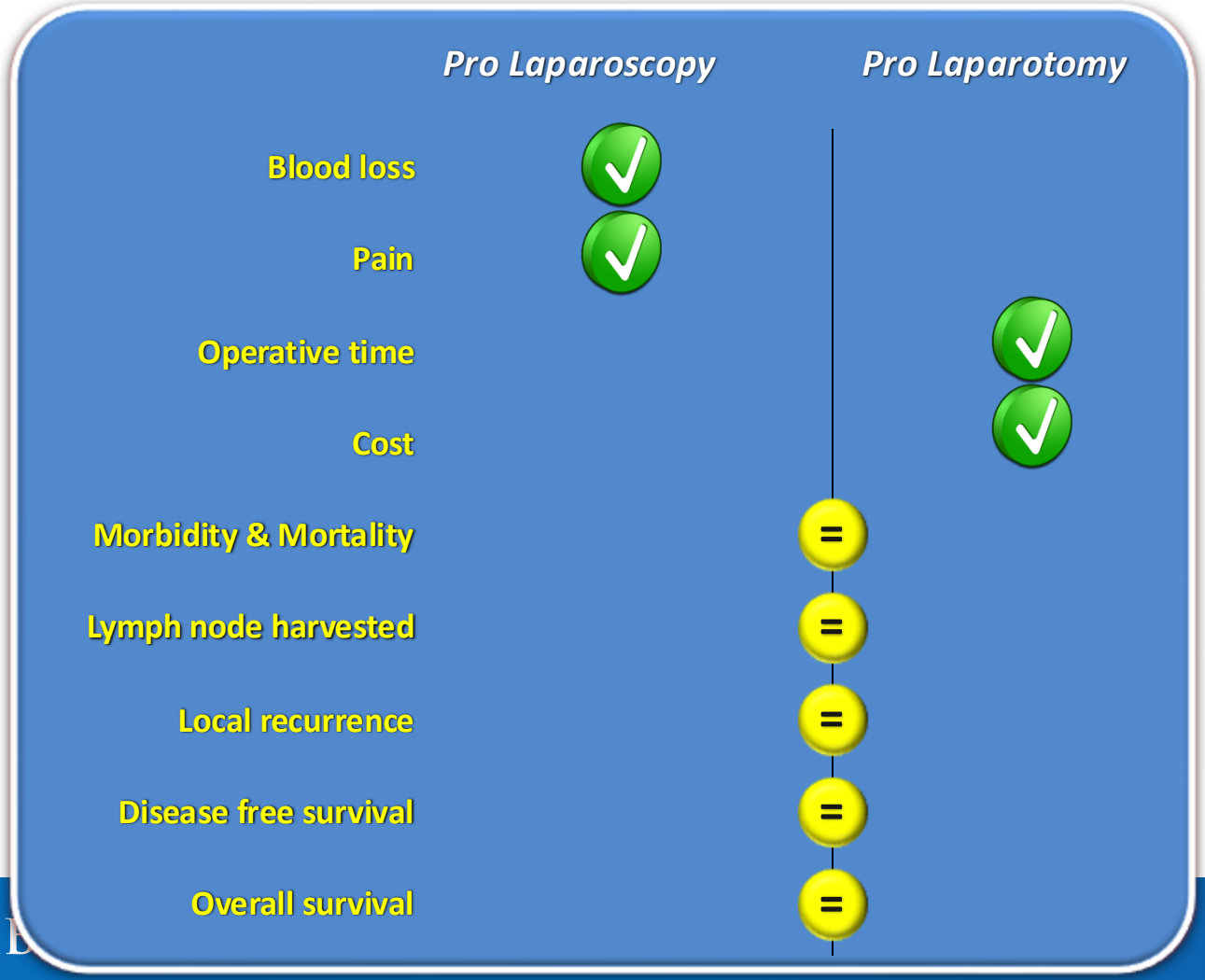
33 prospective

8 retrospective

7 not classified

33 patient series

15 cohort studies



Guidelines

Laparoscopic (including laparoscopically assisted) resection is recommended as an alternative to open resection for individuals with colorectal cancer in whom both laparoscopic and open surgery are considered suitable.

Laparoscopic colorectal surgery should be performed only by surgeons who have completed appropriate training in the technique and who perform this procedure often enough to maintain competence. The exact criteria to be used should be determined by the relevant national professional bodies. Cancer networks and constituent Trusts should ensure that any local laparoscopic colorectal surgical practice meets these criteria as part of their clinical governance arrangements.

The decision about which of the procedures (open or laparoscopic) is undertaken should be made after informed discussion between the patient and the surgeon. In particular, they should consider:

- the suitability of the lesion for laparoscopic resection
- the risks and benefits of the two procedures
- the experience of the surgeon in both procedures.

of Curable Colon and Rectal Cancer

scopic Surgeons (SAGES)

NHS

National Institute for

alth and Clinical Excellence

colorectal cancer

D. D'Antonio • A. Dal Pozzo • M. Fiorino

ncer: clinical practice guidelines

gery

COLOR trial

12 week health care cost analysis	*Laparoscopy*	>	*Laparotomy*
12 week health care cost analysis + Loss of productivity	*Laparoscopy*	≈	*Laparotomy*

MRC-CLASSIC trial

Operative cost	*Laparoscopy*	>	*Laparotomy*
Non - Operative cost	*Laparoscopy*	<	*Laparotomy*

Surgical Innovation
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http://online.sagepub.com

Adoption of Laparoscopic Colectomy: Results and Implications of ASCRS Hands-On Course Participation

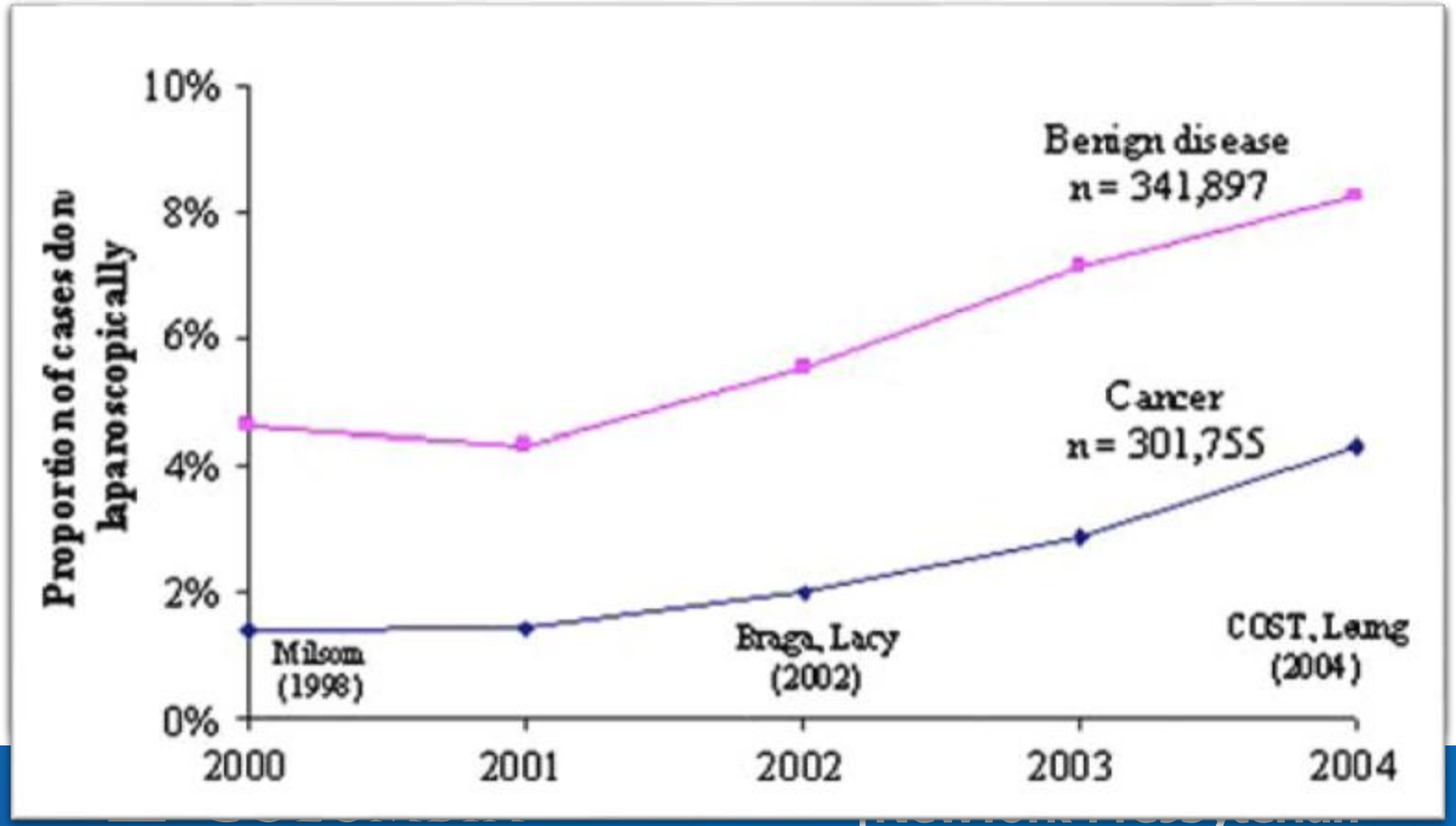
Howard M. Ross, MD, FACS, FASCRS, Clifford L. Simmang, MD, FACS, FASCRS, James W. Fleshman, MD, FACS, FASCRS, and Peter W. Marcello, MD, FACS, FASCRS

Laparoscopic colon resection as a means to remove a section of diseased colon is growing as a fraction of all colon resections performed in the United States. Industry leaders report 20% percent of all colon resections performed annually are currently done using laparoscopic techniques. Though multiple studies indicate that, for both benign and malignant disease, return of bowel function, pain, and length of hospital stay are all improved after a laparoscopic colon resection when compared with colectomy performed through a conventional midline incision, the adoption rate of surgeons has been slow.[1,2]

Surg Endosc (2008) 22:1181–1187
DOI 10.1007/s00464-007-9732-8

Nationwide trends in laparoscopic colectomy from 2000 to 2004

Jason A. Kemp · Samuel R. G. Finlayson



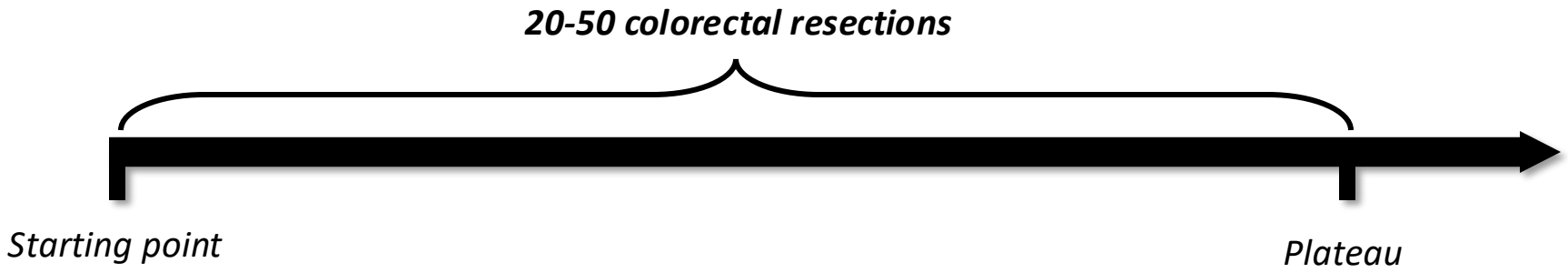
Surg Clin N Am 88 (2008) 927–941

Lessons Learned from the Evolution of the Laparoscopic Revolution

E. Christopher Ellison, MD[a,*], Larry C. Carey, MD[b]

The graphic representation of the relationship between experience with a new procedure or technique and outcomes, including

operative time, conversion rate, morbidity and mortality rate, hospital stay

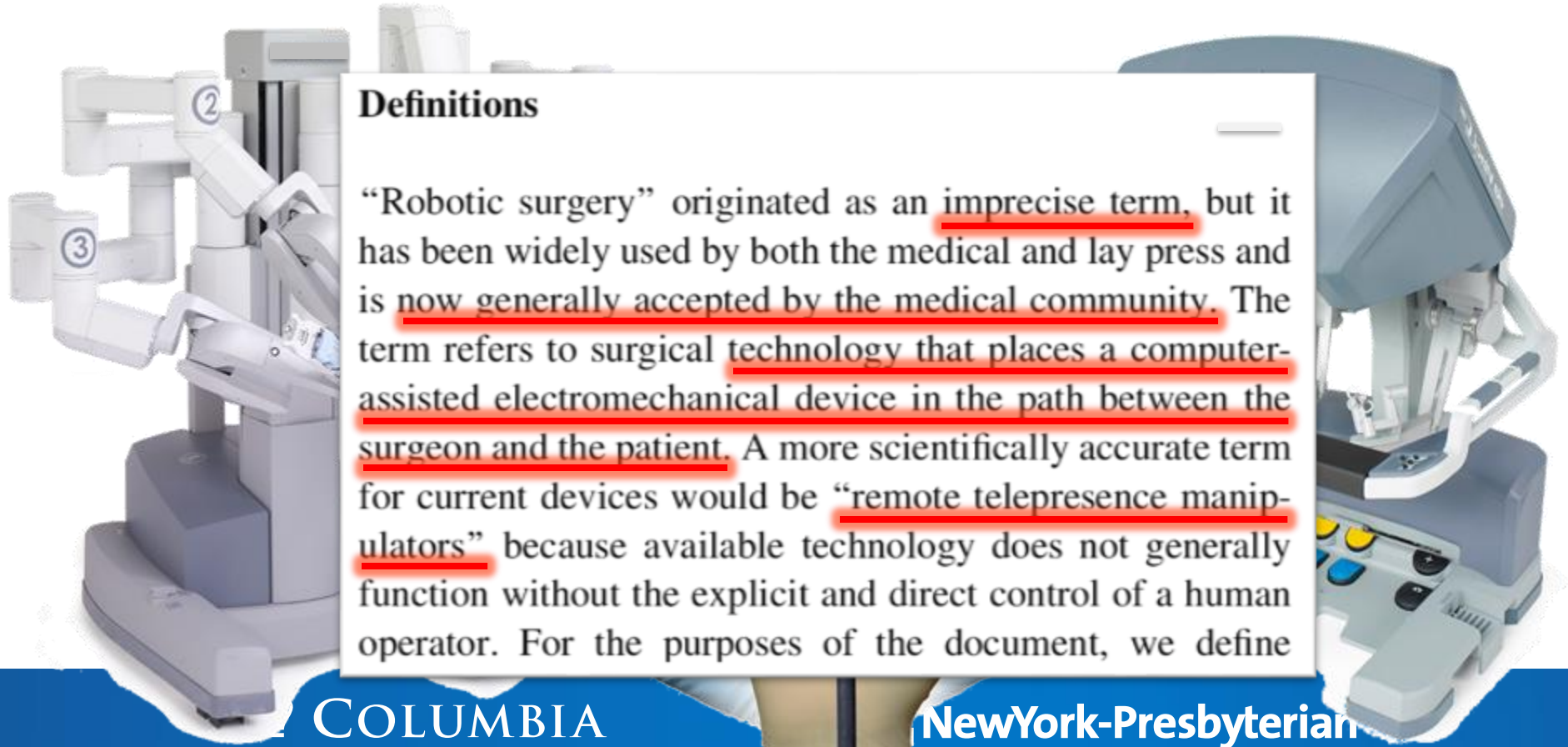


Surg Endosc (2008) 22:313–325
DOI 10.1007/s00464-007-9727-5

CONSENSUS STATEMENT

A consensus document on robotic surgery

D. M. Herron · M. Marohn · The SAGES-MIRA Robotic Surgery Consensus Group



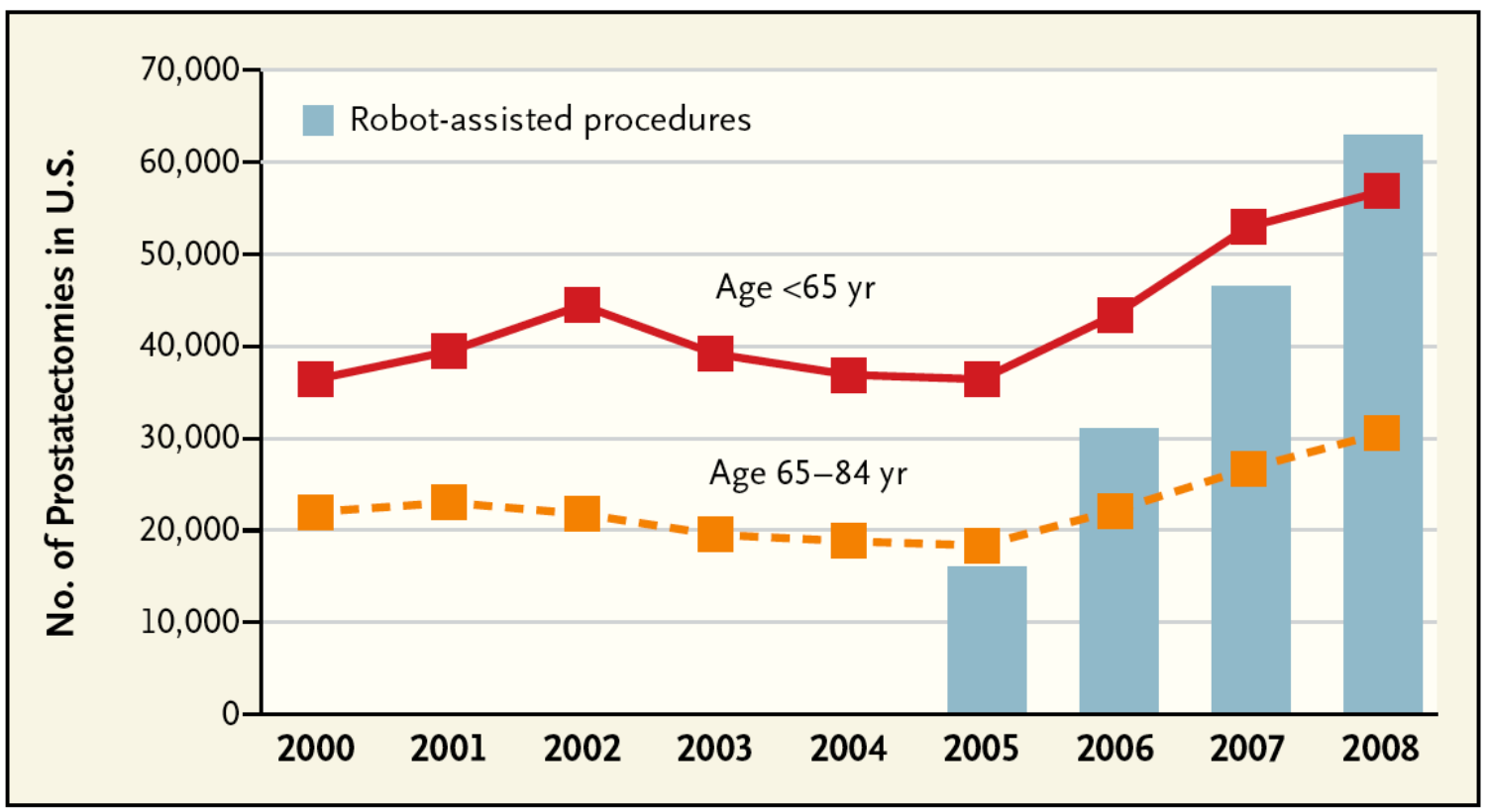
Definitions

"Robotic surgery" originated as an imprecise term, but it has been widely used by both the medical and lay press and is now generally accepted by the medical community. The term refers to surgical technology that places a computer-assisted electromechanical device in the path between the surgeon and the patient. A more scientifically accurate term for current devices would be "remote telepresence manipulators" because available technology does not generally function without the explicit and direct control of a human operator. For the purposes of the document, we define

The NEW ENGLAND JOURNAL of MEDICINE

Perspective

AUGUST 19, 2010



Prostatectomies in the United States, 2000–2008.

Advantages and Limitations of Using a Robotic Surgical System

Advantages
Wristed movements with seven degrees of freedom
Exposure and maneuverability in deep and narrow region
Ease of intracorporeal suturing and knot tying
Steady camera platform with 3-D view of operative field
Optimal surgeon position and ergonomics
Computerized scaling of motion and elimination of physiologic tremor

3-D, three-dimensional; **OR,** operating room

Surg Endosc (2007) 21: 1701–1708
DOI: 10.1007/s00464-007-9231-y

Robotic versus laparoscopic colectomy

A. L. Rawlings, J. H. Woodland, R. K. Vegunta, D. L. Crawford

SURGICAL ENDOSCOPY and Other Interventional Techniques

Table 5. Sigmoid colectomies: operative parameters

	Laparoscopic (n = 12)	Robotic (n = 13)	p Value
Case time (min)			
Mean ± SD	199.4 ± 44.5	225.2 ± 37.1	0.128
Median	198	226	
Range	138–278	147–283	
Length of hospital stay (days)			
Mean ± SD	6.6 ± 8.3	6.0 ± 7.3	0.854
Median	4.5	4	
Range	3–33	3–30	
EBL (ml)			
Mean ± SD	65.4 ± 52.1	90.4 ± 60.0	0.280
Median	50	75	
Range	20–200	20–200	
Conversion to open surgery	0	2	

Table 6. Sigmoid colectomies: cost analysis (adjusted to 2005 U.S. dollars)

	Laparoscopic (n = 12)	Robotic (n = 13)	p Value
Total hospital cost			
Mean ± SD	10,697 ± 11,719	12,335 ± 12,162	0.735
Median	7,406	8,529	
Range	5,312–47,651	6,569–$52,042	
Total OR cost			
Mean ± SD	4,974 ± 1,596	6,059 ± 1,225	0.068
Median	4,784	5,846	
Range	3,041–9,368	4,579–$9,147	
OR personnel cost			
Mean ± SD	1,621 ± 617	2,134 ± 432	0.024
Median	1,594	2,061	
Range	754–3,327	1,614–$3,223	
OR supply cost			
Mean ± SD	2,137 ± 905	3,159 ± 637	0.003
Median	1,989	3,056	
Range	966–4,645	2,392–4,780	
OR time cost			
Mean ± SD	1,348 ± 681	1,500 ± 461	0.519
Median	1,152	1,405	
Range	760–1,505	979–2,810	

Annals of Surgery • Volume 252, Number 2, August 2010

META-ANALYSIS

Efficacy of the Da Vinci Surgical System in Abdominal Surgery Compared With That of Laparoscopy

A Systematic Review and Meta-Analysis

Sergio Maeso, MD, MPH, Mercedes Reza, PharmD,* Julio A. Mayol, MD,† Juan A. Blasco, MD, MPH,* Mercedes Guerra, Lic,* Elena Andradas, MD, MPH,* and María N. Plana, MD, MPH‡*

TABLE 2. Meta-Analyses Results for Each Surgical Indication and Outcome Included

Outcome	Studies	Patients	I^2 %	Method	Effect 95% CI
Colorectal resection					
Open conversions	6	520	17	RD (M-H, fix)	−0.04 (−0.08, 0.00)*
Surgery time (min)	7	532	85	MD (IV, rand)	39.42 (14.99, 63.84)†
Costs ($)	2	69	0	MD (IV, fix)	792 (42, 1543)†
LOS (d)	6	505	67	MD (IV, rand)	−0.26 (−1.55, 1.02)
EBL (mL)	5	214	0	MD (IV, fix)	−7.04 (−22.73, 8.66)
Total conversions	6	520	35	RD (M-H, fix)	−0.01 (−0.05, 0.04)
Complications	6	526	0	OR (M-H, fix)	0.99 (0.59, 1.65)
Lymph nodes (number)	4	442	0	MD (IV, fix)	−0.20 (−2.40, 2.00)
Distal resection margin (cm)	3	336	0	MD (IV, fix)	0.38 (−0.18, 0.95)
Bowel function recovery (d)	3	424	0	MD (IV, fix)	−0.11 (−0.46, 0.23)
Time to oral diet (d)	3	424	76	MD (IV, rand)	−0.26 (−0.74, 0.22)

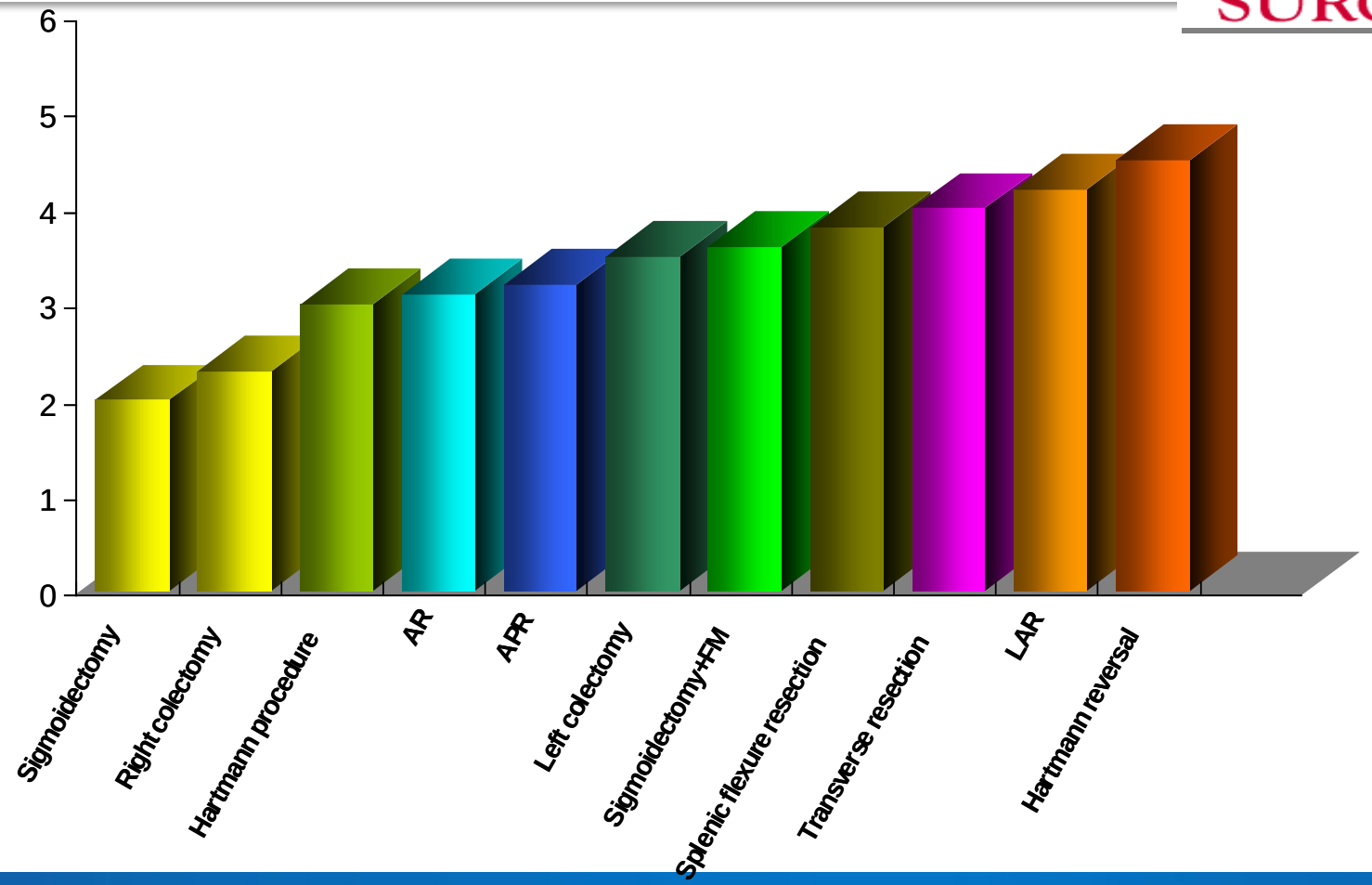
*Statistically significative differences favoring da Vinci surgical system.
†Statistically significative differences favoring conventional laparoscopic surgery.

ORIGINAL ARTICLE

Evaluating the Degree of Difficulty of Laparoscopic Colorectal Surgery

Faek R. Jamali, MD; Asaad M. Soweid, MD; Hani Dimassi, PhD; Charles Bailey, MD; Joel Leroy, MD, FRCS; Jacques Marescaux, MD, FRCS

ARCHIVES OF SURGERY



Concerns in laparoscopic rectal cancer surgery

- ✓Technically challenging
- ✓Multiquadrant working volume
  - Obesity
- ✓Difficult target organ exposure
  - Narrow field without direct line of access
  - Bowel division
  - Margins
  - Autonomic nerve function preservation
- ✓Proximal vascular division
  - Radical lymphadenectomy

Surg Endosc (2006) 20: 1521–1525
DOI: 10.1007/s00464-005-0855-5

SURGICAL ENDOSCOPY
and Other Interventional Techniques

Robotic-assisted laparoscopic low anterior resection with total mesorectal excision for rectal cancer

A. Pigazzi,[1] J. D. I. Ellenhorn,[1] G. H. Ballantyne,[2] I. B. Paz[1]

Designed to overcome limitations of laparoscopic TME for rectal cancer

	Robotic TME (n = 6)	Laparoscopic TME (n = 6)	p Value
Operative time*	4.4 h (3.2–5.3)	4.3 h (3.3–5.2)	NS
EBL*	104 cc (50–200)	150 cc (50–300)	NS
Nodes in the specimen*	14 (9–28)	17 (9–39)	NS
Distance from distal margin*	3.8 cm (1.8–9)	3.5 cm (2.2–5)	NS
Hospital stay*	4.5 days (3–11)	3.6 days (3–6)	NS
Follow up duration*	8 months (5–11)	6 months (1–12)	NS
Complications	One prolonged ileus	One pelvic abscess	–

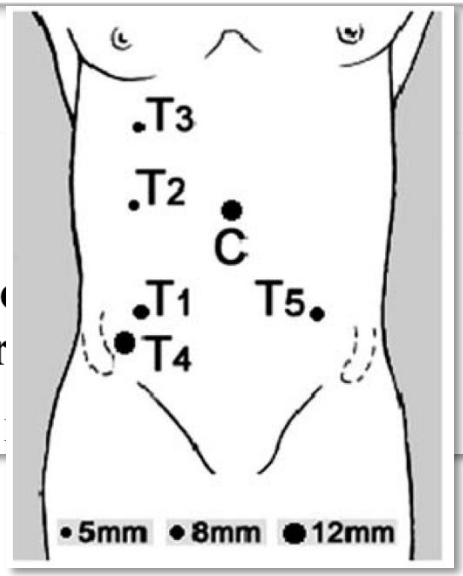
Defining the procedure

Hybrid laparoscopic-robotic

Surg Endosc (2006) 20: 1521–1525
DOI: 10.1007/s00464-005-0855-5

Robotic-assisted lapar… resection with total mesorectal excision for…

A. Pigazzi,[1] J. D. I. Ellenhorn,[1] G. …

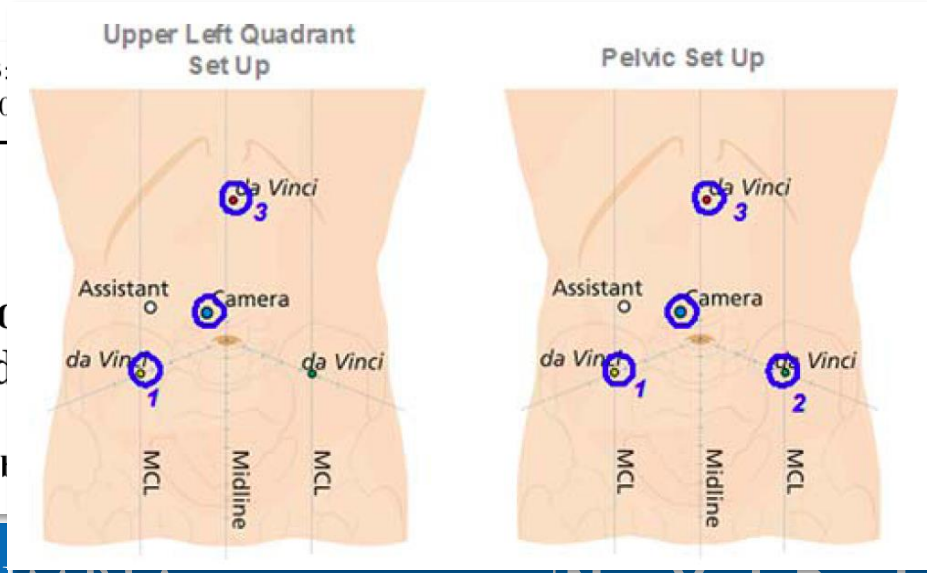


Totally robotic

Surg Endosc (2009) 23…
DOI 10.1007/s00464-0…

Totally robo… excision and… rectal

Minia Hellan · Hul…



Steps for rectal resection

Application of robotic technology

Steps	Working Volume	Gravity Requirement	Precision
Exploration	Large	Dynamic	Low
Vascular dissection	Small	Intermediate	High
Sigmoid mobilization	Medium	Intermediate	Intermediate
Descending colon & splenic flexure	Large	Dynamic	Intermediate
Rectal mobilization	Small	Fixed	High
Bowel division	Small	Fixed	Intermediate
Anastomosis	Small	Fixed	Intermediate

Overcoming the concerns with robotic technology

- ✓Technically challenging
- ✓Multiquadrant working volume
  - Obesity
- ✓Difficult target organ exposure
  - Narrow field without direct line of access
  - Bowel division
  - Margins
  - Autonomic nerve function preservation
- ✓Proximal vascular division
  - Radical lymphadenectomy

Annals of Surgical Oncology **14**(11):3168–3173
DOI: 10.1245/s10434-007-9544-z

Short-Term Outcomes After Robotic-Assisted Total Mesorectal Excision for Rectal Cancer

Minia Hellan, MD, Casandra Anderson, MD, Joshua D. I. Ellenhorn, MD, Benjamin Paz, MD, FACS, and Alessio Pigazzi, MD, PhD

Variable	
(y)TNM stage[a]	Number of patients (%)
0	8 (20.5)
I	13 (33.3)
II	4 (10.3)
III	13 (33.3)
IV	1 (2.6)
Number of removed lymph nodes[b]	13 (7–28)
Distal margin (cm)[b]	2.65 (0.4–7.5)
Positive circumferential margin	None

Ann Surg Oncol (2009) 16:1274–1278
DOI 10.1245/s10434-009-0366-z

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – GASTROINTESTINAL ONCOLOGY

Full Robotic Left Colon and Rectal Cancer Resection: Technique and Early Outcome

Fabrizio Luca[1], Sabine Cenciarelli[1], Manuela Valvo[1], Simonetta Pozzi[1], Felice Lo Faso[1], Davide Ravizza[2], Giulia Zampino[3], Angelica Sonzogni[4], and Roberto Biffi[1]

TABLE 1 Patient data

Characteristics	Value
Type of intervention (*n*)	
APR	7
RAR	17
Coloanal	4
Left hemicolectomy	27
Operative time (min) (range)	290 ± 69 (164–487)
Blood loss (ml) (range)	68 ± 138 (0–600)
Conversions (*n*)	0
Reintervention (*n*)	0
Days to first flatus	2.02 ± 1.13
Days to clear fluids	2.07 ± 1.01
Postoperative hospital stay (days) (range)	7.5 ± 2.8 (4–17)

TABLE 2 TNM stage and pathology results

Characteristics	Value
No. of lymph nodes removed (range)	18.5 ± 8.3 (5–45)
Distal margin	
All cases (mm)	31.6 ± 20
Rectum (mm) (range)	25.15 ± 12.9 (range 6–55)
Positive radial margins	0
Quality of mesorectum (*n*)	
Complete	22
Nearly complete	6
Incomplete	0

Surg Endosc (2008) 22:1601–1608
DOI 10.1007/s00464-008-9752-z

Robotic tumor-specific mesorectal excison of rectal cancer: short-term outcome of a pilot randomized trial

S. H. Baik · Y. T. Ko · C. M. Kang · W. J. Lee · N. K. Kim · S. K. Sohn · H. S. Chi · C. H. Cho

	R-TSME (n = 18) Mean ± SD, median (range)	L-TSME (n = 16) Mean ± SD, median (range)	P Value
Lymph node harvested (n)	20.0 ± 9.1, 18.0 (6– 49)	17.4 ± 10.6, 22 (9–42)	0.437
Proximal resection margin (cm)	10.9 ± 1.7, 8.5 (7.5–20.0)	10.3 ± 3.6, 7.5 (5.5–8.5)	0.549
Distal resection margin (cm)	4.0 ± 1.1, 4.0 (1.0–5.5)	3.7 ± 1.1, 3.5 (1.5–6.0)	0.467
Macroscopic judgment of the specimen			0.368
Complete	17	13	0.323
Nearly complete	1	3	
Incomplete	0	0	

R-TSME, robotic tumor-specific mesorectal excision; L-TSME, laparoscopic tumor-specific mesorectal excision

Surg Endosc (2009) 23:438–443
DOI 10.1007/s00464-008-0202-8

CONSENSUS STATEMENT

The current status of robotic pelvic surgery: results of a multinational interdisciplinary consensus conference

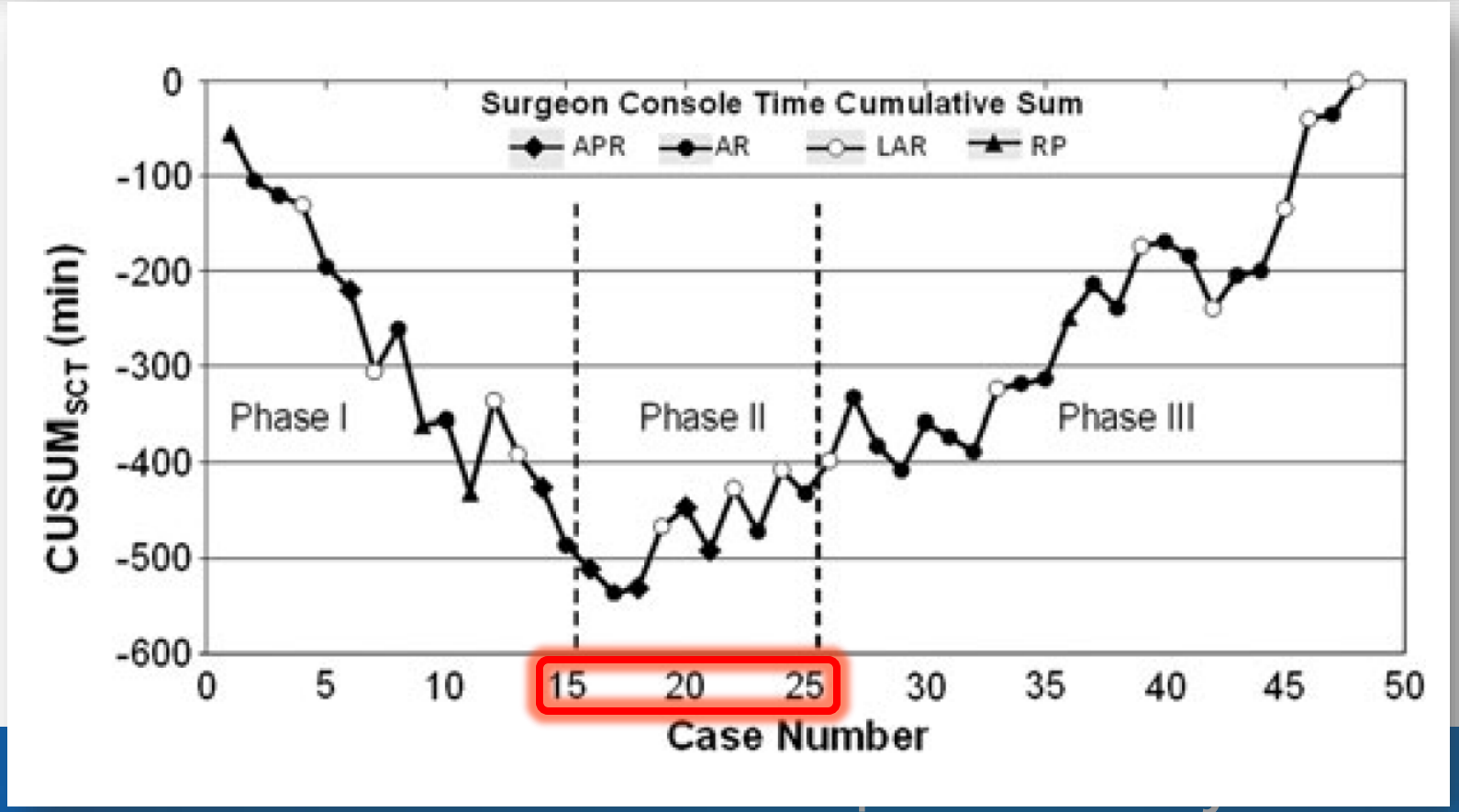
Steven D. Wexner · Roberto Bergamaschi · Antonio Lacy · Jonas Udo · Hans Brölmann · Robin H. Kennedy · Hubert John

Laparoscopic LAR with robotic TME is feasible and safe [59]; however, although the stereoscopic vision and wristed instruments are available with the robot, operative time is increased [60] and the additional cost of robotics is of concern as is the loss of haptic feedback.

Surg Endosc
DOI 10.1007/s00464-010-1281-x
Published online: 24 August 2010

Learning curve for robotic-assisted laparoscopic colorectal surgery

Malak B. Bokhari · Chirag B. Patel ·



Review article Colorectal Disease © 2010 The Association of Coloproctology of Great Britain and Ireland. **12,** 1084–1093

Robotic colorectal surgery: hype or new hope? A systematic review of robotics in colorectal surgery

A. H. Mirnezami*[1], R. Mirnezami†[1], A. K. Venkatasubramaniam‡, K. Chandrakumaran‡, T. D. Cecil‡ and B. J. Moran‡

Reference	Study type	No. patients robotic/lap	Procedures	Comparative outcomes (robotic *vs* laparoscopic)
Delaney [17]	Comparative study	6/6	Robotic: RHC(2) SC(3) RP(1) Laparoscopic: RHC(2) SC(3) RP(1)	↑ OT*; ↑ BL (NS) ↑ LOS (NS); ↑C (NS)
Anvari [18]	Comparative study	10/10	RHC(5) LHC(1) SC(1) STC(1) AR(2)	↑ OT*; ↑ LOS (NS); ↑DRBF (NS)
D'Annibale [19]	Comparative study	53/53	Robotic: RHC(10) LHC(17) SC(11) AR(10) APR(1) TC(2) Hart(1) RPX(1) SBR(1) Laparoscopic: RHC(13) LHC(17) SC(4) AR(15) TC(1) Hart(1) HartR(1) ICR(1) TRC(1)	↑ OT (NS); ↓BL (NS); ↔LOS; ↔ DRBF
Woeste [21]	Comparative study	6/34	Robotic: SC(4) RP (2) Laparoscopic: SC(32) RP (2)	↑ OT*; ↑ BL (NS)
Pigazzi [24]	Comparative study	6/6	Robotic: AR(6) Laparoscopic: AR(6)	↑ OT (NS); ↓BL (NS); ↑LOS (NS)
Rawlings [27]	Comparative study	30/27	Robotic: RHC(17) SC(13) Laparoscopic: RHC(15) SC(12)	RHC: ↑OT*; ↓LOS (NS); ↓BL (NS); ↑C (NS) SC: ↑OT (NS); ↓ LOS (NS) ↑BL (NS); ↑C (NS)
Baik [28]	RCT	18/18	Robotic: AR(18) Laparoscopic: AR(18)	↑ OT (NS); ↓BL (NS) ↓DRBF (NS); ↓LOS*
Spinoglio *et al.* 2008 [29]	Comparative study	50/161	Robotic: RHC(18), LHC(10), AR(19), APR(1), TRC(1) TC(1) Laparoscopic: RHC(50, LHC(73), AR(26), APR(7), TRC(2), TC(3)	↑OT*; ↓LOS (NS) ↓DRBF (NS); ↑DPF (NS)

Robotic Colorectal Surgery

Limited papers

Few RCT

Costs

Opertive time

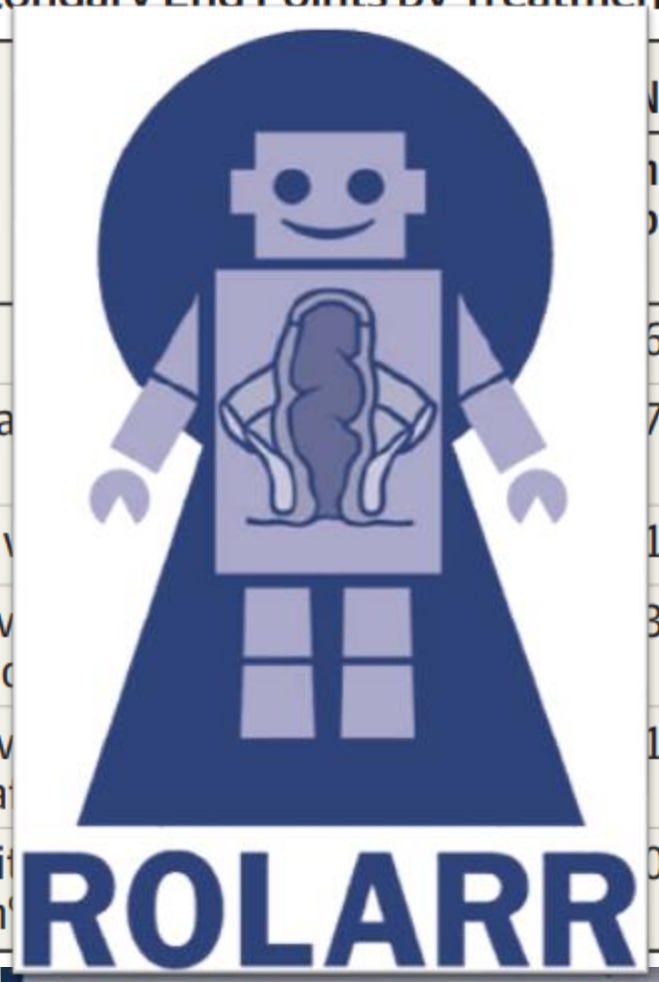
Short/long-term results?

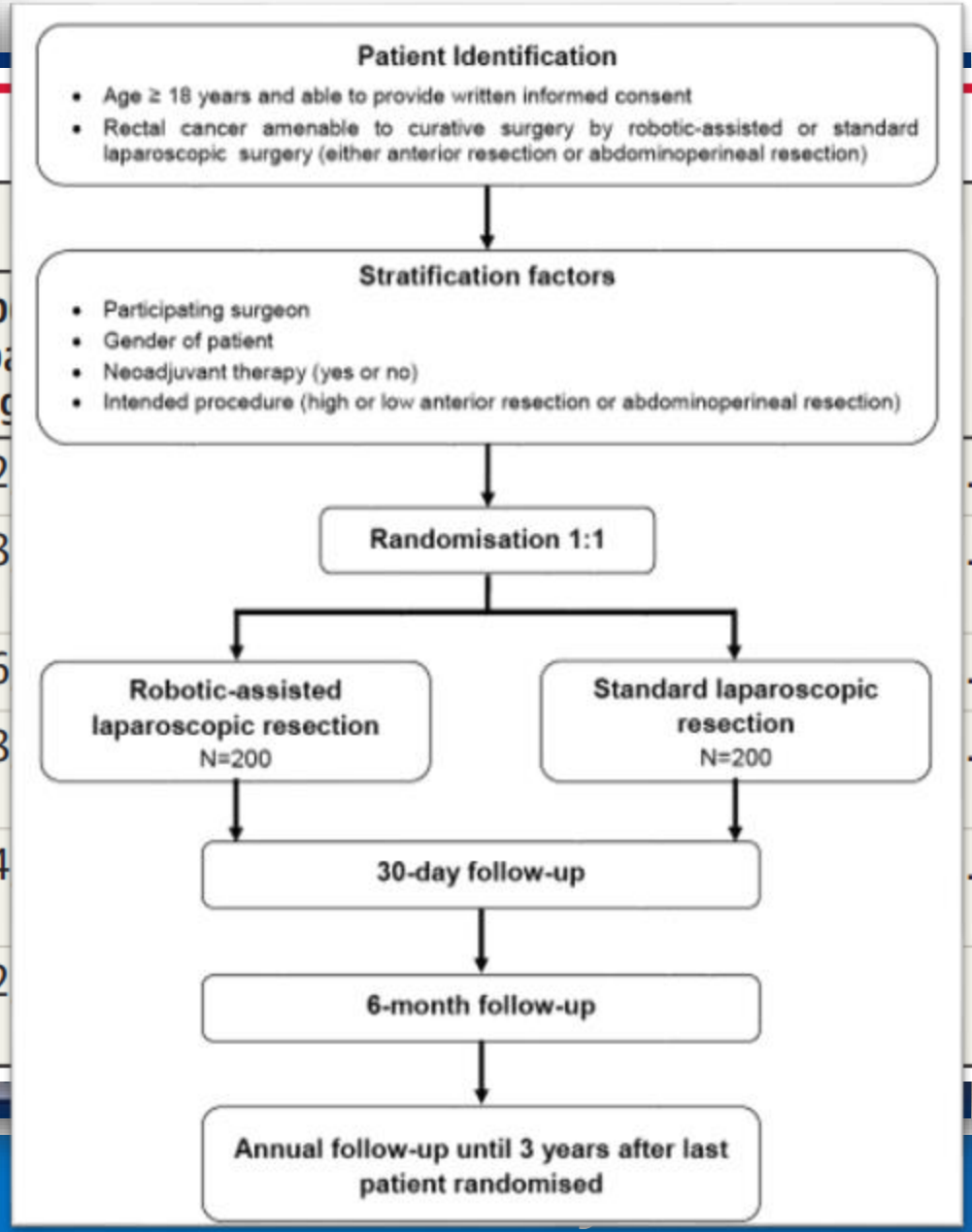
RObotic versus LAparoscopic Resection for Rectal cancer

JAMA October 24/31, 2017 Volume 318, Number 16

Table 3. Secondary End Points by Treatment Group

End Point	No. (%)		P Value
CRM+[b]	6.3)	12	.76) .56
Mesorectal a plane	77.6)	178	.57) .14
Intraoperati	14.8)	36	.74) .94
Postoperativ within 30 d	31.7)	78	.58) .84
Postoperativ and ≤6 mo a	16.5)	34	.26) .25
Mortality wi of operation	0.9)	2	NA

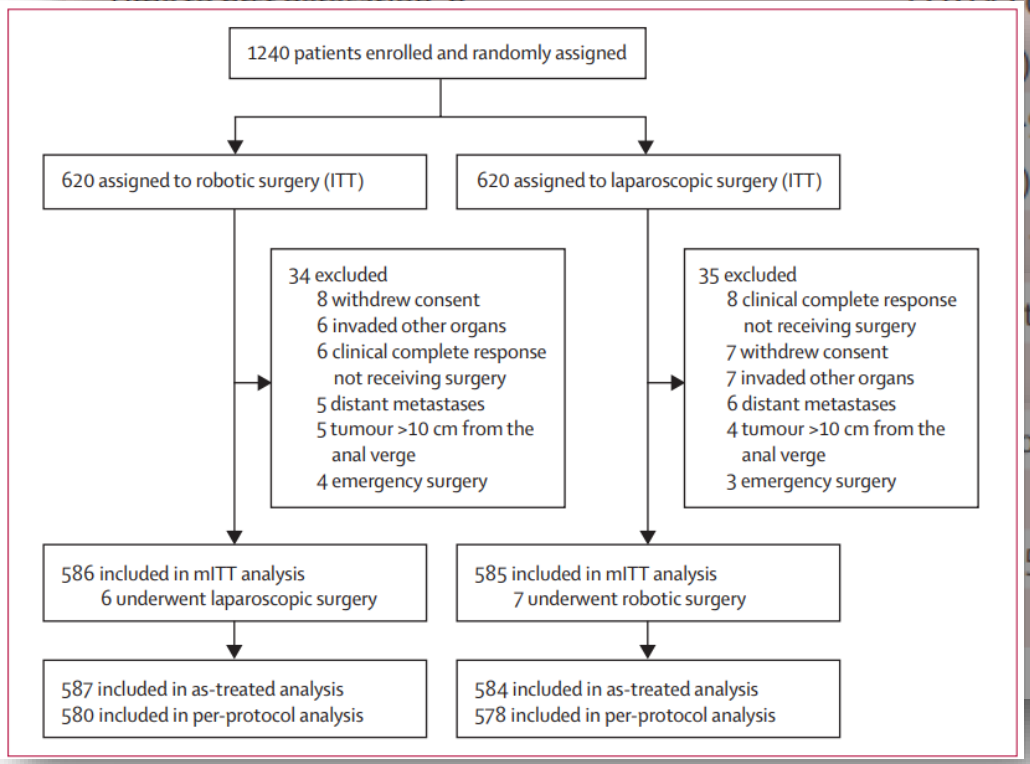




Lancet Gastroenterol Hepatol
2022; 7: 991–1004

Robotic versus laparoscopic surgery for middle and low rectal cancer (REAL): short-term outcomes of a multicentre randomised controlled trial

Qingyang Feng*, Weitang Yuan*, Taiyuan Li*, Bo Tang*, Baoqing Jia*, Yanbing Zhou*, Wei Zhang, Ren Zhao, Cheng Zhang, Longwei Cheng, Xiaoqiao Zhang, Fei Liang, Guodong He, Ye Wei, Jianmin Xu, for the REAL Study Group†



	Robotic group (n=586)	Laparoscopic group (n=585)
Sex		
Male	356 (60·8%)	354 (60·5%)
Female	230 (39·2%)	231 (39·5%)
Age, years	59·1 (11·0)	60·7 (9·8)
Body-mass index*		
Mean (SD), kg/m²	23·5 (3·3)	23·5 (3·1)
Underweight (<18·5 kg/m²)	31 (5·3%)	32 (5·5%)
Normal (18·5–23·9 kg/m²)	296 (50·5%)	299 (51·1%)
Overweight (24–27·9 kg/m²)	213 (36·3%)	210 (35·9%)
Obese (≥28 kg/m²)	46 (7·8%)	44 (7·5%)
American Society of Anesthesiologists score		
1	324 (55·3%)	318 (54·4%)
2	230 (39·2%)	240 (41·0%)
3	32 (5·5%)	27 (4·6%)
Comorbidity	203 (34·6%)	198 (33·8%)
Hypertension	109 (18·6%)	113 (19·3%)
Diabetes	49 (8·4%)	46 (7·9%)
Cardiovascular diseases	32 (5·5%)	31 (5·3%)
Cerebrovascular disease	19 (3·2%)	16 (2·7%)
Pulmonary diseases	13 (2·2%)	15 (2·6%)

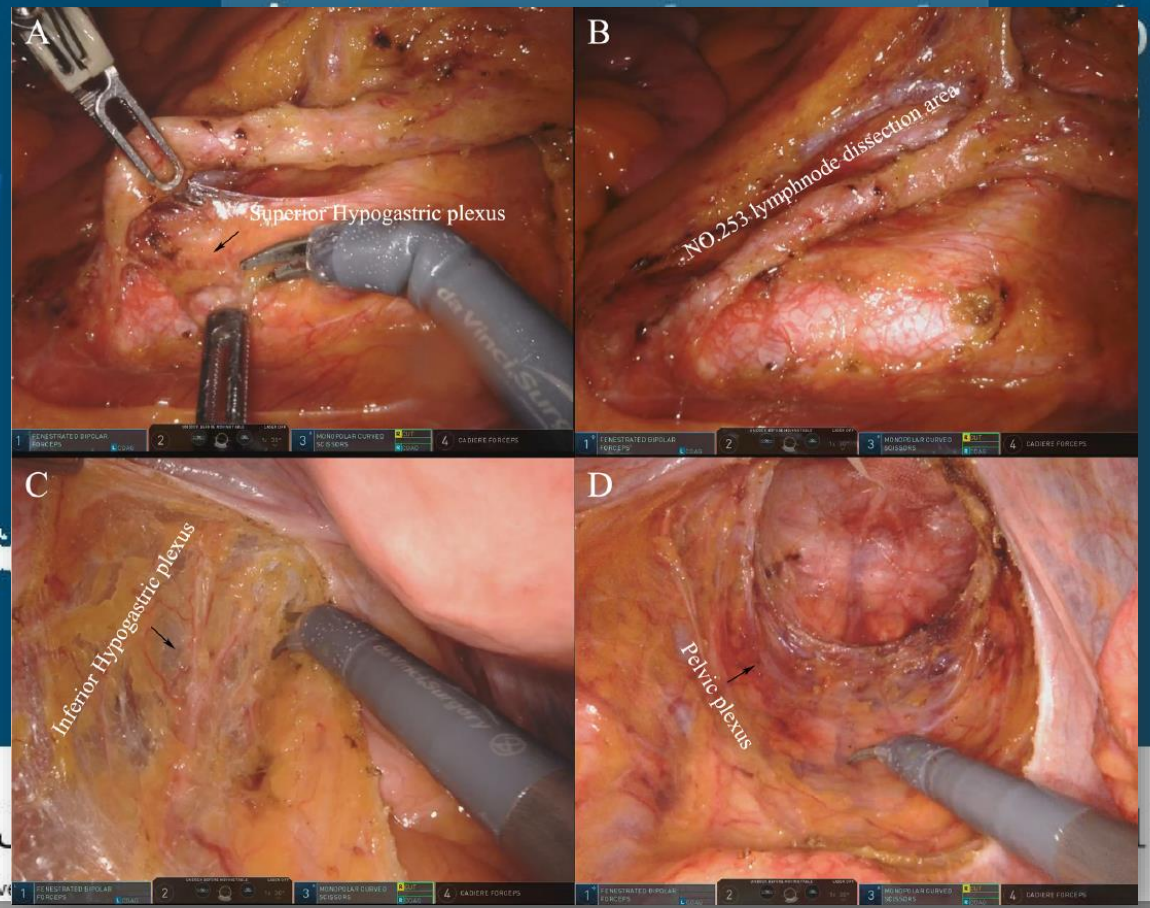
	Robotic group (n=586)	Laparoscopic group (n=585)
(Continued from previous column)		
Preoperative radiotherapy or chemoradiotherapy	254 (43·3%)	257 (43·9%)
Waiting period after radiotherapy		
8–10 weeks	151 (25·8%)	153 (26·2%)
10–12 weeks	92 (15·7%)	91 (15·6%)
>12 weeks	11 (1·9%)	13 (2·2%)
Chemotherapy for waiting period after radiotherapy		
Oral capecitabine	72 (12·3%)	76 (13·0%)
CAPEOX	102 (17·4%)	105 (17·9%)
FOLFOX	80 (13·7%)	76 (13·0%)
Clinical T stage		
1–2	249 (42·5%)	249 (42·6%)
3	337 (57·5%)	336 (57·4%)
Clinical internal sphincter involvement	131 (22·4%)	134 (22·9%)
Clinical N stage		
0	397 (67·7%)	403 (68·9%)
1	146 (24·9%)	145 (24·8%)
2	43 (7·3%)	37 (6·3%)

Functional Outcomes After Lap vs. Robotic Rectal Surgery: Systematic Review & Meta-Analysis

n=14 studies (only 2 randomized)

vs.

Limited available data suggest that robotics



Urinary function may also be improved with robotics, (but only for months in some studies)

Flynn J

91-1204

DISEASES OF THE COLON & RECTUM

COLUMBIA

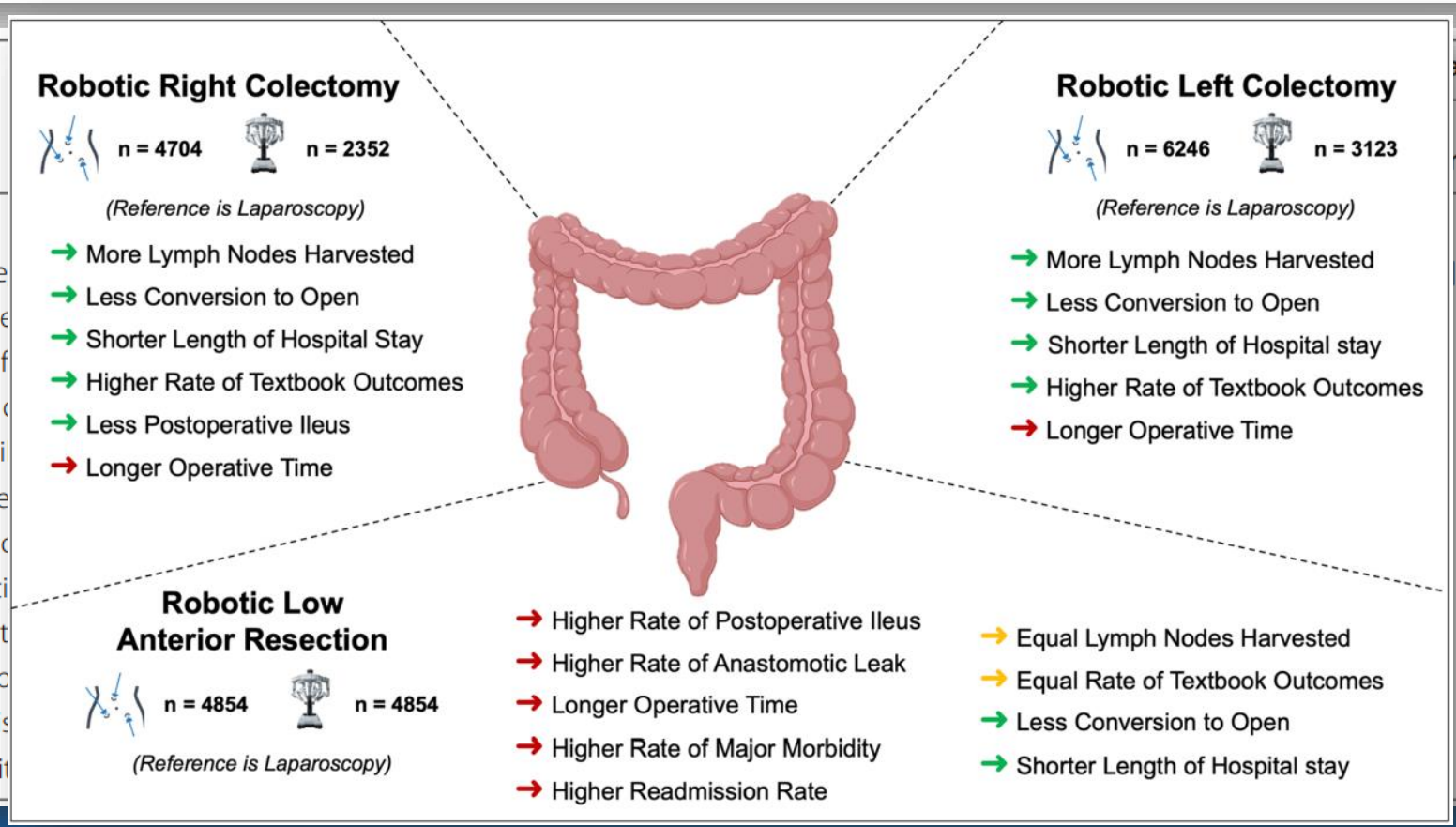
NewYork-Presbyterian

RESEARCH Open Access

World Journal of Surgical Oncology (2023) 21:272

Perioperative outcomes of robotic and laparoscopic surgery for colorectal cancer: a propensity score-matched analysis

Emile Farah[1], Andres A. Abreu[1], Benjamin Rail[1], Javier Salgado[1], Georgios Karagkounis[1], Herbert J. Zeh III[1] and Patricio M. Polanco[1*]



	aset P value
Sample size	
Operative time	< 0.001*
Lymph nodes e	< 0.001*
Bleeding transf	0.385
Conversion to c	< 0.001*
Postoperative il	0.170
Anastomotic le	0.301
Textbook outcc	< 0.001*
Any complicati	0.055
Major morbidit	0.671
Length of hosp	< 0.001*
30-day readmis	0.729
30-day mortalit	0.378

Surgical Oncology 43 (2022) 101695

The role of transanal total mesorectal excision☆

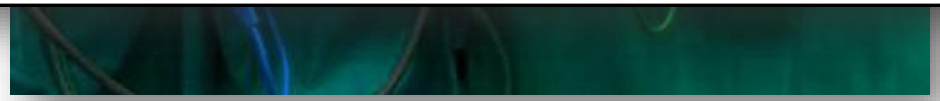
Marieke L.W. Rutgers [a,*], Willem A. Bemelman [a], Jim S. Khan [b], Roel Hompes [a]

Current ongoing TaTME trials.

Study	Type of Study	Groups	Country
PROCAre – Patient Reported Outcomes following CAncer of the rectum [108]	Observational multicenter	OpenTME vs. LapTME vs. RoboticTME vs. TaTME	Spain

Local recurrence rates after TaTME.

Authors	Inclusion	Patients	FU	Tumor height	CRM+	LR TaTME	LR L-TME	p-value
2 yearLR	(yr)	(n)	(m)	(cm)	(%)	(%)	(%)	
Lacy [40]	2011–2014	140	15	Mean 7.6 (SD 3.6)[a]	6.4	2.3	–	
Abdelkader [41]	2015–2018	25	29	<12[a]	8.0	4	–	
Roodbeen [24]	2011–2018	767	26	Median 3.0 [1.0–5.0][a]	7.3	3.3	–	
Simo [42]	2013–2019	173	23	Median 5.0 [4.0–7.0][b]	1.4	3.0	–	
Perdawood [43]	2013–2019	200	29	Mean 7.9 (SD 1.9)[b]	5.5	4.7	–	
Roodbeen [38]	2010–2018[c]	2803	24	Median 4.0 [2.0–6.0][a]	5.8	4.8	–	
Roodbeen [22]	2013–2018[c]	384	23	Median 2.0 [0.5–3.0][a]	9.9	4.7	4.6[d]	0.707
Lau [23]	2014–2020	308	22	Median 7 [1–14][b]	2.9	1.9	–	
Cayedo-Marulanda [15]	2014–2018	608	27	Median 6 [5–8][e]	7.1	3.6	–	
3 year LR								
Hol [21]	2012–2016	159	55	Median 6.0 [0–15][b]	0.6	2.0	–	
Kang [44]	2010–2016	211	35	Mean 5.9 [1.5–12][b]	2.3	6.2	–	
Roodbeen [24]	2011–2018	767	26	Median 3.0 [1.0–5.0][a]	7.3	4.4	–	
Lacy [39]	2011–2018	344	28	Mean 7.2 (95% CI 6.9–7.5)[a]	9.5	3.6	9.6	0.001
5 year LR								
Hol [21]	2012–2016	159	55	Median 6.0 [0–15][b]	0.6	4.0	–	



Conclusions

- Laparoscopy and robotics are additive/complementary, not antagonistic
- No clear benefit for ALL colorectal cancer surgeries
  - Choice of the approach based on pre-existing skillset, local resources, mentoring…
- Improved outcomes with robotic anterior resection in selected case:
  - Male, low tumors, obese patients
- Role in specific instances?
  - lateral lymph node dissection, pelvic exenteration, TaTME…

Future directions:

- More data
- New robotic platforms
- Will AI take my job?