SPHINCTER PRESERVING SURGERY IN RECTAL CANCER

Art Hiranyakas, M.D., PhD.
FACS., FASCRS., FRCST., FRCFPT.(Hon.), FICS.(Governor)

Professor & Director, Colorectal Surgery Clinic, Bangkok Hospital Headquarters.
Bangkok-Phuket Colorectal Disease Institute.


BANGKOK HOSPITAL

A RANDOMIZED TRIAL OF LAPAROSCOPIC VERSUS OPEN SURGERY FOR RECTAL CANCER

- RCT, international trial conducted in 30 hospitals.
- From January 2004 through May 2010.
- Laparoscopic or open surgery in a 2:1 ratio.
- Primary end point: locoregional recurrence at 3 years.
- Secondary end points: disease-free and overall survival.

Bonjer J, et al. N Engl J Med 2015.

A RANDOMIZED TRIAL OF LAPAROSCOPIC VERSUS OPEN SURGERY FOR RECTAL CANCER

- 1,044 patients included (699 in the laparoscopic).
- The conversion rate: **16%**.
- In the laparoscopic-surgery group
  - operating time: 52 minutes longer.
  - bowel function: 1 day earlier.
  - hospital stay: 1 day shorter.

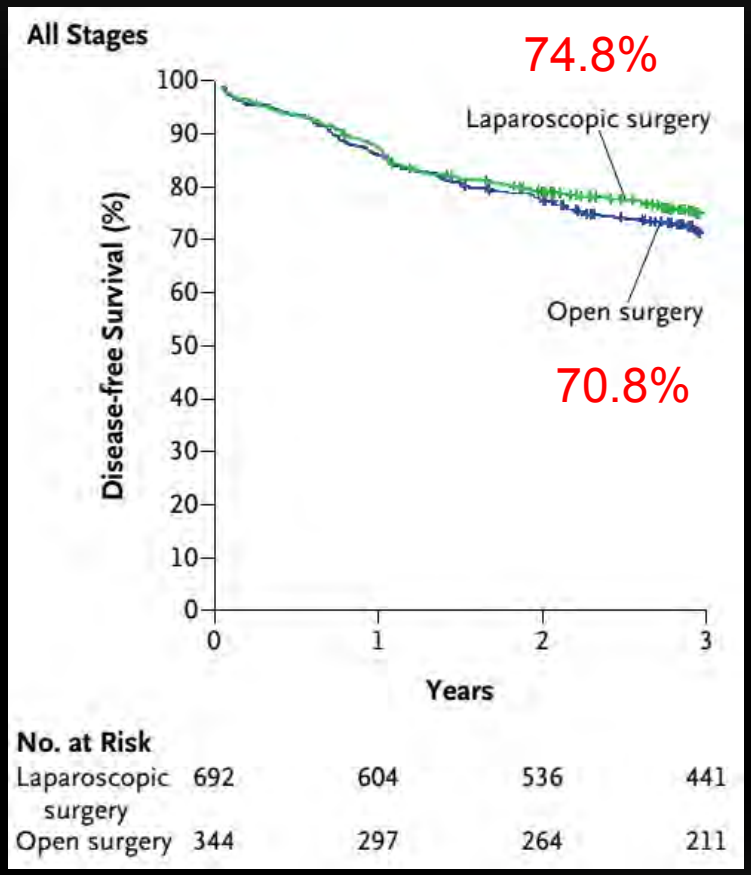
Bonjer J, et al. N Engl J Med 2015.

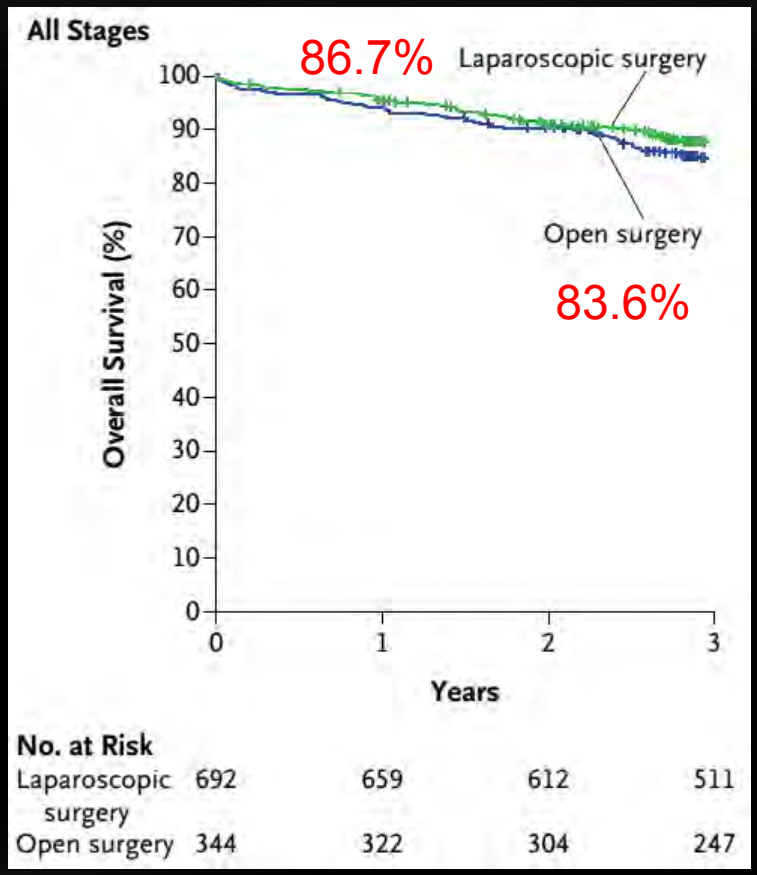
A RANDOMIZED TRIAL OF LAPAROSCOPIC VERSUS OPEN SURGERY FOR RECTAL CANCER

Type of Lesion and Surgery	Involved Circumferential Resection Margin*		Locoregional Recurrence in Intention-to-Treat Population	
	Patients with Finding†	Between-Group Difference‡	Rate	Between-Group Difference‡
	no./total no. (%)	*percentage points (95% CI)*	%	*percentage points (90% CI)*
All lesions				
Laparoscopic surgery	56/588 (10)	−0.5 (−4.9 to 3.5)	5.0	0.0 (−2.6 to 2.6)
Open surgery	30/300 (10)		5.0	

Bonjer J, et al. N Engl J Med 2015.

A RANDOMIZED TRIAL OF LAPAROSCOPIC VERSUS OPEN SURGERY FOR RECTAL CANCER





Bonjer J, et al. N Engl J Med 2015.

COMPARISON

	Preoperative Radiation	Conversion	Locoregional Recurrence	+CRM
CLASICC, 2007	28.1%, 28.7%	36% then 16%	9.7%, 10.1%	16%,
COLORII, 2015	59%, 58%	16%	4.3%, 6.3%	10%,

Jayne D, et al. J Clin Oncol 2007.

Bonjer J, et al. N Engl J Med 2015.

IMPACTS OF CONVERSION

- Conversion to an open operation after attempted laparoscopic colorectal resection increased postoperative **morbidity** and **prolonged hospital stays**. The overall survival is similar, but **carcinoma-free survival is compromised.**

Chan AC, et al. Surg Endosc 2008.

- Conversion in laparoscopic surgery for curable colorectal cancer is associated with **a worse perioperative outcome** and **worse disease-free survival**.

White I, et al. JSLS 2011.

IMPORTANCE OF CONVERSION FOR RESULTS OBTAINED WITH LAPAROSCOPIC COLORECTAL SURGERY

- A multicenter, prospective, observational study
- 33 institutions in Germany, Austria, and Switzerland
- 1,658 patients, August, 1995 to February, 1999
- conversion rate was 5.2 percent (n=86)

Marusch F, et al. Dis Colon Rectum 2001.

IMPORTANCE OF CONVERSION FOR RESULTS OBTAINED WITH LAPAROSCOPIC COLORECTAL SURGERY

- The patients requiring a conversion were significantly ↑ BMI
- Resections of the rectum were associated with a higher risk for conversion
- Conversion group
  - ↑ Intraoperative complications (27.9 vs. 3.8%)
  - ↑ Duration of the operation
  - ↑ Postoperative morbidity (47.7 vs. 26.1%), and mortality (3.5 vs. 1.5%)
  - ↑ Recovery time, and postoperative hospital stay

Marusch F, et al. Dis Colon Rectum 2001.

LAPAROSCOPIC RESECTIONS FOR COLORECTAL CANCER: DOES CONVERSION EFFECT SURVIVAL?

- 377 laparoscopic resections for colorectal cancer, a prospective database
- November 1991 and June 2002
- 46 conversions: 12.8%
- The converted group had a significantly higher weight (75 kg vs. 69 kg, $p = 0.013$)
- Median follow-up was 30.5 months

Moloo H, et al. Surgical Endoscopy 2004.

LAPAROSCOPIC RESECTIONS FOR COLORECTAL CANCER: DOES CONVERSION SURVIVAL?

- Significantly lower 2-year survival after converted procedures as compared to laparoscopic group

  (75.7% vs. 87.2%, $p = 0.02$)

- A trend toward lower 5-year survival

  (61.9% vs. 69.7%, $p = 0.077$)

Moloo H, et al. Surgical Endoscopy 2004.

CAN THE ROBOT HELP?

ROBOTIC VS. LAPAROSCOPIC RESECTION FOR RECTAL CANCER: THE ROLARR TRIAL

- International, multicenter trial (29 hospital - 10 countries - 40 surgeons).
- RCT comparing robotic assisted versus laparoscopic curative rectal cancer surgery.
- 471 patients (237 robotic versus 234 laparoscopic).
- 45% neoadjuvant chemotherapy.

Pigazzi A., presented in ASCRS Annual Meeting 2015.

ROBOTIC VS. LAPAROSCOPIC RESECTION FOR RECTAL CANCER: THE ROLARR TRIAL

- NO statistically significant advantages to robotic TME relative to
  - number of nodes (23.43)
  - quality of TME (75% complete)
  - involvement of circumferential margins (5.7%)
  - 30 day morbidity (32.4%)

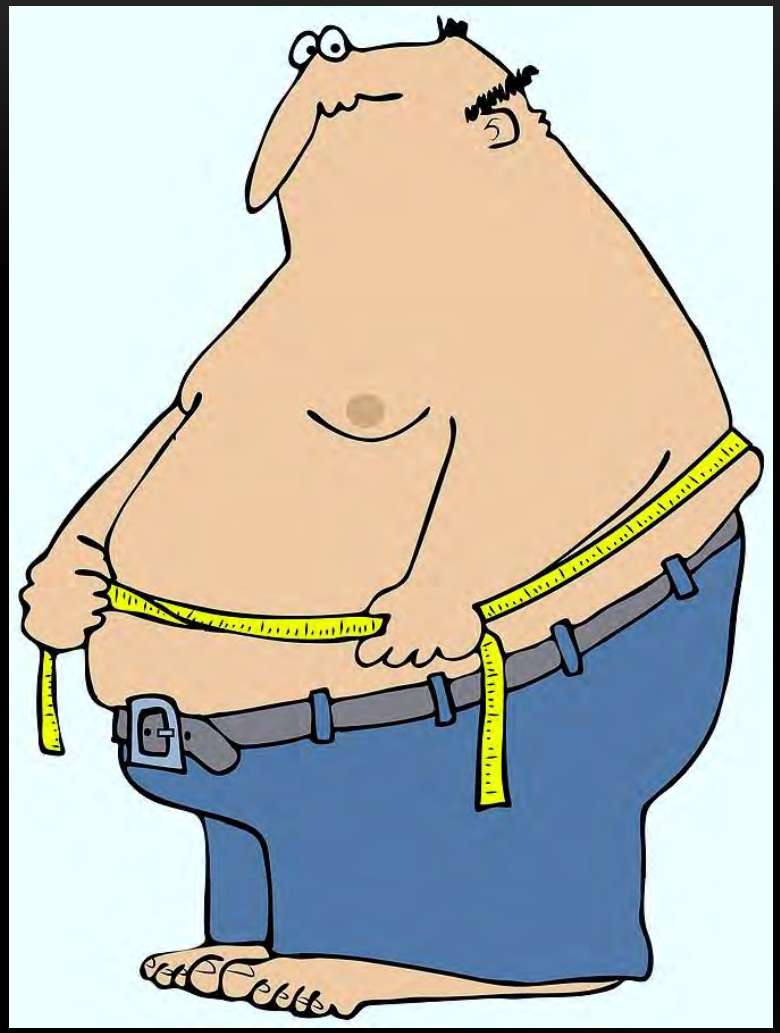
Pigazzi A., presented in ASCRS Annual Meeting 2015.

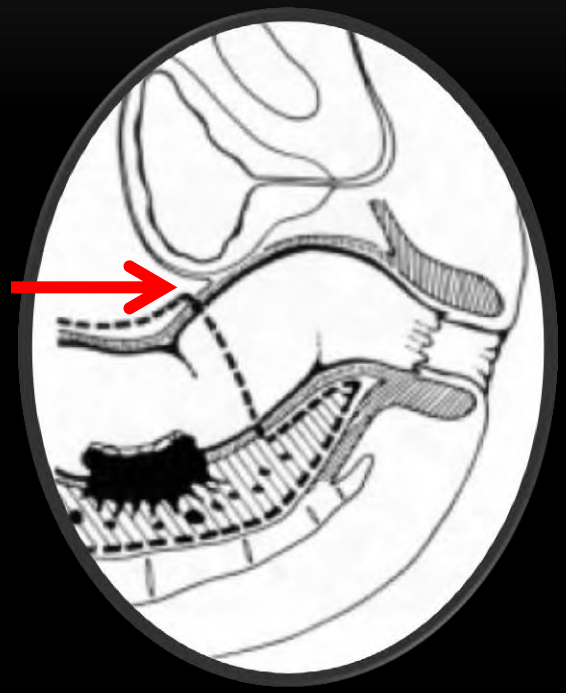
ROBOTIC VS. LAPAROSCOPIC RESECTION FOR RECTAL CANCER: THE ROLARR TRIAL

- Failed to demonstrate any statistically significant advantage relative to conversion rate (8.15 vs 12.2%).
- Similar short term oncologic outcomes.

Pigazzi A., presented in ASCRS Annual Meeting 2015.

LIMITATIONS OF LAPAROSCOPIC TME





LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: A COMPARATIVE STUDY.

- Prospectively collected data
- January 2007 and December 2008
- 40 patients (21 LAR, 19 LPT), 92% men

Hiranyakas A, et al. Am J Surg 2011.

	LAR (n=21)	LPT (n=19)
Age (yr) [1]	61.3 SEM 2.40	61.2 SEM 3.15
Male/female ratio	21/0	16/3
Body mass index (kg/m^2)[1]	26.1 SEM 0.8	26.7 SEM 1.6
ASA score[2]	2 (1-3)	2 (1-3)
Lower margin of tumor from anal verge[3]		
<8 cm	11 (52.4)	10 (52.6)
8-12 cm	10 (47.6)	9 (47.4)
Tumor greatest diameter[3]		
≤4 cm	15 (71.4)	15 (78.9)
>4 cm	6 (28.6)	4 (21.0)
Tumor stage[3]		
pT/ypT0	1 (4.8)	0 (0)
pT/ypT1	2 (9.5)	2 (10.5)
pT/ypT2	8 (38.1)	4 (21.1)
pT/ypT3	10 (47.6)	13 (68.4)

Hiranyakas A, et al. Am J Surg 2011.

	LAR (n=21)	LPT (n=19)
Operating time (hrs)[1]	2.7 SEM 0.2	2.9 SEM 0.1
Extraction wound size (cm)[1]	3.1 SEM 0.3	*NA*
Estimated blood loss (ml)[1]	46.2 SEM 9.2	78.6 SEM 18.3
Conversion[2]	2 (9.5)	1 (5.3)

Hiranyakas A, et al. Am J Surg 2011.

	LAR (n=21)	LPT (n=19)
Pain score[1,2]	5.9 (7.6)	6.4 (1.6)
Time for ileostomy to start function[1]	2.6 (0.3)	3.6 (0.6)
Hospital stay[1]	6.8 (0.7)	11.5 (3.7)
At 2 years follow up		
-Bowel movements[1,3]	3.5 (0.9)	2.4 (0.6)
-Wexner incontinence score [1,3]	3.3 (2)	1.3 (0.8)
At the last follow up (mean, months)	*33.4 SEM 1.3*	*33.5 SEM 1.5*
-Bowel movements[1,3]	2.6 (0.8)	2.2 (0.5)
-Wexner incontinence score [1,3]	1.0 (1)	1.1 (0.8)

Hiranyakas A, et al. Am J Surg 2011.

LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: A COMPARATIVE STUDY.

- Benign anastomotic strictures were higher after LPT

  (n = 4, LAR n = 0, *P* = .042)

- LPT may be considered selectively for a bulky distal rectal tumor in a small pelvis with comparable functional results.

Hiranyakas A, et al. Am J Surg 2011.

LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: LONG-TERM OUTCOMES

	LPT (30)	LAR (147)	P-value
Neoadjuvant chemoradiotherapy	9 (31.0%)	61 (43.3%)	0.2230
Tumor site - Midrectum - Low rectum	 8 (26.7%) 22 (73.3%)	 75 (51.0%) 72 (49.0%)	0.0149*
Tumor size (median, cm)	4	4	0.2649

LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: LONG-TERM OUTCOMES

Operative outcomes

	LPT (30)	LAR (147)	P-value
Operative time (mins)	164.8	130.4	< 0.0001 *
Operative blood loss (mL)	96.4	70.9	0.3569
Conversion	3 (10.0%)	12 (8.2%)	0.7221
Complete mesorectum	9 (50.0%)	66 (76.7%)	0.0608

LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: LONG-TERM OUTCOMES

Operative outcomes (cont.)

	LPT (30)	LAR (147)	P-value
Distal resection margin (cm)	2.9	4.4	0.0920
Positive CRM	1 (3. 3%)	4 (3.6%)	0.3569
Return of bowel function (days)	4.9	4.5	0.5746
Hospital stay (days)	11.3	7.7	0.0726

LAPAROSCOPIC ULTRALOW ANTERIOR RESECTION VERSUS LAPAROSCOPIC PULL-THROUGH WITH COLOANAL ANASTOMOSIS FOR RECTAL CANCERS: LONG-TERM OUTCOMES

Long-term outcomes

	LPT (30)	LAR (147)	P-value
Follow-up time (months)	46.4	37.4	0.5610
Overall survival	75.0%	89.1%	0.0627
Local recurrence	1 (3.3%)	1 (0.7%)	0.3127
Systemic recurrence	5 (16.7%)	17 (11.6%)	0.5427

THE APPLICATION OF TaTME FOR PATIENTS WITH MIDDLE AND LOW RECTAL CANCER
A SYSTEMATIC REVIEW AND META-ANALYSIS

- PubMed, Embase, and Web of Science inception to Feb 15, 2017.
- 13 studies were included, which enrolled 859 patients (TaTME 414).
- 3 RCTs and 10 MCCs comparing TaTME with LaTME for rectal cancer.

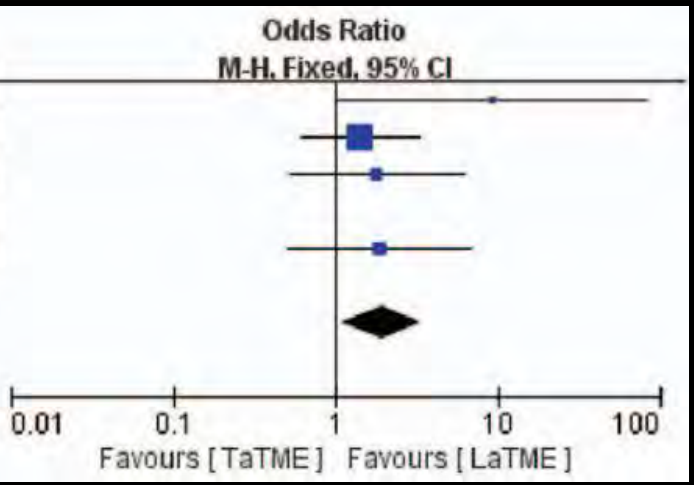
Hu, et al. Meicine 2018.

Macroscopic Quality of Mesoretum

Study or Subgroup	TaTME Events	TaTME Total	LaTME Events	LaTME Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Velthuis2014	24	25	18	25	4.2%	9.33 [1.05, 82.78]	2014
Denost 2014	35	50	31	50	54.2%	1.43 [0.62, 3.29]	2014
Fernandez 2015	27	32	24	32	21.8%	1.80 [0.52, 6.25]	2015
de'Angelis 2015	34	37	35	37	0.0%	0.65 [0.10, 4.12]	2015
Perdawood2016	20	25	17	25	19.8%	1.88 [0.52, 6.84]	2016
Total (95% CI)		**132**		**132**	**100.0%**	**1.93 [1.09, 3.42]**	
Total events	106		90				

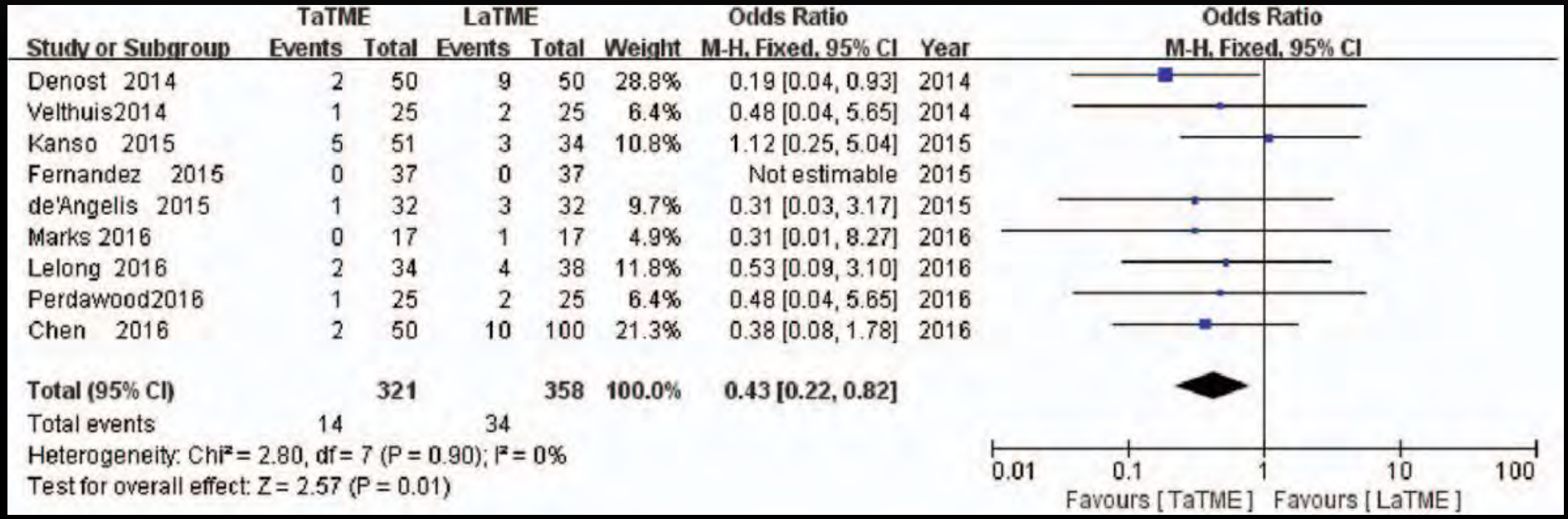
Heterogeneity: $Chi^2 = 2.52$, $df = 3$ ($P = 0.47$); $I^2 = 0\%$

Test for overall effect: $Z = 2.25$ ($P = 0.02$)



Hu, et al. Meicine 2018.

Positive Circumferential Resection Margin



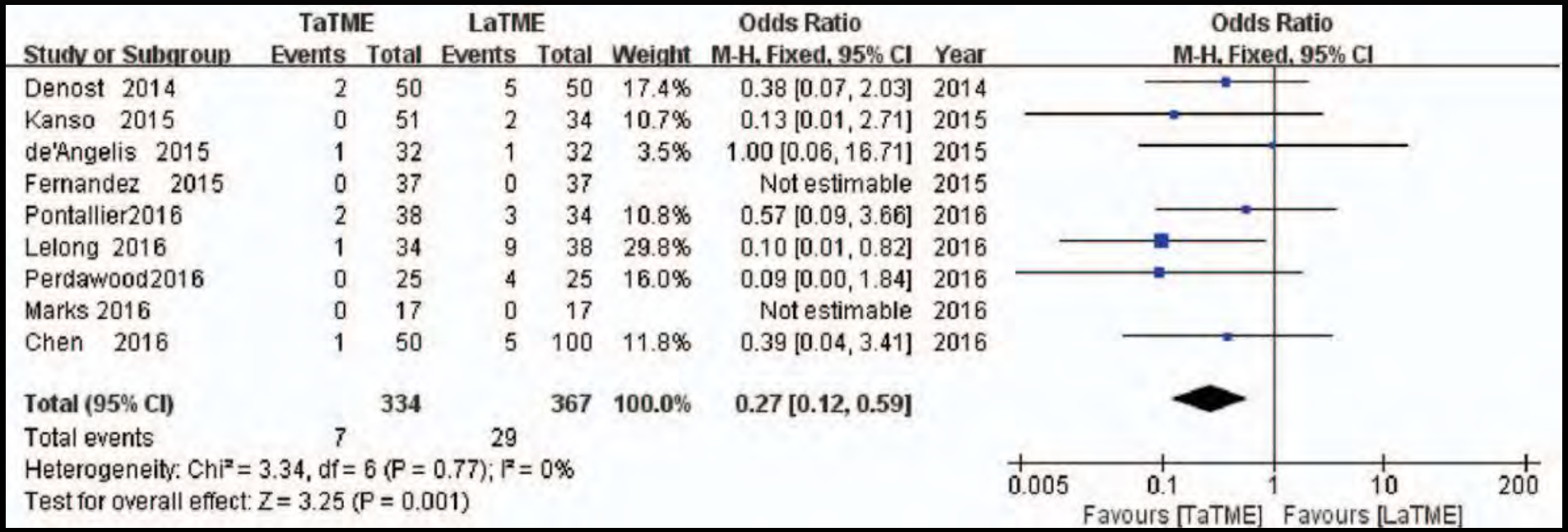
Study or Subgroup	TaTME Events	TaTME Total	LaTME Events	LaTME Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Denost 2014	2	50	9	50	28.8%	0.19 [0.04, 0.93]	2014
Velthuis2014	1	25	2	25	6.4%	0.48 [0.04, 5.65]	2014
Kanso 2015	5	51	3	34	10.8%	1.12 [0.25, 5.04]	2015
Fernandez 2015	0	37	0	37		Not estimable	2015
de'Angelis 2015	1	32	3	32	9.7%	0.31 [0.03, 3.17]	2015
Marks 2016	0	17	1	17	4.9%	0.31 [0.01, 8.27]	2016
Lelong 2016	2	34	4	38	11.8%	0.53 [0.09, 3.10]	2016
Perdawood2016	1	25	2	25	6.4%	0.48 [0.04, 5.65]	2016
Chen 2016	2	50	10	100	21.3%	0.38 [0.08, 1.78]	2016
Total (95% CI)		**321**		**358**	**100.0%**	**0.43 [0.22, 0.82]**	
Total events	14		34				

Heterogeneity: Chi² = 2.80, df = 7 (P = 0.90); I² = 0%

Test for overall effect: Z = 2.57 (P = 0.01)

Hu, et al. Meicine 2018.

Conversion



Study or Subgroup	TaTME Events	TaTME Total	LaTME Events	LaTME Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Denost 2014	2	50	5	50	17.4%	0.38 [0.07, 2.03]	2014
Kanso 2015	0	51	2	34	10.7%	0.13 [0.01, 2.71]	2015
de'Angelis 2015	1	32	1	32	3.5%	1.00 [0.06, 16.71]	2015
Fernandez 2015	0	37	0	37		Not estimable	2015
Pontallier2016	2	38	3	34	10.8%	0.57 [0.09, 3.66]	2016
Lelong 2016	1	34	9	38	29.8%	0.10 [0.01, 0.82]	2016
Perdawood2016	0	25	4	25	16.0%	0.09 [0.00, 1.84]	2016
Marks 2016	0	17	0	17		Not estimable	2016
Chen 2016	1	50	5	100	11.8%	0.39 [0.04, 3.41]	2016
Total (95% CI)		**334**		**367**	**100.0%**	**0.27 [0.12, 0.59]**	
Total events	7		29				

Heterogeneity: $Chi^2 = 3.34$, $df = 6$ ($P = 0.77$); $I^2 = 0\%$

Test for overall effect: $Z = 3.25$ ($P = 0.001$)

Hu, et al. Meicine 2018.

THE APPLICATION OF TaTME FOR PATIENTS WITH MIDDLE AND LOW RECTAL CANCER A SYSTEMATIC REVIEW AND META-ANALYSIS

- Not significant intraoperative and postoperative complications between the 2 groups

Hu, et al. Meicine 2018.

THE APPLICATION OF TaTME FOR PATIENTS WITH MIDDLE AND LOW RECTAL CANCER A SYSTEMATIC REVIEW AND META-ANALYSIS

- TaTME was associated with a reduction in the positive CRM rate, TaTME thus could achieve complete tumor resection and improve long-term survival of patients with mid- and low-rectal cancer.

Hu, et al. Meicine 2018.