Optimizing Rectal Cancer Care: The Evolving Role of Transanal Endoscopic Surgery

33rd Annual Controversies, Problems & Techniques in Surgery
Gliedman Oration

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Disclosures

- **None**

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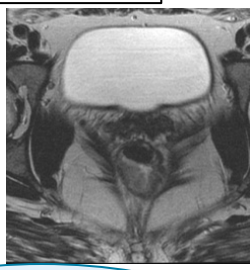
Optimizing Rectal Cancer Outcomes

PREOPERATIVE STAGING

Histopathology review
High-resolution MRI
>Predict CRM



+/- NEOADJUVANT, ADJUVANT TREATMENT

MULTIDISCIPLINARY TEAM

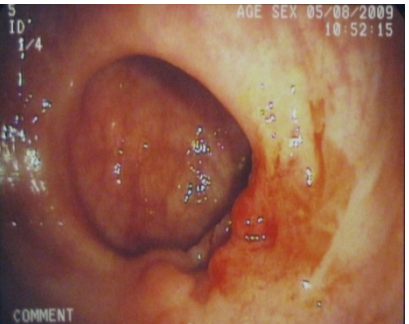
PATHOLOGIC ASSESSMENT

Standard CRT

Short-course XRT → ↓side effects

+EGFR inhibitors → ↑ downstaging

Standardized TME grading and synoptic reports



ONCOLOGIC RESECTION (TME)

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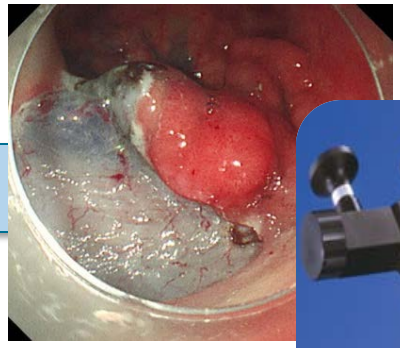
Evolution in MIS for Rectal Cancer

Early Tumors

Transanal

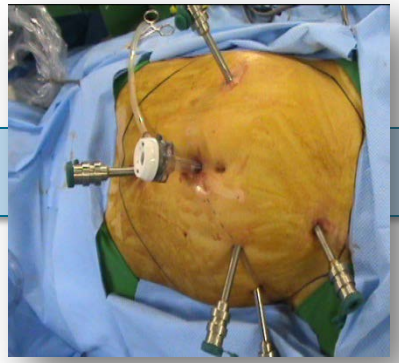
EMR



ESD

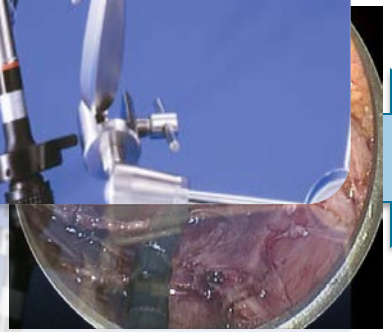
Advanced Tumors

Open



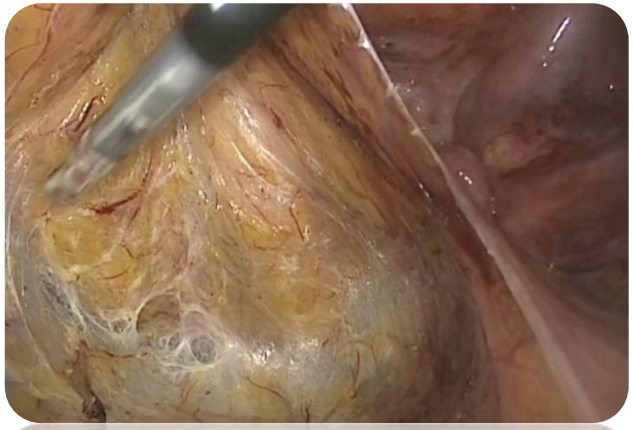
Lap

Robotic



Transanal TME

Treatment Options for Early Rectal Cancer



APR, LAR (TME)

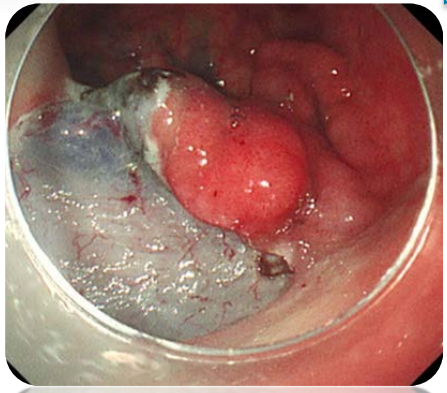
TAE

TES

EMR/ESD

0-8cm

0-20cm



0 - >20cm

Transanal Endoscopic Microsurgery (TEM)

Prof. Gerhard Buess, 1983

- Rectal lesions 2-25 cm from the AV
  - Benign lesions
  - Early rectal cancer
  - Palliation of advanced rectal tumors

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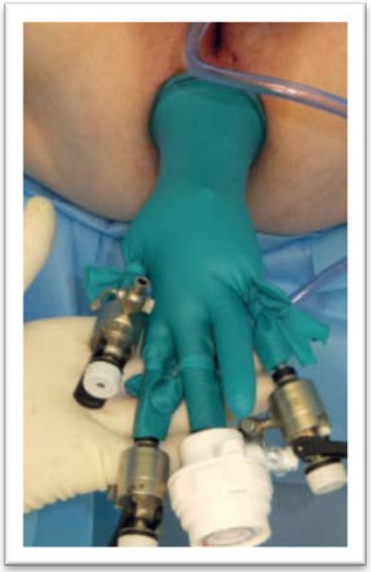
Transanal Endoscopic Platforms

Rigid (TEM, TEO) → **Disposable (TAMIS)**

Michalik et al,
Surg Laparosc endosc
Percutan Tech 2011;21:308

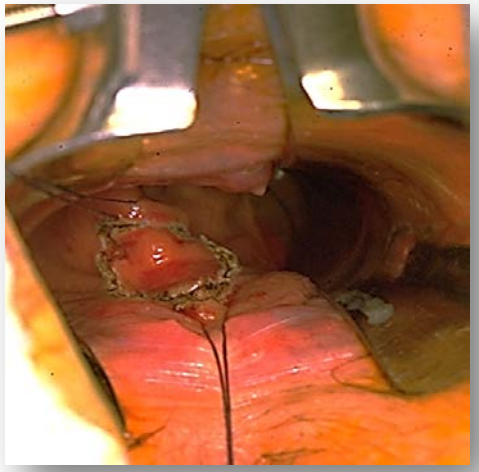
Tuech et al,
EJSO Tech 2011;37:334

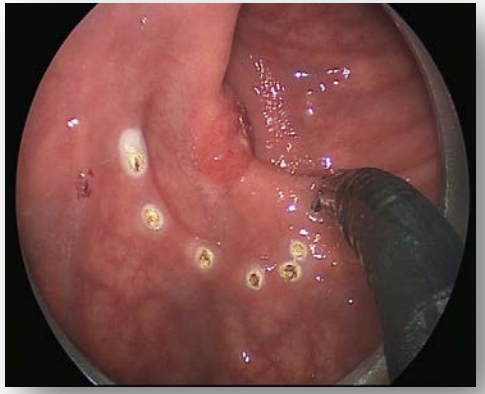
Barendse et al,
Ann Surg, 2012
Wolthuis et al, Tech
Coloproctol 2012;16:161



Hompes et al,
BJS, 2012;90:1429

Transanal Endoscopic Surgery (TES) vs. Transanal Excision (TAE)





TES vs. TA for all Rectal Neoplasms

	TEM (n=82)	*TA (n=89)*	*P value*
Any complication (yes)	12 (15)	15 (17)	0.69
Major or minor complication			0.99
Major	4 (33)	6 (40)	
Minor	8 (67)	9 (60)	
LOS (days)	0.63±1	1.46±3	0.007
Specimen fragmentation			<0.001
Whole	77 (94)	58 (65)	
Fragmented	5 (6)	28 (31)	
Unreported	0 (0)	3 (3)	
Margins (clear)*	74 (90)	63 (71)	0.001
Recurrence (yes)	4 (5)	24 (27)	0.004
All cause mortality (deaths)	2 (2)	26 (29)	0.01

Moore et al, Dis Colon Rectum 2008; 51:1026

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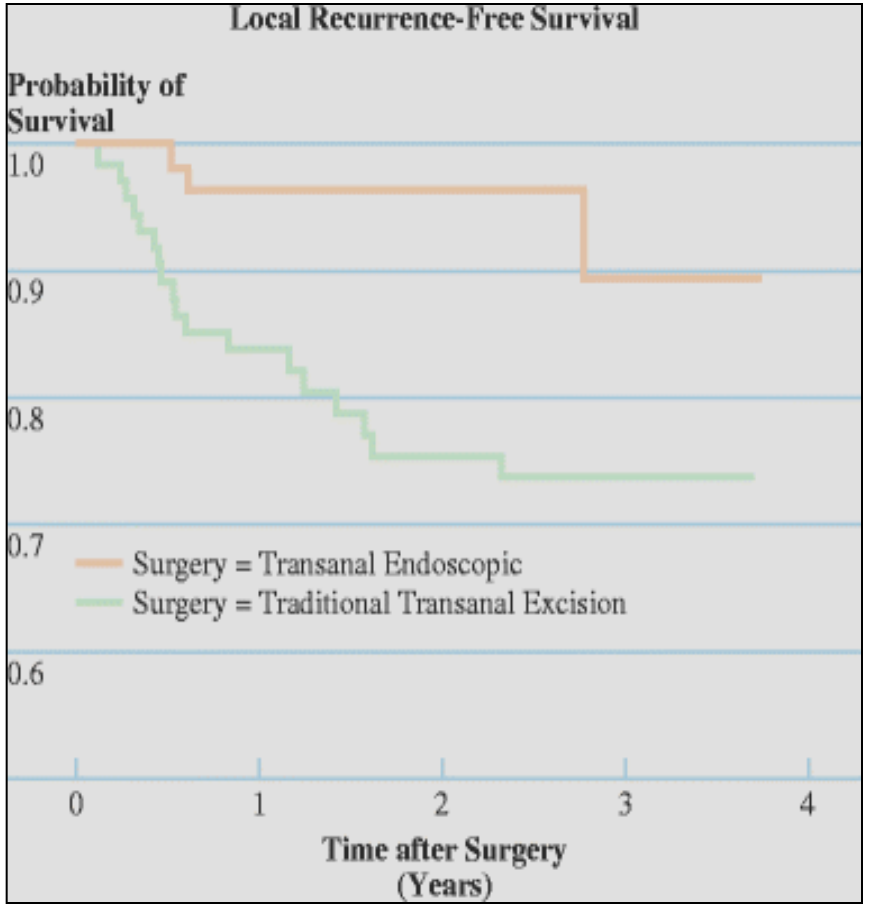
TES vs. TAE



Moore JS et al, Dis Colon Rectum 2008 51:1026

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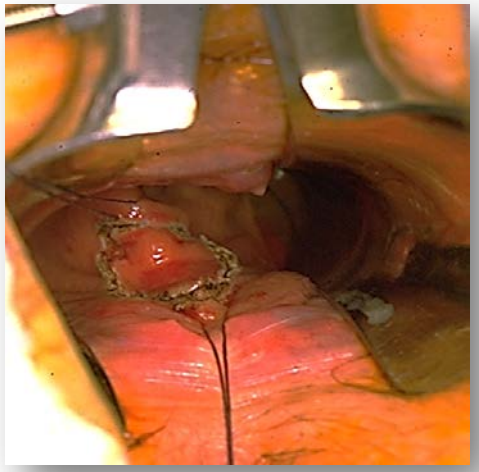
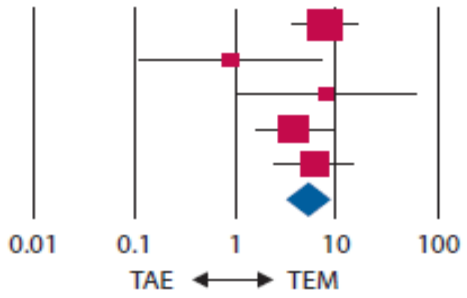
TES vs. TAE



Study name	OR	Lower limit	Upper limit	*Z* Value	*p* Value
de Graaf E (17)	7.656	3.708	15.806	5.503	0.000
Lebedyev A (18)	0.900	0.115	7.067	–0.100	0.920
Christoforidis D (19)	7.972	1.039	61.192	1.996	0.046
Moore J (8)	3.817	1.614	9.028	3.050	0.002
Langer C (20)	6.000	2.427	14.834	3.880	0.000
	5.281	3.201	8.712	6.515	0.000

Statistics for each study

OR and 95% CI



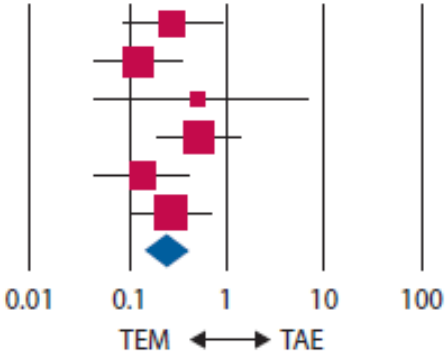
+Margins

Study name	OR	Lower limit	Upper limit	*Z* Valuee	*p* Value
Han Y (16)	0.282	0.088	0.903	–2.132	0.033
de Graaf E (17)	0.127	0.047	0.345	–4.047	0.000
Lebedyev A (18)	0.526	0.044	6.293	–0.507	0.612
Christoforidis D (19)	0.527	0.203	1.368	–1.316	0.188
Moore J (8)	0.139	0.046	0.421	–3.490	0.000
Langer C (20)	0.272	0.108	0.689	–2.745	0.000
	0.248	0.154	0.401	–5.690	0.000

Study name

Statistics for each study

OR nd 95% CI

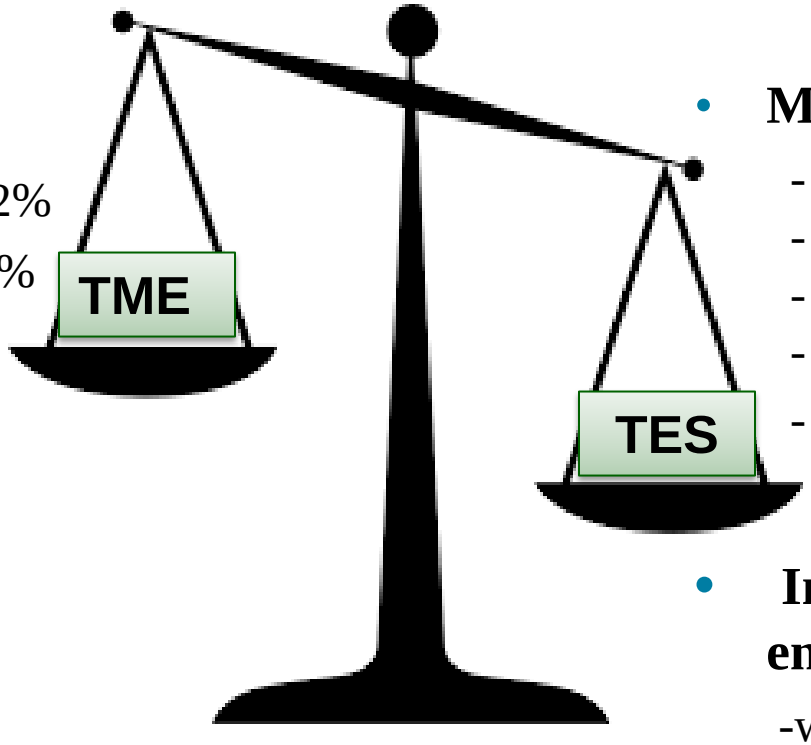


Local Recurrence

Clancy et al, Dis Colon Rectum 2015;58:254-61

TME vs TES for Early Rectal Cancer Perioperative Outcomes

- **Mortality 2-8%**
- **Morbidity 35-50%**
  - urinary dysfunction 5-12%
  -sexual dysfunction 10-35%
  - FI 20-30%
  - wound complications
  - pain, longer ecovery
- **High APR rate**
- **High conversion rate**

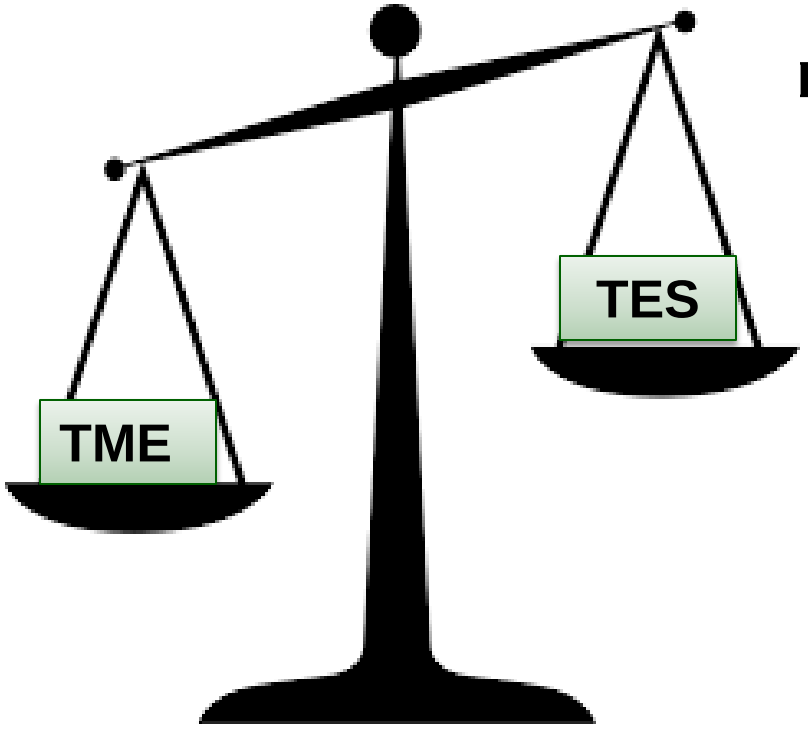


- **Mortality ≤0.5%**
- **Morbidity 3-28%**
  - bleeding
  - staple line dehiscence
  - perforation
  - urinary retention
  - transient FI
- **Intraperitoneal entry**

  -when adequately closed, not associated with increased complications

TME vs TES for Early Rectal Cancer
Oncologic Outcomes

- **Recurrence rate (T1)**
  - <5%



Recurrence rate (T1)
- 0-12%

Local Excision: Oncologic Outcomes Related to T/N Staging

TABLE 1 AJCC/UICC TNM, Definitions*

	Category
Primary tumor (T)	TX
	TO
	Tis
	T1
	T2
	T3
	T4
Regional lymph nodes (N)	NX
	N0
	N1
	N2
Distant metastasis (M)	MX
	M0
	M1

Rate of associated LN metastasis

T1 → 6-12%

T2 → 7-22%

T3 → 30-66%

N1 → 40-55%

N2 → 22-30%

M1 → 5%

5-Year Survival rate

*Adapted from Greene FL, Page DL, Fleming ID, et al. (eds)[1] with permission from Springer-Verlag.
†Wittekind C, Greene FL, Hensen DE (eds).[11]

Local Excision for T1 Tumors: Outcomes Related to Nodal Status

TABLE 1 AJCC/UICC TNM, Definitions*

	Category
Primary tumor (T)	TX
	TO
	Tis
	T1
	T2
	T3
	T4
Regional lymph nodes (N)	NX
	N0
	N1
	N2
Distant metastasis (M)	MX
	M0
	M1

6-12%

Histopathological predictors of risk of nodal involvement in T1 tumors

Risk factors for nodal involvement

- Poorly differentiated
- Vascular/lymphatic invasion
- Sm3 level
- Tumor budding
- Size (> 4 cm in diameter)

Additional characteristics favoring local treatment

- Tumor front characteristics (pushing, infiltrative)

*Adapted from Greene FL, Page DL, Fleming ID, et al. (eds)[1] with permission from Springer-Verlag.
†Wittekind C, Greene FL, Hensen DE (eds).[11]

TES and Oncologic Principles

- TES for rectal cancer: **SUCCESS BASED ON STRICT PATIENT SELECTION**
  - Preoperative staging
  - Careful preoperative pathology review

Identify Low risk T1 rectal cancers

- ≤ 4cm in diameter
- Sm1 or Sm2
- No LVI invasion
- Well-moderately well differentiated
- No tumor budding

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TEM for Early Rectal Cancer: Oncologic Outcomes in Selected T1 Cancers

Table 1.
Oncologic Results for pT1 Lesions Excised With Transanal Endoscopic Microsurgery

References	No. of Patients	Local Recurrence	Five-Year Disease-Free	Five-Year Survival
Lee *et al.*[6]	52	4.1	95.9	100
Buess *et al.*[4]	12	0		
Langer *et al.*[9]	16	12.5		
Winde *et al.*[10]	24	4.2		96
Demartines *et al.*[11]	9	8.3		
Buess *et al.*[12]	25	4		
Smith *et al.*[7]	30	10		
Floyd and Saclarides (current study)	53	7.5	100	
Tsai et al,	58	9.8		

Dis Colon Rectum 53(1): 16-23 2010

Prospective database of TEM from 1996-2008

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TES vs. TME for T1 Rectal Cancer: RCT

- N= 53 T1 cancers (AR: 28, TEM: 25)
- 4 years follow-up
- Complication rate: NS
- 5 year local recurrence rate: NS
  - TEM: 1/25 (4%)
  - LAR: 0

Winde G, et al. Min Invasive Ther 1997: 6: 315-23

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ESD vs. TES ?

- Japanese multicenter prospective study
- (n= 1,090 patients/10 yrs)

Tumor size, mm, mean ± SD	35 ± 18		
Range	3-140	Histology	
Tumor location		Non-neoplastic	4
Cecum	103	Adenoma	356
Right colon	408	Mucosal cancer	519
Left colon	263	SM1 cancer	112
Rectum	337	SM2 cancer	101

Saito et al. Gastro Intest Endosc 2010;72:1217

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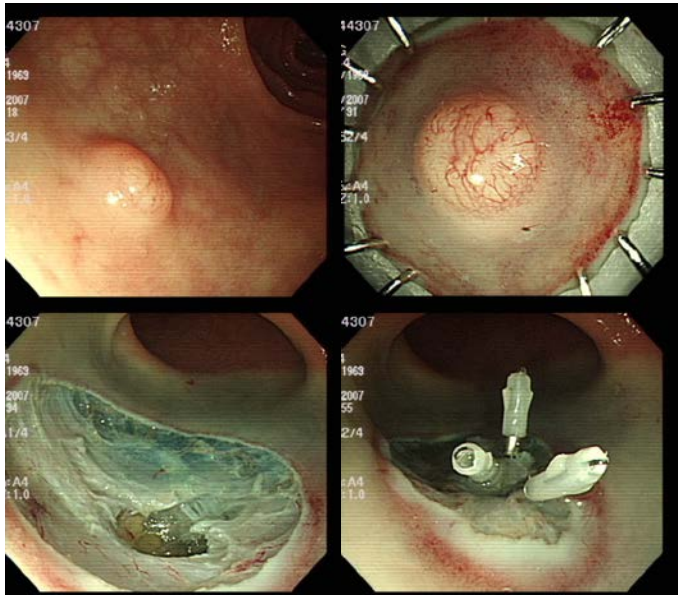
ESD vs. TES ?

- Perforation rate: 3 ~ 20 %
- Clipping or surgery

En bloc resection rate, %	88.0
Curative resection rate, %	89.0
Procedure time, min, mean ± SD	116 ± 88
Complications, no. (%)	72 (6.5)
Perforation	54 (4.9)
Delayed perforation	4 (0.4)
Postoperative bleeding	17 (1.5)
Emergency surgery cases, no. (%)	4 (0.4)



Saito et al. Gastro Intest Endosc 2010;72:1217

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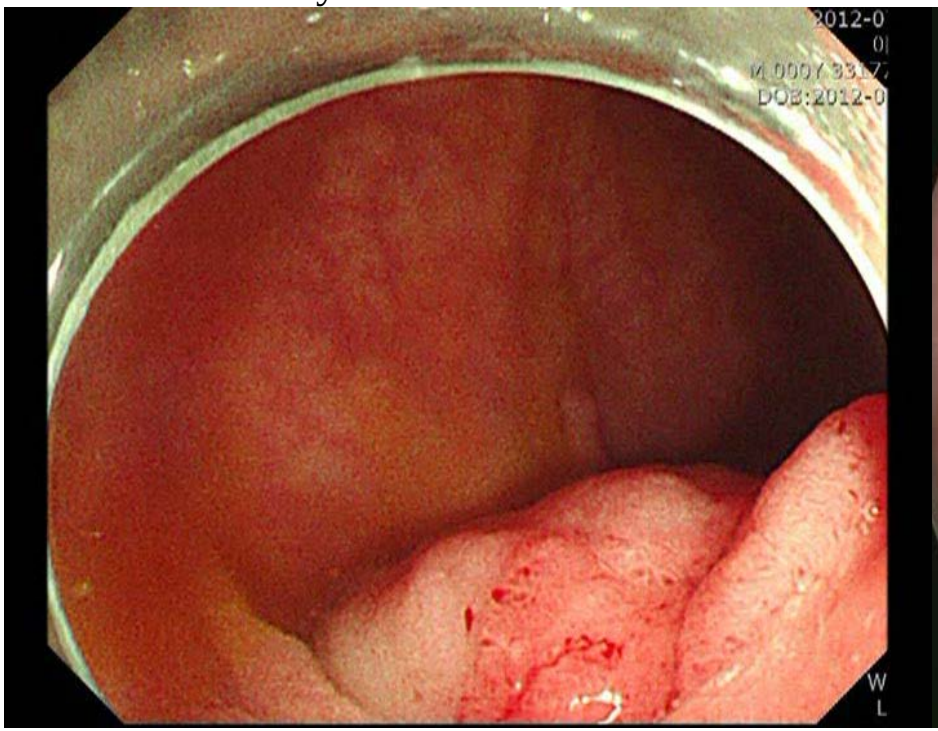
ESD vs. TES for Early Rectal Cancer

Courtesy of Dr. DK Sohn



- Superior to EMR
- long learning curve
- risk of perforation
- patient selection
- Longer OR time ?

- Full thickness assessment of the tumor with suture closure

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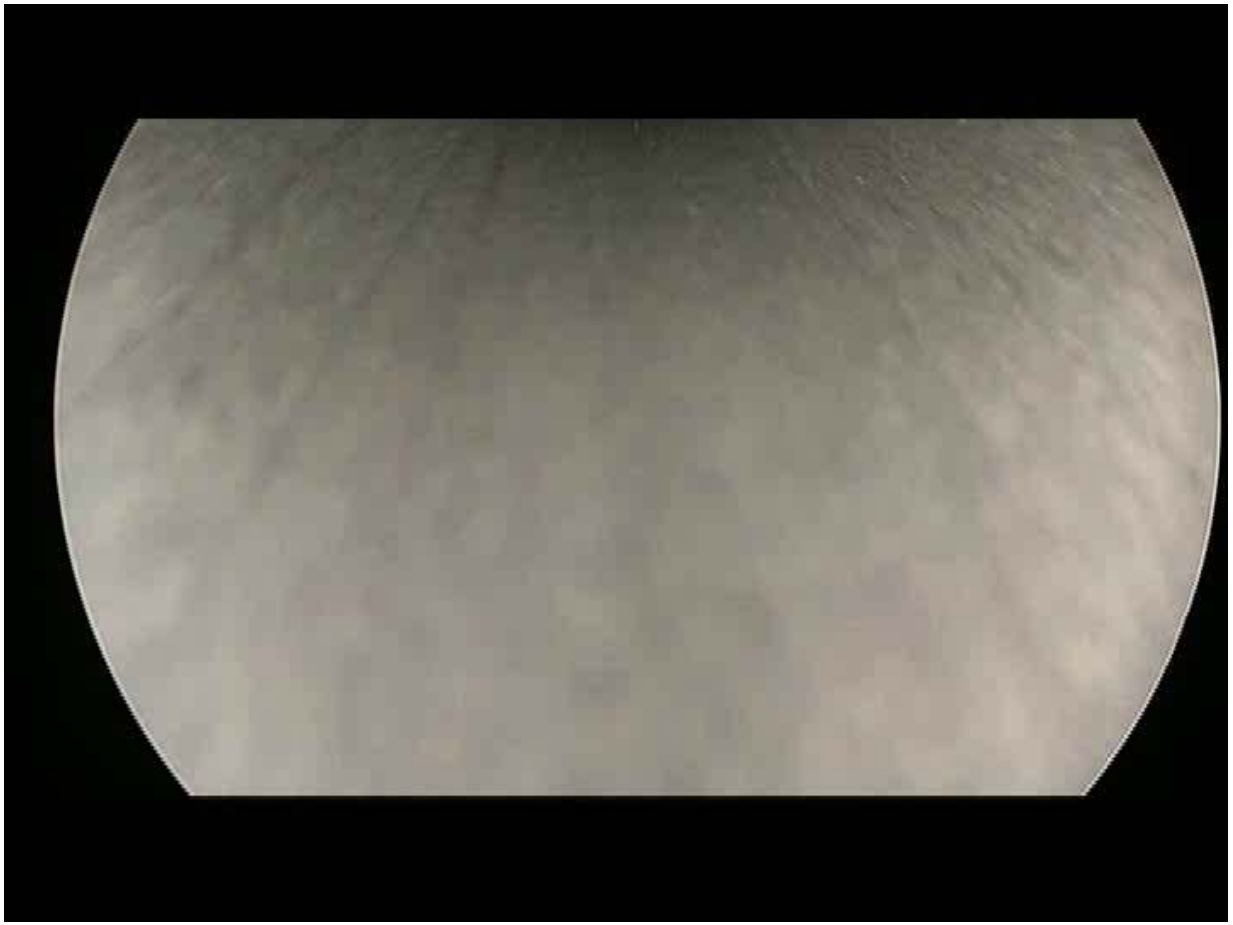
TES for Complex Rectal Lesions

-Large pedunculated polyp 12-15 cm from AV, along right lateral rectal wall

-Anticipated peritoneal entry: prone position



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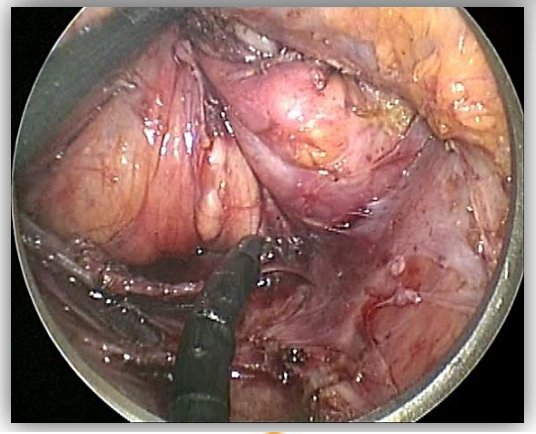
Treatment Options for Advanced Rectal Cancer

- **Transabdominal TME** (Open/Lap/Robotic)
- LAR or APR

  +/- neoadjuvant/adjuvant treatment

- **Hybrid/Pure Transanal TME**

  +/- neoadjuvant/adjuvant treatment



- **Neoadjuvant treatment only**

  +/- transanal Local Excision

Goals of Rectal Cancer Resection (TME)

- Achieve negative resection margins
  - proximal, distal and CRM
- Complete TME
  - intact mesorectal fascia
- Adequate lymph node harvest

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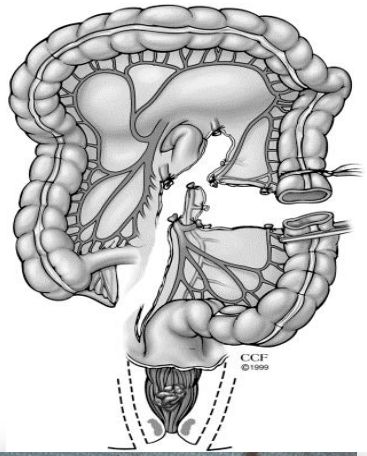
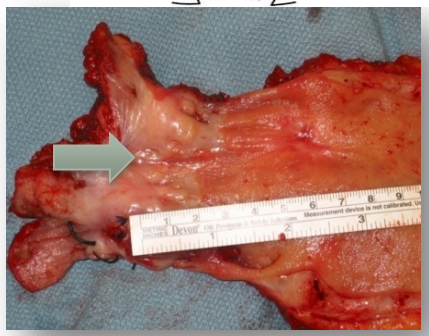
Impact of Chemoradiation Therapy: Rising Rates of Sphincter Preservation

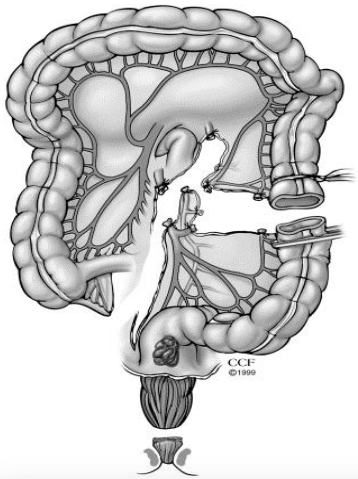
Distal Margin	5 cm	< 2cm	1cm	<1cm	5mm
	Goligher 1951	Pollet, 1983	Vernava, 1992	Nash, 2010	Rutkovski, 2012

APR

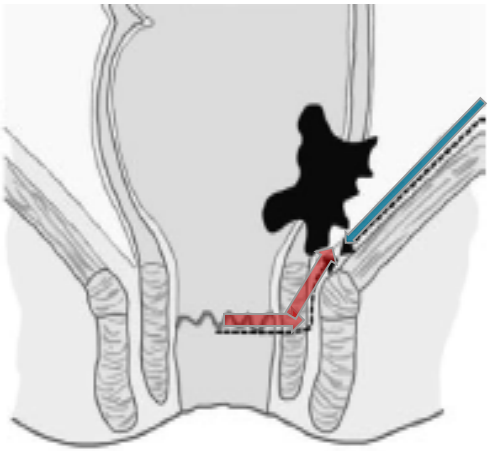


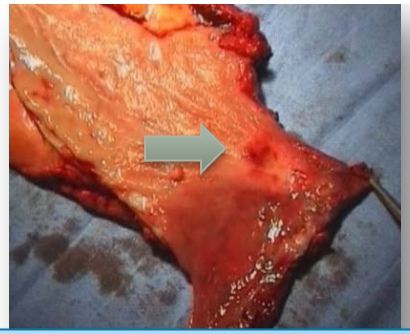


LAR



LAR + ISR





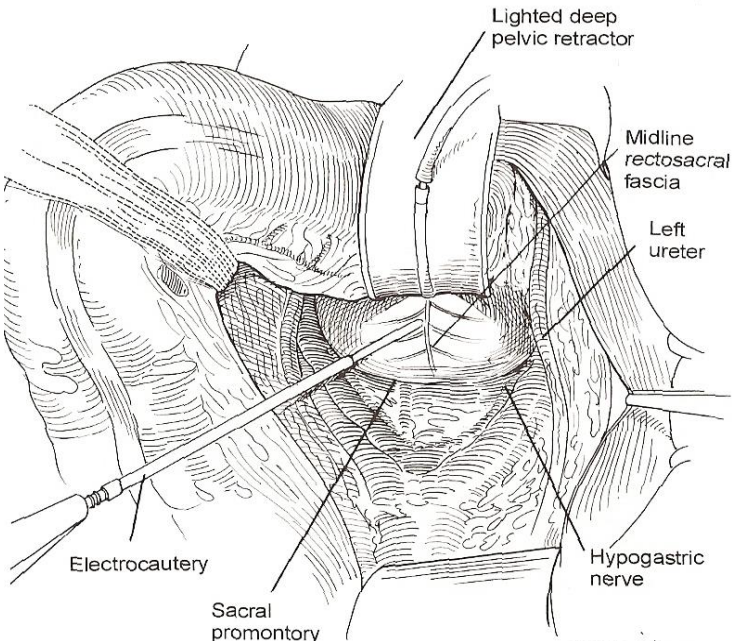
+CRT

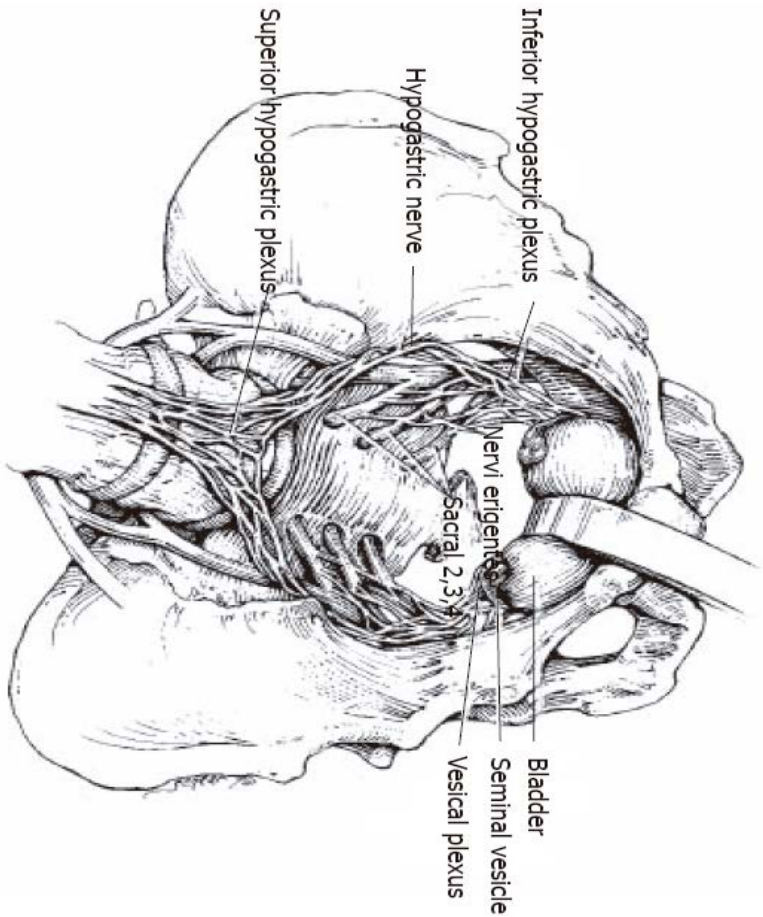
40-70% downstaging
20-40% cPR

Sphincter-Sparing

TME: Unique Challenges

- Factors complicating rectal resection
  - visceral obesity
  - narrow male pelvis
  - preoperative CRT
  - autonomic nerve preservation
  - sphincter preservation





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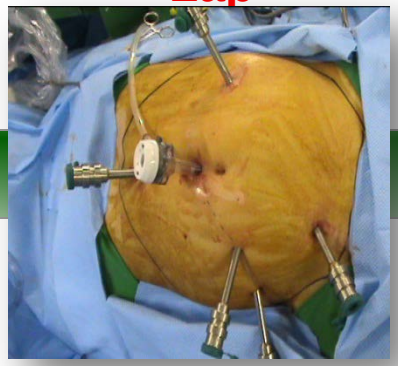
Evolution in MIS for Advanced Rectal Cancer

Advanced Tumors

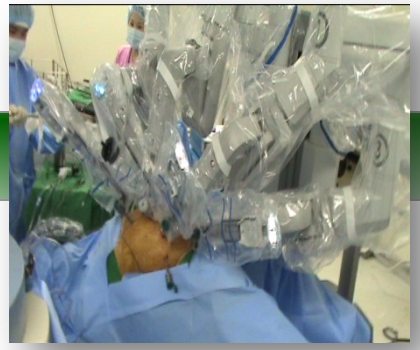
Open

Lap



HALS

Robotic



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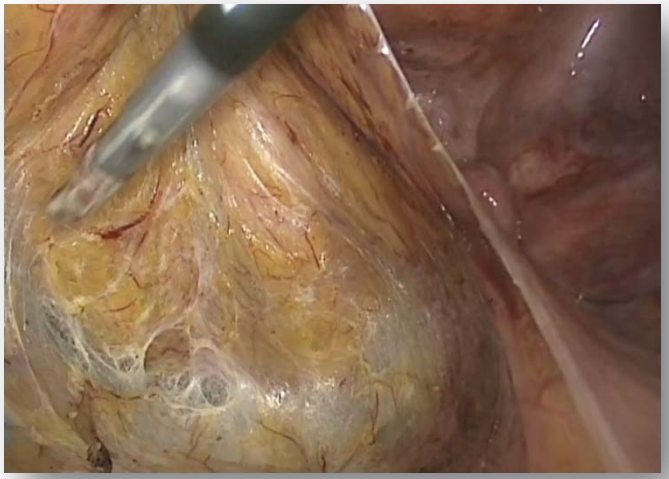
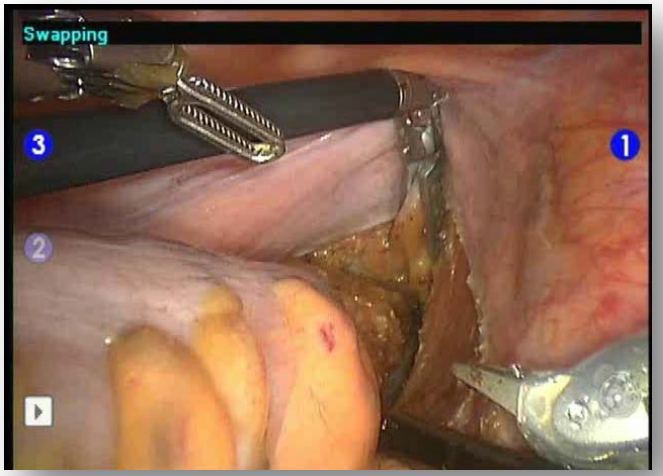
TME: Imperfect Outcomes

- Incidence of incomplete resection
  - ➢ 10-15% **Impact**
    - advanced tumors
    - lower rectal tumors
  - ➢ 10-30% conversion rates **Impact**
  - ➢ High rate of APR **Impact**



- Mortality: 2-8%
- Morbidity 30-50% **Impact**
  - ➢ Urinary dysfunction 5-12%
  - ➢ Sexual dysfunction 10-35%
  - ➢ Fecal incontinence 20-30%
  - ➢ Wound Complications
  - ➢ Pain, long recovery



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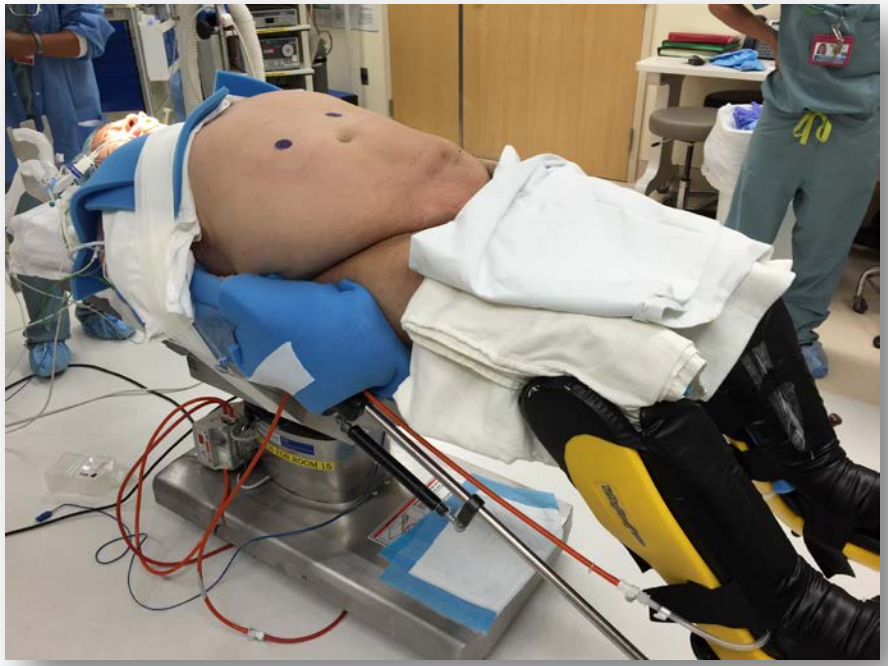
Abdominal TME: Limitations



Laparoscopy vs Open TME

- Improved exposure
- Faster resolution of ileus
- Less pain, reduced narcotic use
- Shorter LOS
- Similar morbidity

	COLOR II/ACOSOG/AlaCaRT		
			
Lap:Open	699:345	240:222	238:235
Conversion	17%	11.3%	9%
APR rate	29%	22.7%	8%

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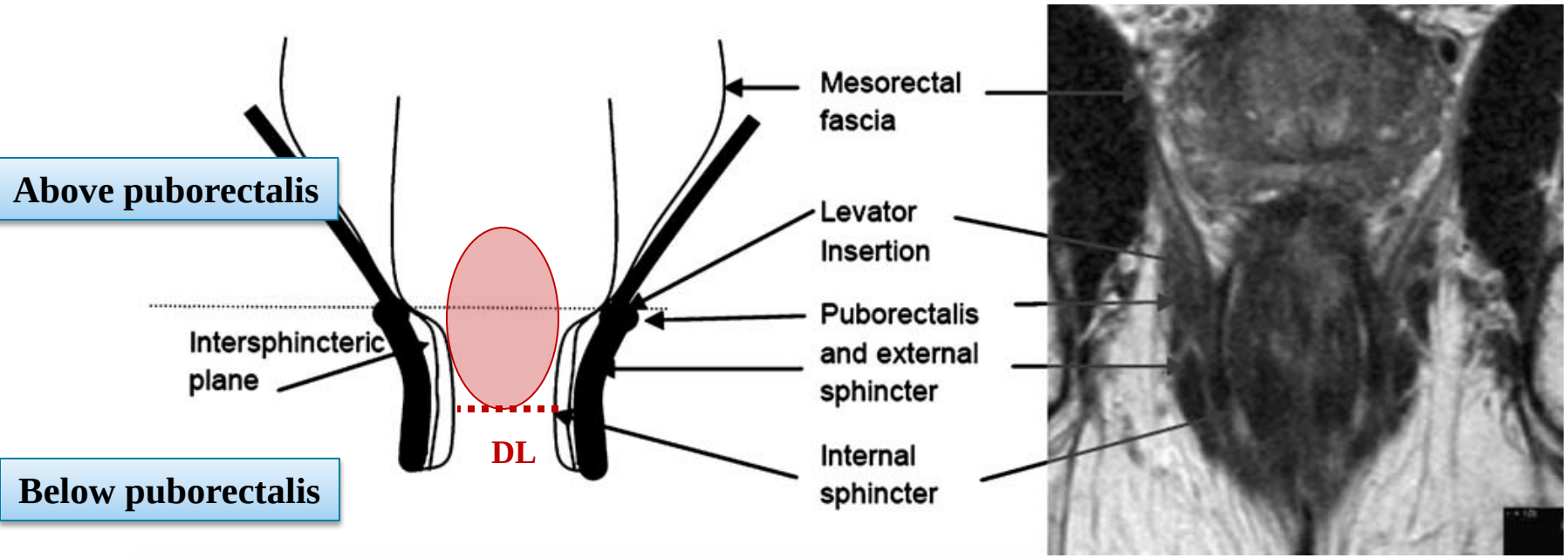
Blind Spot of Abdominal TME



	LAP			OPEN		
						
Incomplete TME	3%	8%	3%	3%	5%	1%
Positive CRM	10%	12.1%	7%	10%	7.7%	3%

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Europe

Laparoscopic versus open surgery for rectal cancer (COLOR II): short-term outcomes of a randomised, phase 3 trial

Martijn H G M van der Pas, Eva Haglind, Miguel A Cuesta, Alois Fürst, Antonio M Lacy, Wim C J Hop, Hendrik Jaap Bonjer, for the COlorectal cancer Laparoscopic or Open Resection II (COLOR II) Study Group*

APR Rate

Location	Lap APR	Open APR
Upper rectum	6 (3%)	1 (1.2%)
Mid rectum	38 (19%)	10 (12.5%)
Lower rectum ≤ 5cm	156 (78%)	69 (86.2%)
Total	200 (28.6%)	80 (23.2%)

Positive CRM

Location	Lap TME	Open TME
Upper rectum	18 (9%)	9 (9%)
Mid rectum	22 (10%)	4 (3%)
Lower rectum ≤ 5cm	15 (9%)	17 (22%)*
Total	56 (10%)	30 (10%)

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Lap TME: Adoption in the US

- Laparoscopic LAR for rectal cancer ~20% in 2009

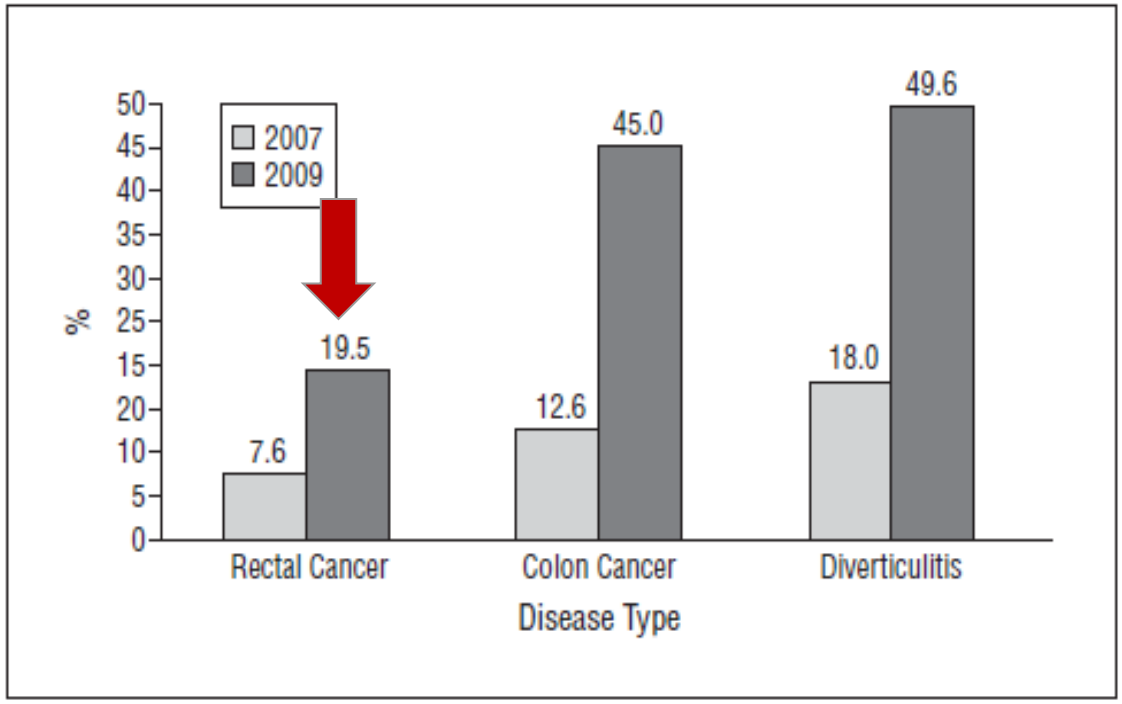


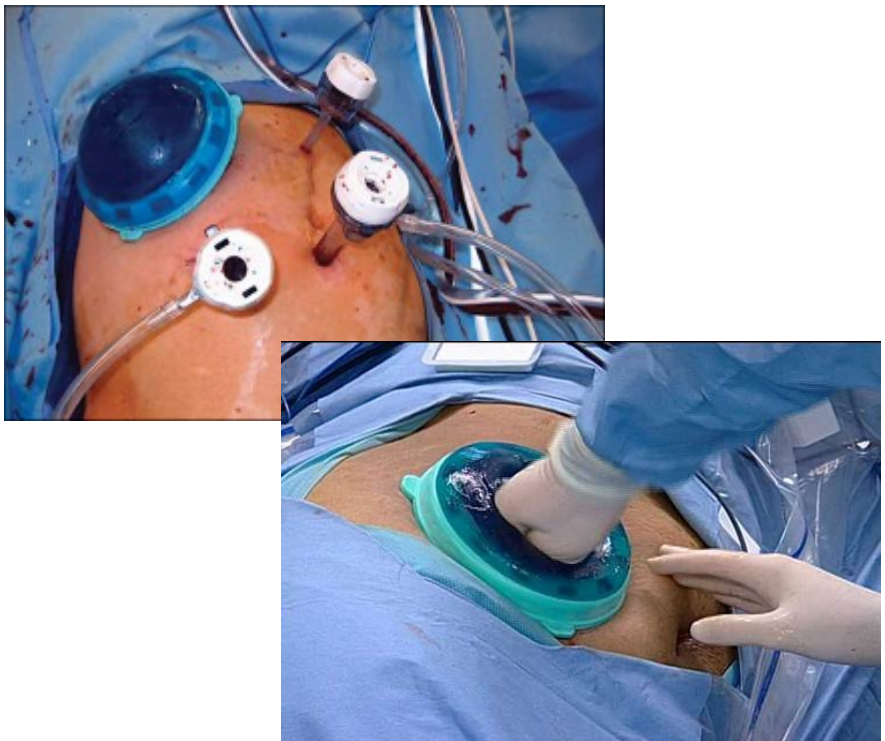
Figure 2. Use of laparoscopy according to disease type in 2007 and 2009.

Kang et al, Arch Surg 2012;24:2022

Hand-Assisted Laparoscopy

PROS

- Shorter operative time (level I)
- Similar short-term outcomes
- Similar oncologic outcomes



CONS

- Larger incision
- Does not reduce conversion rates
- Not increasing adoption of MIS in colorectal surgery
- Surgeons may never master pure laparoscopy

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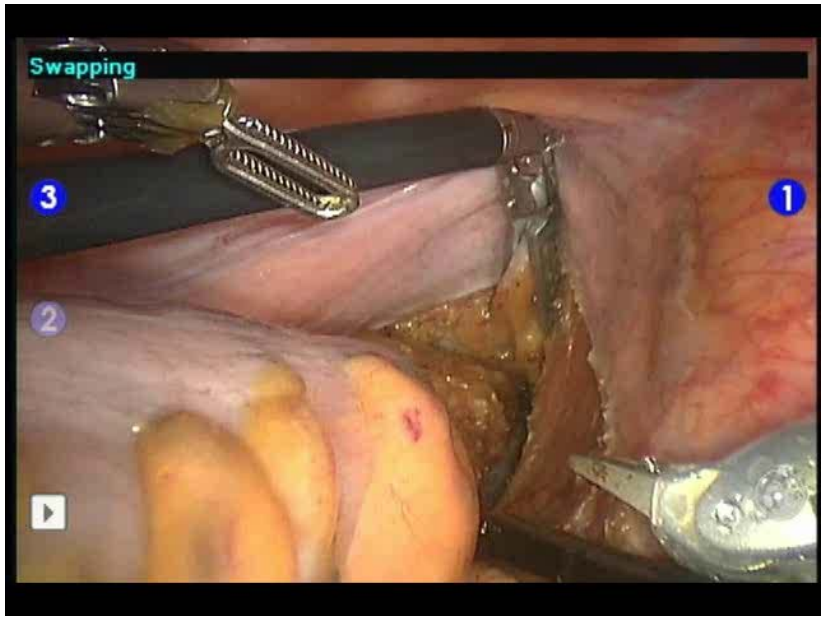
Robotic vs. Laparoscopic TME

- Reduced conversion rates ?
- Increase adoption of MIS for colorectal surgery ?



New Possibilities: Transanal NOTES Colorectal resection

2007

Surg Endosc (2007) 21:1870–1874
DOI 10.1007/s00464-007-9552-x

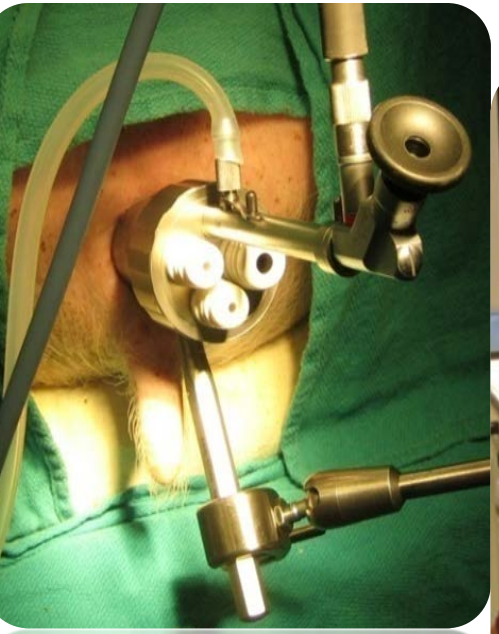
Feasibility of radical sigmoid colectomy performed as natural orifice translumenal endoscopic surgery (NOTES) using transanal endoscopic microsurgery

M. H. Whiteford · P. M. Denk · L. L. Swanström

Received: 1 June 2007 / Accepted: 19 July 2007 / Published online: 21 August 2007

- TEM used to perform sigmoid resection in 3 human cadavers
  - 24cm-long sigmoid + mesentery resected

Combined Transanal/Transgastric NOTES Rectosigmoid Resection

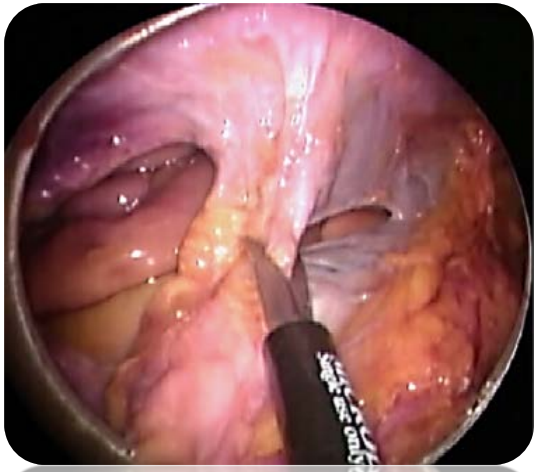


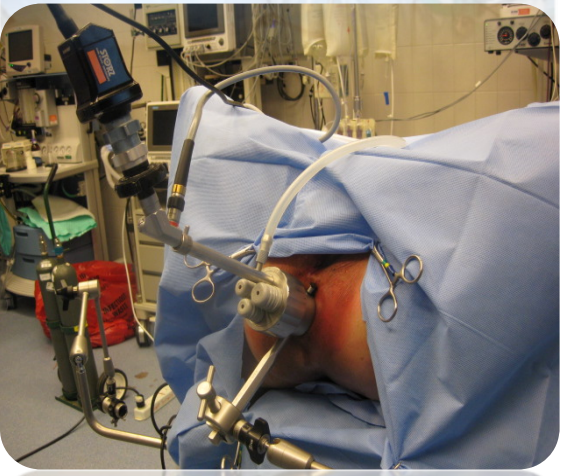
Survival study, N=20 swine

A Teaching Affiliate of Harvard Medical School

Sylla et al, Surg Endosc 2010;24:2022

Human Cadavers Large Series





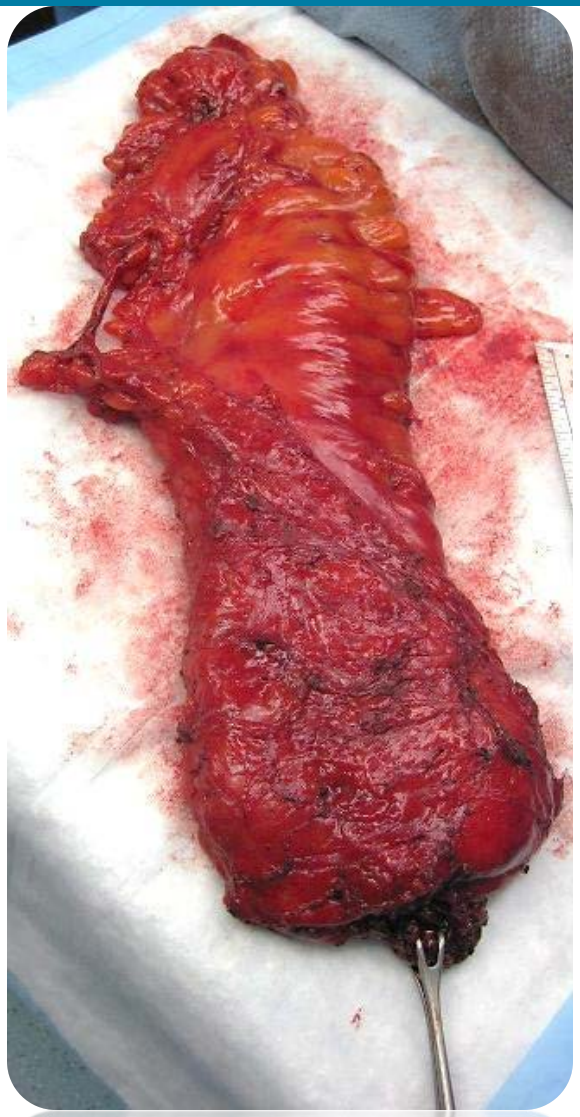
- 32 human cadavers
  - 19 TA only
  - 8 Lap-assisted TA
  - 5 TG + TA
- Specimen exteriorized: 15-91.5cm
- OR time: 3-8 hours
- Intact mesorectum 100%
- 9 bowel perforations
- Complicating factors (pure NOTES)
  - obesity, adhesions,
  - Limited instruments

Telem et al, Surg Endosc 2012;27:74

Can Adequate TME be Achieved ?

Sylla et al, Surg Endosc 2010;24:2022

Telem et al, Surg Endosc 2013;27:74



First case of Hybrid Transanal NOTES TME

November 2009

Surg Endosc
DOI 10.1007/s00464-010-0965-6

NEW TECHNOLOGY

NOTES transanal rectal cancer resection using transanal endoscopic microsurgery and laparoscopic assistance

Patricia Sylla · David W. Rattner · Salvadora Delgado · Antonio M. Lacy

76F with T2N2 rectal cancer
Operative time: 4 ½ hrs
Complete mesorectal excision
Home on POD#5
ypT1N0 (23 negative lymph nodes)

Surg Endosc (2013) 27:3396–3405
DOI 10.1007/s00464-013-2922-7

November 2011

A pilot study of natural orifice transanal endoscopic total mesorectal excision with laparoscopic assistance for rectal cancer

Patricia Sylla · Liliana G. Bordeianou · David Berger · Kyung S. Han · Gregory Y. Lauwers · Dushyant V. Sahani · Mohammed A. Sbeih · Antonio M. Lacy · David W. Rattner

Patient	Epidural	OR time (min)	Trocars	ISR	Pelvic drain	Approach for IMA division	EBL (ml)	LOS (days)	Complications
1F	Y	238	4	N	N	Transanal	300	4	None
2M	Y	270	4	Y	Y	Laparoscopic	250	4	Urinary dysfunction
3M	N	423	5	Y	Y	Transanal	100	10	Ileus
4M	Y	228	4	Y	Y	Transanal	100	4	Urinary dysfunction
5F	Y	214	4	N	N	Transanal	80	4	None

Surg Endosc (2013) 27:3396–3405
DOI 10.1007/s00464-013-2922-7

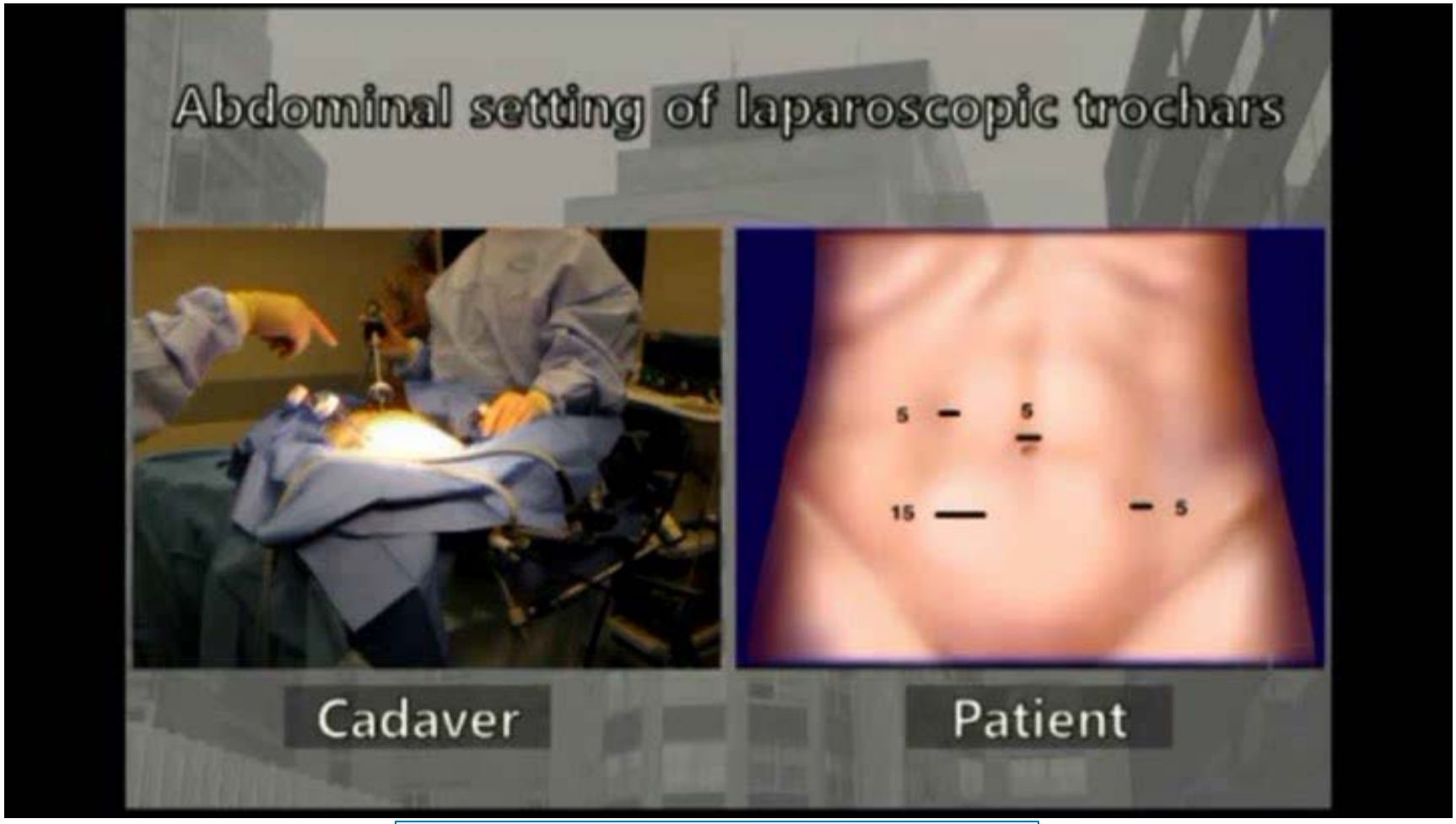
November 2011

A pilot study of natural orifice transanal endoscopic total mesorectal excision with laparoscopic assistance for rectal cancer

Patricia Sylla · Liliana G. Bordeianou · David Berger · Kyung S. Han · Gregory Y. Lauwers · Dushyant V. Sahani · Mohammed A. Sbeih · Antonio M. Lacy · David W. Rattner

Patient	Final tumor stage (TNM)	Retrieved LN	TME quality	Tumor size (cm)	Distal margin (cm)	CRM (cm)	Adjuvant Treatment	Ileostomy closure
1F	ypT2N0M0	41	Complete	1.5	10	0.6	Y, Folfox	Y
2M	ypT2N0M0	16	Complete	5	1.5	1	Y, Capox	Y
3M	pT1N0M0	53	Complete	5.5	2	1.1	N	Y
4M	pT2N1M0	34	Complete	2.7	0.8	0.2	Y	N
5F	pT0N0M0	21	Complete	N/A	N/A	N/A	N	Y

Standardize taTME Training



Video Presentation ASCRS
June 2012

A Teaching Affiliate
of Harvard Medical School

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Hospital

International taTME Experience

July 2016

Europe	USA and South America	Asia	Other
France	Brazil	China	Australia
Netherlands	Chile	South Korea	India
UK	USA	Japan	New Zealand
Spain	Columbia		
Italy			
Belgium			
Germany			
Czech Republic			
Denmark			
Ireland			
Switzerland			
Luxembourg			
Portugal			
Norway			

> 4,500 cases performed worldwide

>1,500 cases entered in LOREC taTME registry

taTME: Publications

July 2012

Report	N	Tumor location	Transanal Platform	CRT	Final TNM stage	LN	OR time	BMI	LOS	Comp	Mesorectum	Margins	Stoma	Coloanal anastomosis
Sylla et al, 2010	1	6 cm, AV	Rigid metal (TEO, Storz)	Y	ypT1N0	23	270 min	20	5 d	None	Complete	Negative	Y	Handsewn
Chen et al, 2010	1	5 cm, AV	Custom-made proctoscope	N	pT3N2	25	290 min	22	NS	None	Complete	Negative	N	Stapled
Tuech et al, 2011	1	3 cm, DL	Single port (Endorec, Apside)	N	ypT1N0	15	300 min	20	NS	NS	Complete	NS	Y	Handsewn
Zorron et al, 2012	2	7 cm, AV	Colonoscope, Single port (Triport, Olympus)	N	pT3N1 (2)	11-12	390-410 min	NS	7 d	Foot paresthesia (1)	Complete	Negative	Y	Stapled
Lacy et al, 2012	3	9-10 cm, AV	Single port (Gelpoint, Applied)	Y (2)	ypT3N0 (2) ypT1N0 (1)	NS	125-155 min	16-25	5-6 d	Dehydration (1)	Complete	Negative	Y (2) N (1)	Stapled

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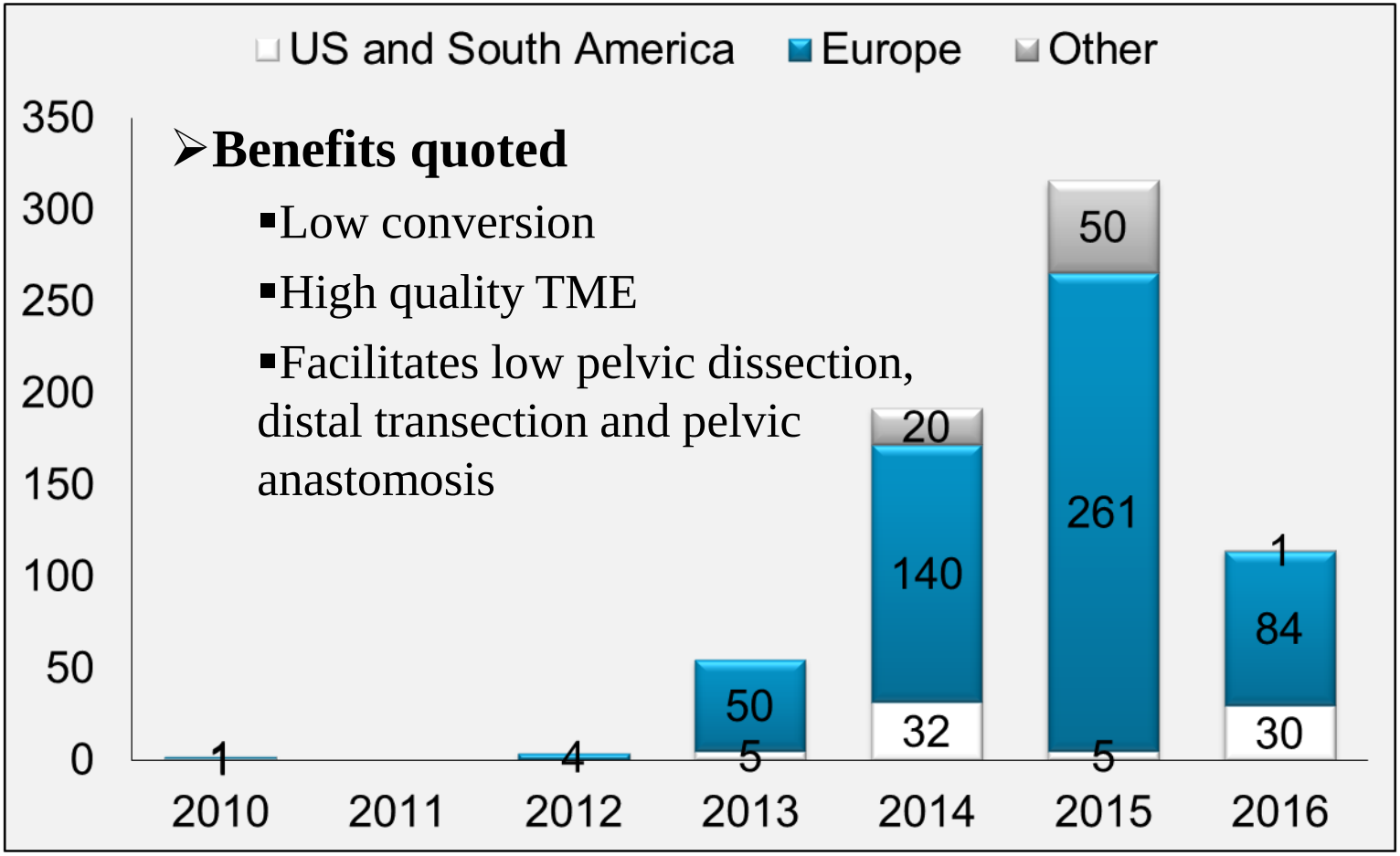
taTME: Publications

October 2016

> 684 cases published
> Only 3 MCT (France, Netherlands, Taiwan)

+ 720 cases from LOREC International Registry



Largest Series taTME For Rectal Cancer (N>15)

Series	N	BMI	Tumor Location	CRT	Final stage
Overall	574 (37 APR)	23.4-27.9	Mid-Low	Y(279)	Mostly T1-3, N1-2, M0

Assist	OR time	Intraop complications	Postop complications	LOS
Hybrid (555) Pure (19)	152-360 min	44 (7%) intraop complications, <5% conversion	0-40% postop complications, major <15%	4.5-14

Urinary retention
Ischemic conduit
Anastomotic leak
Abscess
Stricture
SBO
Renal failure
Readmission

LN	TME quality	Margins	Oncologic outcomes
10-23	Complete (90%), near complete (8.5%), incomplete (1.5%)	0-9%	---

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Transanal Total Mesorectal Excision

International Registry Results of the First 720 Cases

Annals of Surg 2016

Marta Penna, MRCS,¶ *Roel Hompes, MD,** *Steve Arnold, FRCS,*† *Greg Wynn, FRCS,*‡ *Ralph Austin, FRCS,*‡ *Janindra Warusavitarne, PhD,*§ *Brendan Moran, FRCS,*† *George B. Hanna, PhD,*¶ *Neil J. Mortensen, FRCS,** *and Paris P. Tekkis, FRCS*||*, on behalf of the TaTME Registry Collaborative*

Postoperative Clinical Outcomes Factor	TaTME Registry Data Results Total: 720 Cases
Length of hospital stay in days, median (range)	8.00 (2–97)
Postoperative morbidity at 30 days, n (%)	213 (32.6)
Clavien-Dindo classification at 30 days, n (%)	
I or II	142 (21.7)
III	66 (10.1)
IV	5 (0.8)
V	3 (0.5)
Missing	68 (9.4)
Overall Mortality Rate*, n (%)	17 (2.4)
Pelvic sepsis, n (%)	
Anastomotic leak:	
Early	32 (5.4)
Delayed	8 (1.3)
Intraabdominal / pelvic abscess	17 (2.4)
Surgical reinterventions	44 (6.1)
Unplanned hospital readmissions	50 (6.9)

*Overall mortality rate refers to reported deaths occurring at any time point during the study period.

- **Intraop Complications**
  - 20 conversions (2.8%)
  - 5 urethral injuries (0.7%)
  - 2 bladder injuries (0.3%)
  - 1 vaginal perforation (0.1%)

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Transanal Total Mesorectal Excision

International Registry Results of the First 720 Cases

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TABLE 5. Histopathological Data

Total number of cancer cases	634
Pathological T stage, n (%)	
T0	82 (14.1)
T1	70 (12.1)
T2	197 (34.0)
T3	222 (38.3)
T4	9 (1.6)
Pathological N stage, n (%)	
N0	406 (69.2)
N1	122 (20.8)
N2	59 (10.1)
Missing	47 (7.4)
Quality of TME specimen, n (%)	
Intact	503 (85.0)
Minor defects	65 (11.0)
Major defects	24 (4.1)
Rectal perforation	12 (2.0)
Number of lymph nodes harvested	
Mean ± SD	16.5 ± 9.2
Median (range)	15 (0–70)
Positive DRM, n (%)	2 (0.3)
Positive CRM, n (%)	14 (2.4)

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taTME: Functional Results

- Fecal incontinence assessed in 4 taTME series
  - no severe incontinence (*Dumont*, N=4)
  - 40% continent 1 year post-op, **60% incontinent** to gas (35%), liquids (15%), 25% with stool fragmentation (*Rouanet*, N=30)
  - "most patients with mild fecal incontinence" (*Atallah*, N=20)
  - 5% with severe incontinence requiring stoma, 23% with stool fragmentation and difficulties with evacuation (*Tuech*, N=56)
- **Does taTME worsen the LARS ?**

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taTME: Indications and Contraindications

Based on current published experience

- PATHOLOGY
  - Benign (strictures, IBD, fistulas) and cancer
- PROCEDURES
  - Suitable for APR, perineal proctectomy, LAR +/- ISR, IPAA
- STAGE
  - Exclude T4, threatened CRM, sphincter involvement
- BMI ?
  - May be particularly beneficial

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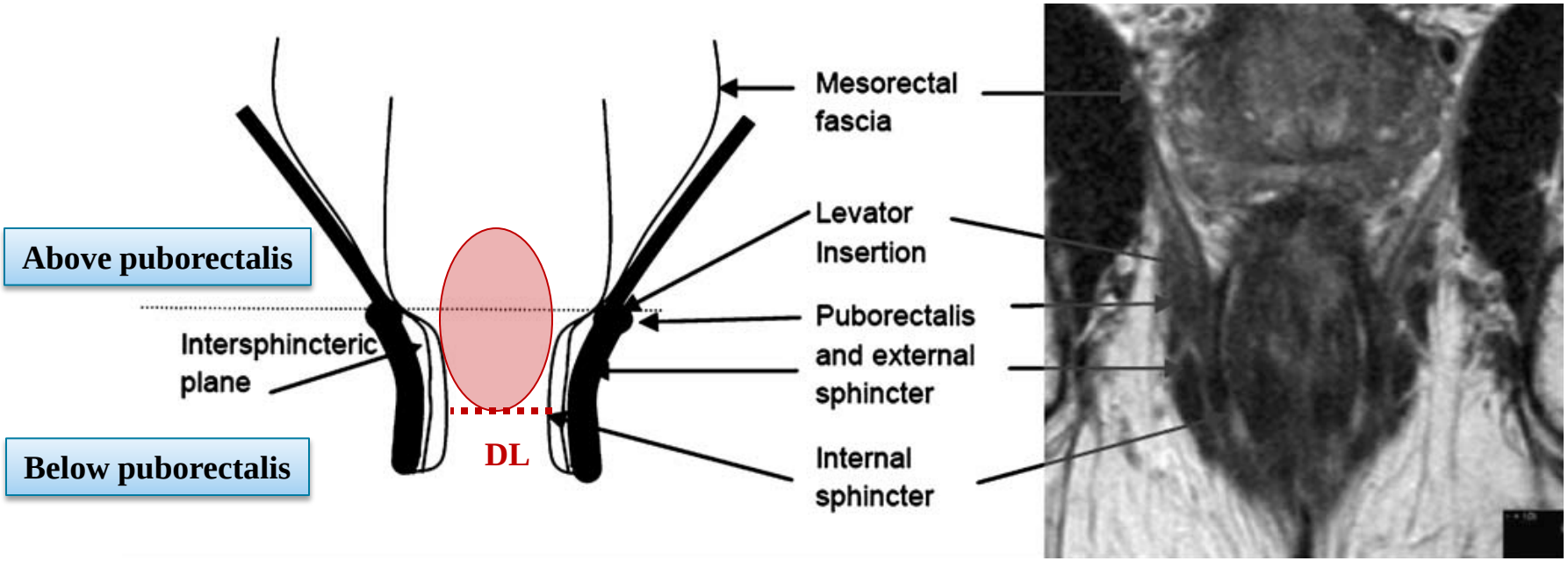
taTME Sweet Spot: Low and Mid-Rectal Cancer

Eur Radiol (2009) 19: 643–650
DOI 10.1007/s00330-008-1184-6

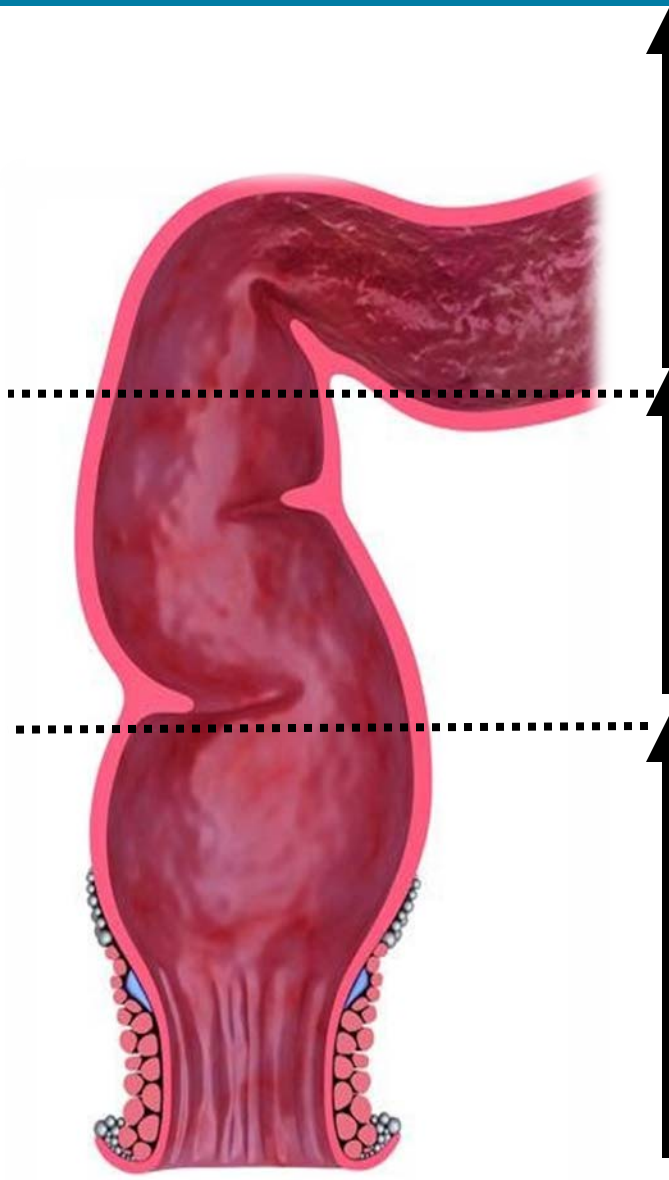
GASTROINTESTINAL

Oliver C. Shihab
Brendan J. Moran
Richard J. Heald
Philip Quirke
Gina Brown

MRI staging of low rectal cancer



Consensus: taTME Sweet Spot



10-15cm

5-10cm

0-5cm

Upper rectum

Laparoscopic TME
Robotic TME

Mid-rectum

Laparoscopic TME
Robotic TME
taTME for obese patient

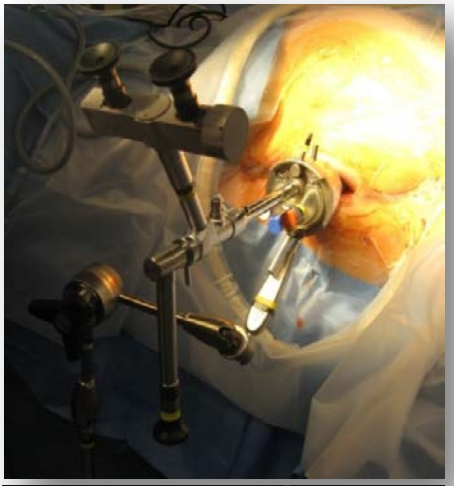
Low rectum

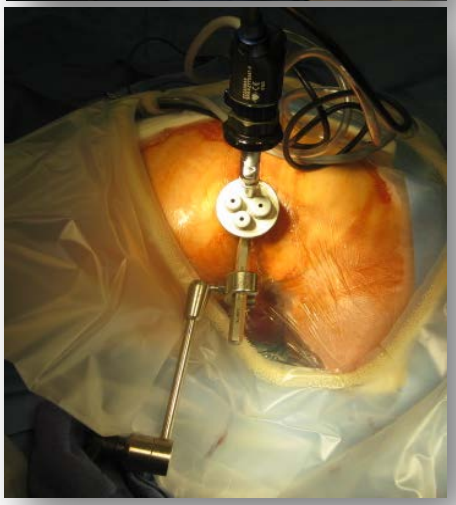
taTME

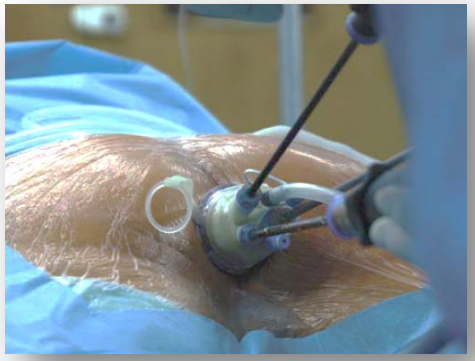
Intersphincteric resection
+ taTME

taTME Equipment

TEM/TEO (one transanal surgeon) → **TAMIS (2 transanal operators)**







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taTME Equipment

Transanal tools | Instruments | Smoke Evacuation

taTME Approach and Operative Sequence

1 Team
Abdominal>Transanal>
+/- Combined

OR TIME

2-Team
Combined Abdominal and Transanal

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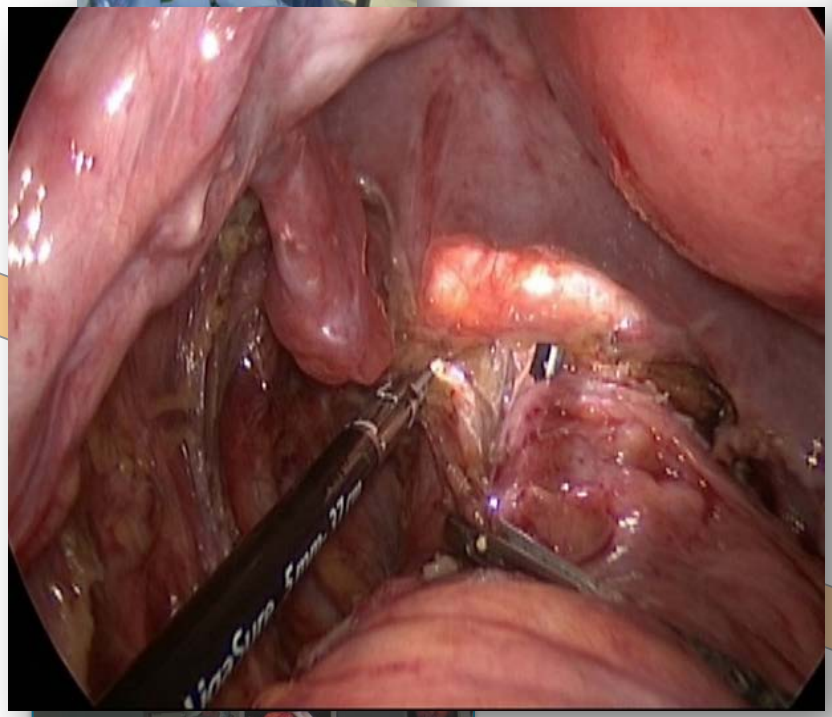
taTME Approach and Operative Sequence

1 Team
Abdominal>Transanal>
+/- Combined



2-Team
Combined Abdominal
and Transanal

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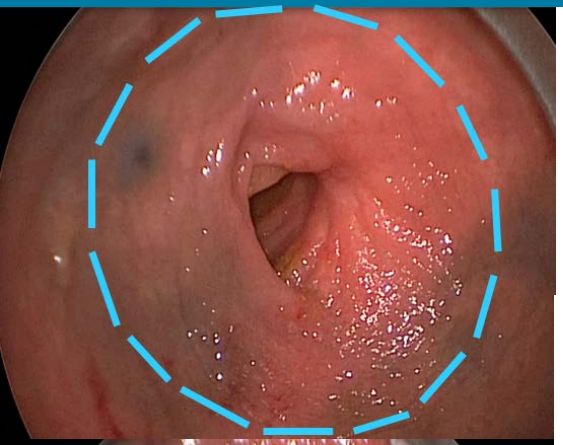
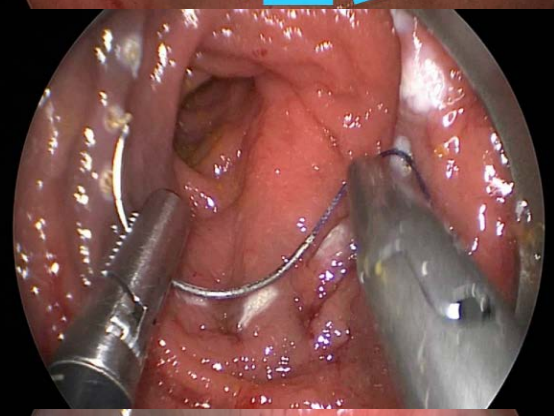
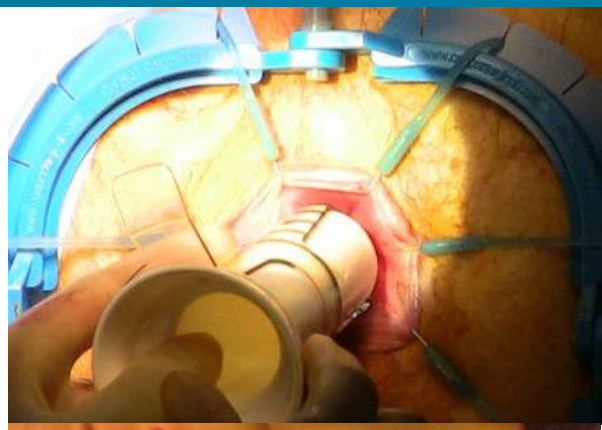
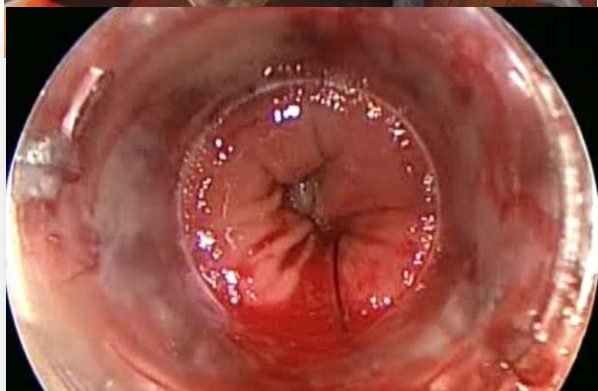
taTME for Mid-Rectal Tumors





Tumor >2 cm above the anorectal ring



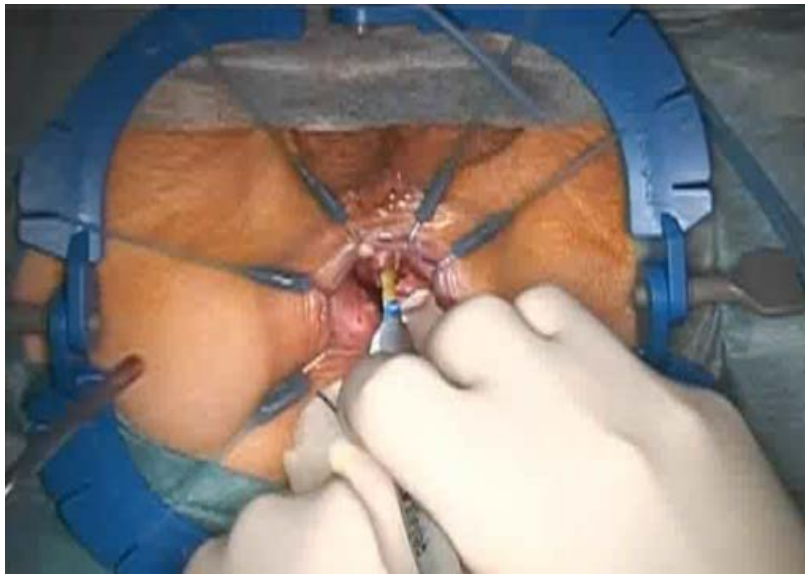


Minimize risk of Excessive Length of Rectum resected

Tumors > 2cm from anorectal ring

Courtesy of Roel Hompes, MD

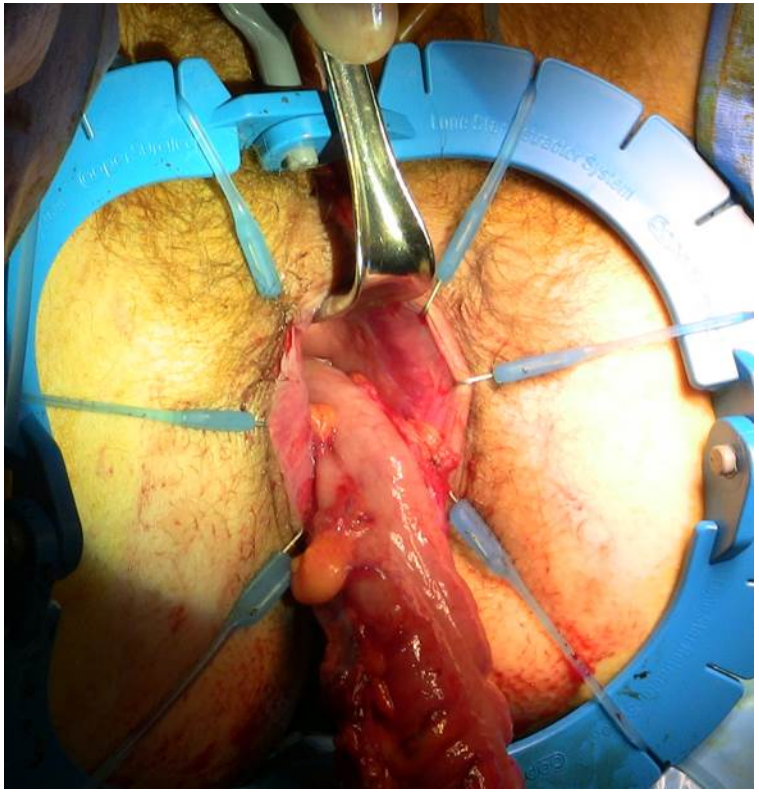
taTME for Low Rectal Tumors



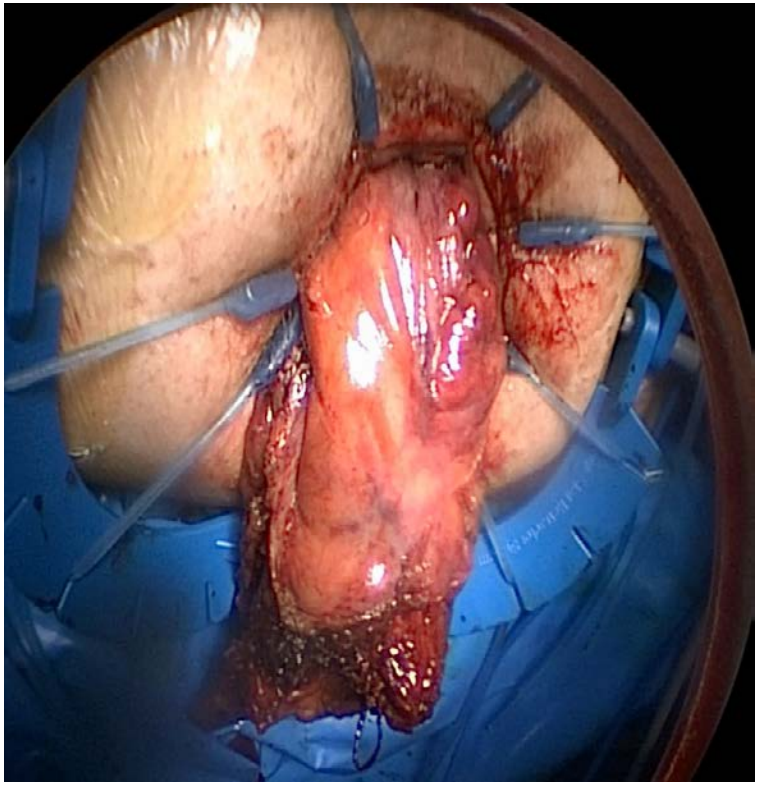
Tumors < 2cm from DL

Specimen Extraction

Amenable inlet and specimen > Transanal Extraction



Bulky specimen and narrow inlet > Abdominal Extraction



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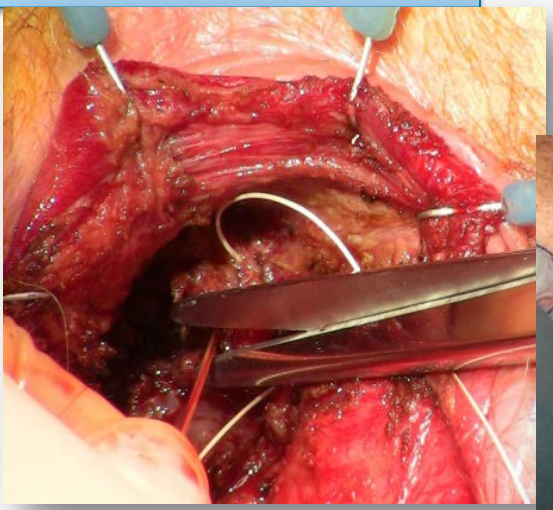
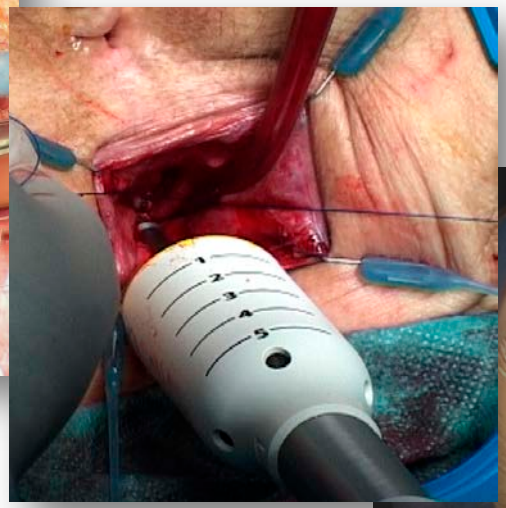
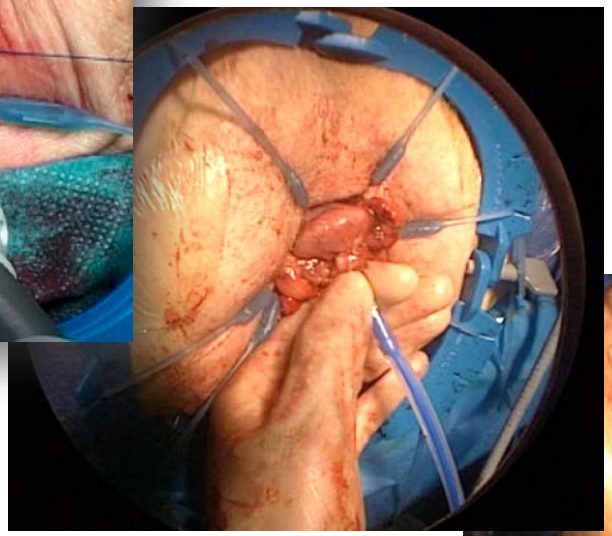
Low Colorectal and Coloanal Anastomosis

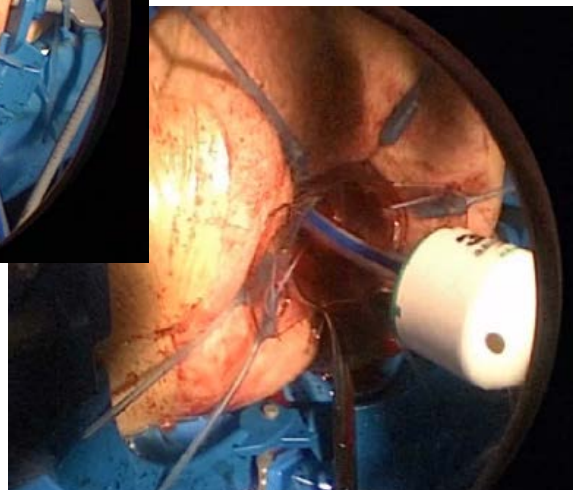
Low Rectal Tumors

Mid/Upper Rectal Tumors









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Standardize taTME Training

First US taTME (TEM) cadaver lab, Chicago, **September 2013**

First US taTME (TAMIS) cadaver lab, San Diego, **November 2014**

- Prerequisite: Expertise in MIS TME and experience in TES
- Emphasis: Team training
- End-point: TME quality

taTME Cadaver Workshops

UK

Pre-course

Survey of experience

completed via emailed

Day 1

AM – Didactic lectures, videos and interactive discussion

PM – Pursestring practice on simulated bench top model

TaTME on cadaver model 1

Day 2

AM – TaTME on cadaver model 2

PM – Lectures on service set up and taTME registry

Feedback and closing remarks

2015

USA

Evening session

Procedural videos and interactive presentations

1st course (Group A)

Pre-lab survey of experience

TaTME on cadaver model

Post-lab survey

Debrief session with feedback

Post-course survey

2nd course (Group B)

AM - Pre-lab survey of experience

TaTME on cadaver model 1

PM - Post-lab survey

TaTME on cadaver model 2

Debrief session with feedback

Post-course survey

Penna, Whiteford, Hompes, Sylla, Colorectal Dis 2016

TME Specimen Grading

Complete

Near-Complete

Incomplete

MOUNT SINAI SCHOOL OF MEDICINE

THE OREGON CLINIC

Penna, Whiteford, Hompes, Sylla, Colorectal Diseases, 2016

Structured taTME Training Pathway

Pre-requisites
- Expertise in MIS TME
- Experience in TES
- Experience in ISR

Self-learning
- Online taTME learning modules
- taTME online videos
- Published literature

Workshop
- Interactive presentations, videos and lectures
- Simulated and dry purse-string model practice
- taTME cadaveric model
  - At least 1 male cadaver
  - Team training mimicking clinical scenario
  - Debrief with feedback and review of TME specimen quality

Proctorship
- Proctorship for initial taTME cases
- Further feedback from proctor
- Data entry into taTME Registry

Independent practice
- Continue data collection into registry
- Audit of outcomes

iLappSurgery Foundation

taTME App
Joep Knol

Oxford Colorectal
THE OREGON CLINIC
MSSM MOUNT SINAI SCHOOL OF MEDICINE

Penna, Whiteford, Hompes, Sylla, Colorectal Diseases, 2016

Initial Experience with taTME Training Labs

	Pre-course taTME experience	Post-course taTME experience	Indication	taTME platform
Team A1	Cadaver (1), taTME (4 benign, 8 cancers)	30 (2 comp proctectomy, 2 ELAPE, 26 LAR)	Cancer (28) Benign (2)	Applied (24) Glove port (6)
Team A2	0	4 LAR	Cancer (4)	Wolf (1) Applied (3)
Team A3	22 (benign, cancer)	12 LAR	Cancer (12)	Applied (12)
Team A4	0	2 LAR	Cancer (2)	Applied (2)
Team A5	0	0	N/A	N/A
Team B1	0	10 LAR	Cancer (10)	Wolf (2) Applied (8)
Team B2	0	8 LAR	Cancer (3), benign (5)	Wolf (8)
Team B3	Cadavers (6), taTME (2 benign)	4 comp proctectomy	Benign (4)	Storz (3) Applied (1)
Team B4	taTME (3 benign)	12 (6 LAR, 6 comp proctectomy)	Benign (12)	Wolf (3) Applied (9)
Team B5	0	3	Cancer (3)	Wolf (3)

- 9/10 teams > 85 taTME
- 2 teams > only benign
- 2 teams > 2nd training lab
- 2 teams > want proctoring

Initial Experience with taTME Training Labs

	Post-course taTME experience	Operative setup	Intraoperative difficulties and complications
Team A1	30 (2 comp proctectomy, 2 ELAPE, 26 LAR)	2 surgeons, sim (13/30) 2 surgeons, seq (17/30)	33% (1 blg, 1 id correct plane, 8 CO2 leak, incorrect plane post, 1 TME completed abdominally)
Team A2	4 LAR	2 surgeons, seq (4/4)	25% (incorrect plane ant/lat) **1 posterior urethral injury**
Team A3	12 LAR	1 surgeon (12/12)	Major in ~10% (difficulty id correct plane, incorrect plane post, CO2 leak)
Team A4	2 LAR	1 surgeon (2/2)	100% (difficulty id correct plane, incorrect plane lat/post, smoke, CO2 leak, TME abdominally)
Team A5	0	N/A	N/A
Team B1	10 LAR	2 surgeons, seq (10/10)	30% (2 CO2 leak, 1 id correct plane)
Team B2	8 LAR	2 surgeons, sim (1/8) 1 surgeon (7/8)	12.5% (1 TME completed abdominally)
Team B3	4 comp proctectomy	2 surgeons, sim (1/4) 1 surgeon (3/4)	50% (2 incorrect plane ant/lat)
Team B4	12 (6 LAR, 6 comp proctectomy)	2 surgeons, seq (10/12) 1 surgeon (2/12)	50% (difficulty id correct p incorrect plane post, smo
Team B5	3	2 surgeons, seq (1/3) 1 surgeon (2/3)	33% (1 difficulty id correc plane)

Published Urologic Injuries during taTME

- **First report by Rouanet (DCR 2013)**
  - 2/30 low rectal ca (6.7%), TEO
  - high risk (anterior, bulky)
  - early along learning curve

- **Kang et al (Surg Endosc 2015)**
  - 1/20 (5%), TAMIS (Gelpoint Path)

- **Atallah and Albert (Colorectal Dis 2015)**
  - 1/50 (2%), occurred after >20 cases
  - 1/50 ureteral injury (2%) during abdominal dissection

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Urologic Injuries during taTME vs Abdominal TME

Transanal Total Mesorectal Excision

International Registry Results of the First 720 Cases

Marta Penna, MRCS,¶ Roel Hompes, MD,* Steve Arnold, FRCS,† Greg Wynn, FRCS,‡ Ralph Austin, FRCS,‡ Janindra Warusavitarne, PhD,§ Brendan Moran, FRCS,† George B. Hanna, PhD,¶ Neil J. Mortensen, FRCS,* and Paris P. Tekkis, FRCS||, on behalf of the TaTME Registry Collaborative*

Annals of Surg 2016

taTME (Lorec)

- 5 urethral injuries (0.7%)
- 2 bladder injuries (0.3%)

Traditional TME

- Injury to bladder <2%
- Urethral injury 0% in LAR, < 0.5% in APR
- Ureteral injury 1-2%

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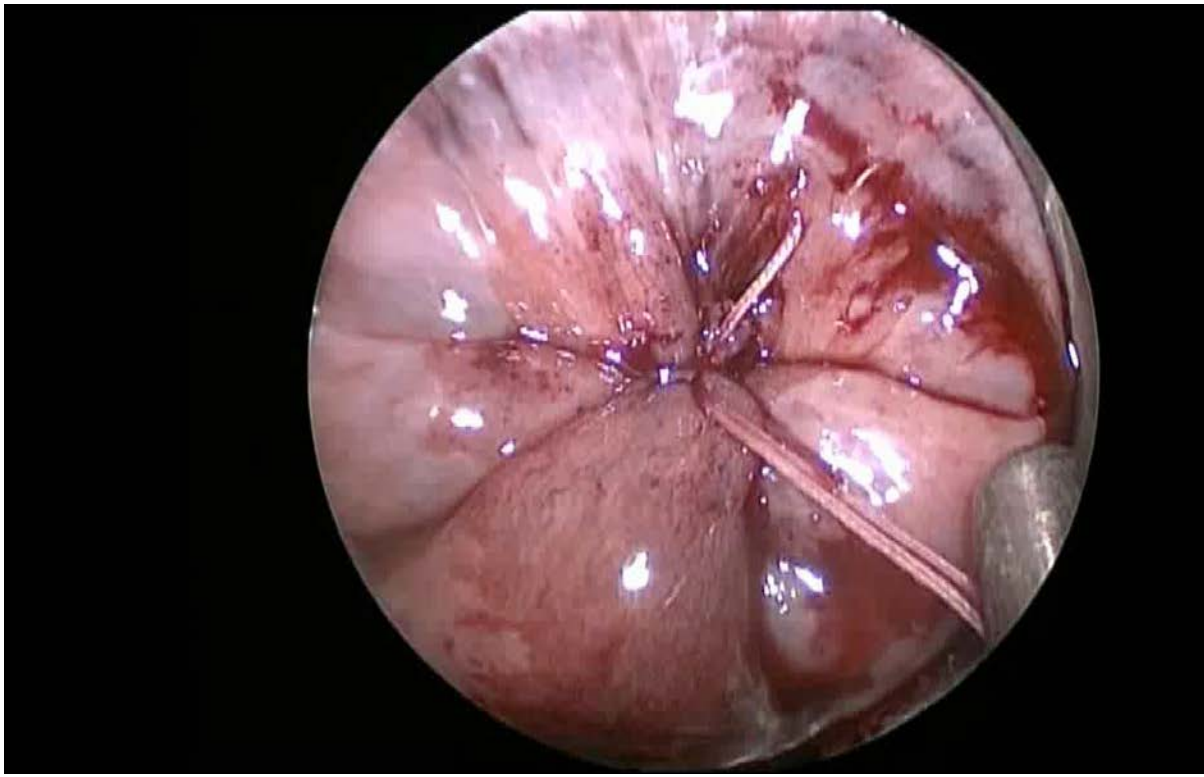
Risk Factors for Urethral Injury

Anatomic Factors
- T4 tumors
- Post-XRT fibrosis
- Prior prostatectomy

Technical Factors
- Learning curve
- Prior training
- Technical errors



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Ongoing taTME International Registries

Home | Patient Entry & Update | Hospital Administrator

4 10/04/1966

Click [X] to return to Patient Selection page. Clicking [X] does NOT automatically save the curre
If changes are made, ALWAYS click the Save Changes button on each screen before moving to

Patient | Preop | Operation | Images | Postop | Pathology/Outcome | Perineal Wound Healing | Re-admissions/Late Morbidity

Date of death:
Indication Cancer
WHO performance: Fully active
ASA grade: Some illness, normal activity

Pre-op

Height from AV: 4 cms from ARJ: 1 cms
CRM extent: 1 quadrant
Metastatic disease: None
MRI staging: T2 N0
CRM: Clear from ARJ: 2 cms
Neo-adjuvant: none
Response TRG:
Previous surgery: None
Previous treatments: none

Operation

Operation: 26/03/2012 Ultralow AR
Simultaneous abdominal/perineal? Yes
Abdominal (mins): Perineal (mins):
Extraction site: Transanally Distance from AV: 2 cms
Configuration: Handsewn: E-E

Reinterventions: 0

Pathology & Outcome

Specimen quality: Mesorectal plane (intact)
Perforation height:
Comments:
Discharged: 29/03/2012
Stoma closure: closed 10/12/2012

LOREC Registry
US OSTRiCh Registry

taTME Clinical Trials

INSTITUT NATIONAL DU CANCER

GRECCAR 11

Goupe de REcherche Chirurgicale sur le CAncer du Rectum

COLOR III

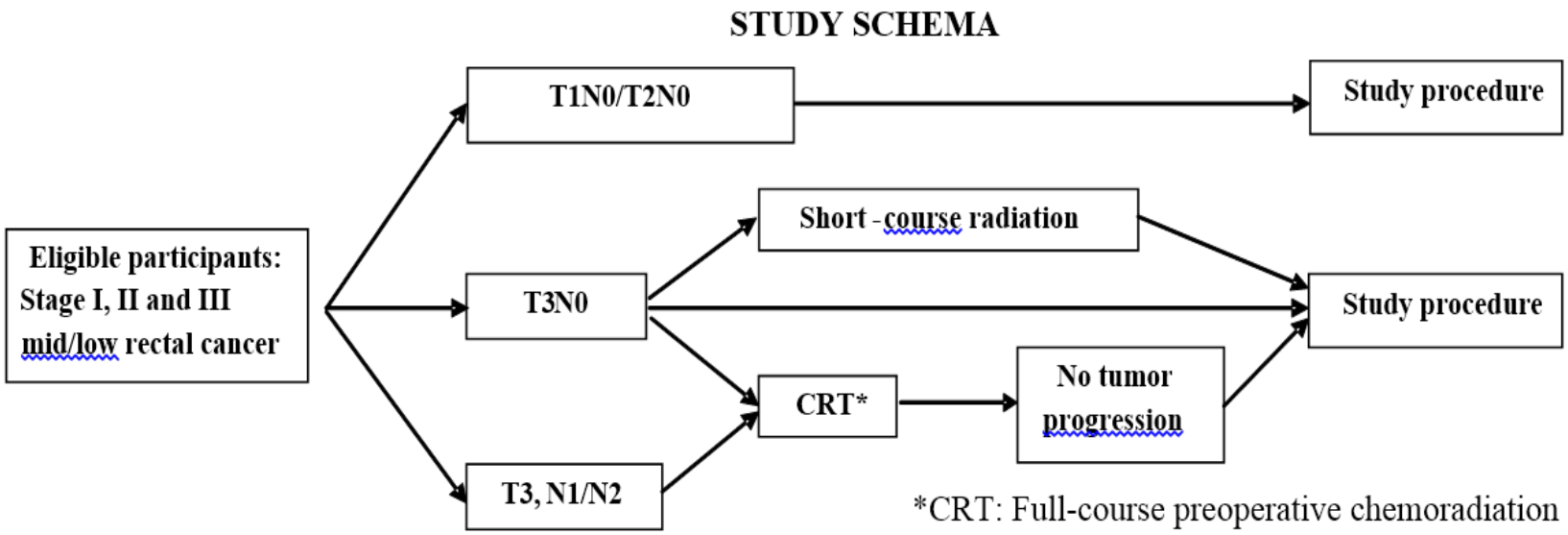
COLon cancer
Laparoscopic or Open Resection

Multi-center, open-label, randomized, 2-arm, phase-III, clinical trials

taTME versus laparoscopic TME for rectal cancer

taTME: US Initiative

- **Phase II MCT**
  - -> 100 pts across 10 US centers of expertise in lap/robotic TME and TEM/TAMIS, min 5 taTME cases
    - primary outcome: Quality of TME (complete and near complete TME)
    - secondary outcomes: Pathology, perioperative outcomes, short and long-term oncologic outcomes, functional results

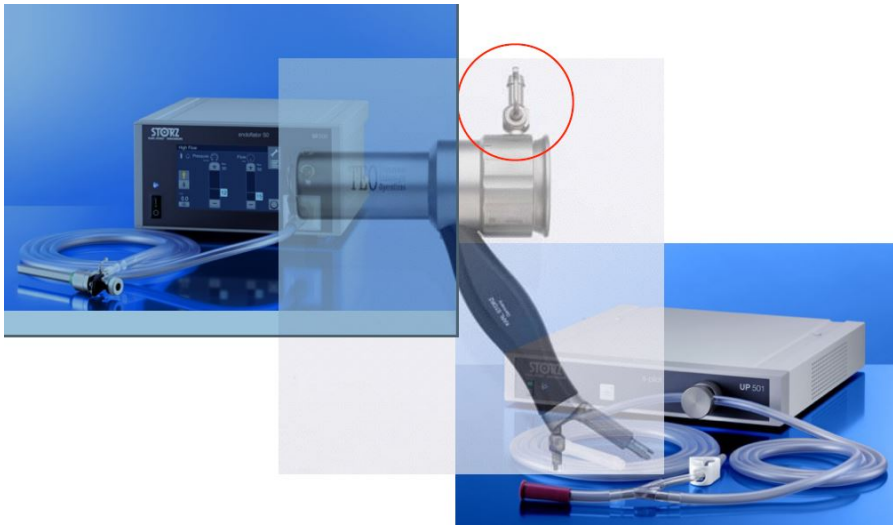


Future directions of Transanal NOTES

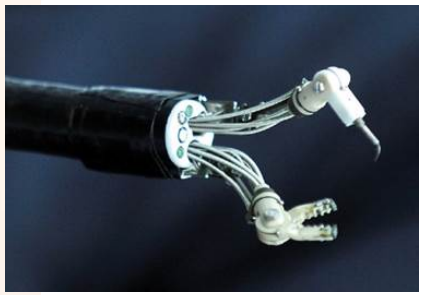
Laparoscopic instruments

Costs of Disposables

High-flow Insufflation/Smoke evacuation



Robotic Endoluminal platforms



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HOUSTON, TX
MARCH 22-25, 2017

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Program Co-Chair: Melina Vassiliou, MD

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