



The experience of robot system in the surgical management of lower rectal cancer



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Laparoscopy penetration in Korea

• Laparoscopy rates for three leading procedures steadily increased for 6 years.



심사평7



Installation of robotic surgical system in Korea



- 2016 System Installs in Korea
 - 59 systems in 46 hospitals as of July 2016









Minimal invasive procedures for Colorectal Cancer surgery at YUHS





Total number: 15309 (2009 ~ 2016.6)

Robotic Surgery, Department of Surgery (2005 ~ 2016.6)









Advantage vs. Disadvantage of Robotic Surgery



Ergonomic position Elimination of physiologic tremors Dexterity ↑ Seven degree of freedom Stable camera Stereoscopic view

Less haptic feedback than laparoscopy

Unproven benefit

High cost

High start-up cost





Robotic Surgery - Autonomic Nerve Preservation-





Deep pelvic floor dissection









Anterior pelvic Dissection 🛞





Nerve preservation of Robotic surgery









How Robotic instruments be usefully implemented in Rectal cancer surgery ?

- Very low lying rectal cancer
 - Ultralow anterior resection and ISR, CAA
 - <u>Beyond TME</u>
 - Extralevator APR
 - <u>Hemilevator excision in patients with</u> <u>ipsilateral involvement of levator ani muscle.</u>
 - Pelvic lymph node dissection

- Any kind of Deep pelvic dissection



Lateral Pelvic LNs Metastasis







Lateral PLND







Robotic ISR



Robotic versus laparoscopic coloanal anastomosis with or without intersphincteric resection for rectal cancer

Se Jin Baek · Sami AL-Asari · Duck Hyoun Jeong · Hyuk Hur · Byung Soh Min · Seung Hyuk Baik · Nam Kyu Kim

 Table 2 Operative data

	Laparoscopy (<i>n</i> = 37) <i>n</i> (%)	Robot (<i>n</i> = 47) <i>n</i> (%)	p Value	
Type of rectal division			1.000	
Above dentate line ^a	33 (89.2)	41 (87.2)		
ISR	4 (10.8)	6 (12.8)		
Type of anastomosis			0.748	
Straight	33 (89.2)	40 (85.1)		
Colonic J pouch	4 (10.8)	7 (14.9)		
Type of coloanal anastomotic method			0.279	
Hand-sewn	32 (86.5)	36 (76.6)		
Stapled	5 (13.5)	11 (23.4)		
Conversion to open surgery	6 (16.2)	1 (2.1)	0.020	
Protective stoma	36 (97.3)	40 (85.1)	0.073	1
Operation time (min) ^b	360.7 ± 88.2	352.7 ± 130.3	0.737	
EBL (ml) ^b	302.7 ± 305.3	190.9 ± 284.7	0.087	





^a Transabdominally or transanally

^b Values are means ± standard deviations

Hospital stay (Robot 9 days vs laparoscopy 11 days, p=0.011) Open conversion rate (Robot 2.1% vs laparoscopy 16.2%, p=0.02) No difference in 3yr OS, 3yr DFS





Hemi-levator excision to provide greater sphincter preservation in low rectal cancer

Sami F. AlAsari • Daero Lim • Nam Kyu Kim

Int J Colorectal Dis (2013) 28:1727-1728

Unilateral tumors located at the level of the levator ani, anorectal ring level ISR – Hemi levator excision - APR





Operative finding







Hemilevator ani excision





1885 Chejungwon



ORIGINAL ARTICLE pISSN 2288-6575 • eISSN 2288-6796 https://doi.org/10.4174/astr.2017.93.4.1 Annals of Surgical Treatment and Research



Novel anal sphincter saving procedure with partial excision of levator-ani muscle in rectal cancer invading ipsilateral pelvic floor

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Table 1. Patient characteristics

	Characteristic	Value
	Age (yr)	53.0 (41.5-65.0)
	Sex	
	Male	9
	Female	4
	Body mass index (kg/m²)	24.0 (21.0-27.5)
	ASA PS classification	
	I	1
	II	9
Fig 2 Set	III	2
excision	Tumor location from the anal verge (cm)	3.0 (2.0-4.0)
extent of re	Preoperative stage	
excision in	Tumor infiltration	
the invade	cT3	7
(B) Corona	cT4	6
resection for	Lymph node metastasis	
through th	cN0	3
and sleeve	cN1	8
tum resect	cN2	2
for homilo	Distant metastasis	
levator-an	cM0	13
anal sphi	cM1	0
after sacrui	Surgical method	
	Laparoscopic surgery	1
Annals of Su	Robotic surgery	12
	Excised side of levator-ani muscle	
	Right	4
	Left	9
	Duration of operation (min)	321.0 (295.5–486.5)
	Intraoperative blood loss (mL)	100 (75 0_325 0)

was achieved, especially the CRM, which was the primary intention of HLE. The definite median distance from the tumor to the proximal, distal, and circumferential margin was 20.0, 1.0,

Table 2. Pathologic results

Variable	Value
Tumor regression grade (Mandard et	al. [14])
1 ^{a)}	2
2	4
3	4
4	3
Pathologic stage (ypTNM)	
yp0	2
ypl	6
ypll	2
ypIII	3
Tumor size ^{b)} (cm)	1.2 (0.5-2.5)
Positive resection margin	0
Distance of resection margin ^{b)} (cm)	
Proximal margin	20.0 (15.0-22.0
Distal margin	1.0 (0.5-2.0)
Circumferential margin	0.4 (0.3-1.1)
Lymphovascular invasion	0
Histologic subtype	
Well differentiated	1
Moderately differentiated	8
Poorly differentiated type	3
Mucinous type	1

^{a)}Mandard grade I means complete pathologic response (pCR). Values are presented as median (interquartile range) or number. ^{b)}Data for pCR were excluded because of the absence of residual ASA PS, American Society of Anesthesiologists physical status. tumor.





The International Journal of Medical Robotics and Computer Assisted Surgery

Robotic interface for transabdominal division of the levators and pelvic floor reconstruction in abdominoperineal resection : a case report and technical description

- NK Kim et al., Int J Med Robotics Comput Assist Surg (2014)

Robotic EAPR TME : Cylindrical specimen

Robotic EAPR with transabdominal division of levators



Transabdominal division of levator ani muscle









Robotic Surgery
- Rectovaginal septum division -







Robotic Surgery - Deep Pelvic Floor Dissection-







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ROLARR Trial Design



Primary Endpoint

- Technical
 - Intra-op conversion to open surgery

Key Secondary Endpoints

- Oncological
 - CRM positivity rates
 - 3 year local recurrence rates

Other Secondary Endpoints

- Safety (30 day & 6 months)
- Functional (I-PSS[©], IIEF & FSFI[©])
- QoL (SF-36v2[™], MFI[®]-20)
- 3 year DFS & OS
- Health economics
- Quality of the plane of surgery



Primary endpoint – conversion to open surgery



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Overall conversion rate: 10.1%

	La p (n=2 30)	Roboti c (n=23 6)	Tot al (n=46 6)	Difference in rates (95% CI)
Conversion	28 (12.2%)	19 (8.1%)	47 (10.1%)	4.1% (-1.4%, 9.6%)
Odds Ratio (95% CI)	0.61 (0.31, 1.21), p = 0.158		
Robotic vs. Lap				

A priori defined subgroup analyses

	Lap	Robotic	Total	Odds Ratio (95% CI)
Conversion				
Males: Yes	25/156 (16.0%)	14/161 (8.7%)	39/317 (12.3%)	0.46 (0.21, 0.99)
Low AR: Yes	22/165 (13.3%)	11/152 (7.2%)	33/317 (10.4%)	0.49 (0.21, 1.12)
Obese: Yes	15/54 (27.8%)	10/53 (18.9%)	25/107 (23.4%)	0.58 (0.21, 1.60)







Totally Robotic Rectal Surgery - Single Docking Technique -





Colonic Palaise phase

Personal Experience of Robotic TME for Recta		Variable		Total (n=462)		
Cancer (2008.	Cancer (2008.03 ~ 2017.08.31 N=462)		Location	Low (<6cm)	155 (33.5%)	
Variable		Total (n=462)		Middle (6-10cm)	213 (46.1%)	
Sex	Male	296 (64.1%)		High (≥ 10cm)	81 (17.5%)	
	Female	166 (35.9%)		rectosigmoid	13 (2.8%)	
Age	Median (Range)	56 (19-88)	Histology	WD	62 (13.4%)	
BMI	Mean (kg/m²)	23.36 ± 3.19		MD	334 (72.3%)	
Operation	AR	9 (1.9%)		PD, Mucinous	24 (5.2%)	
	LAR	295 (63.9%)		no residual (s/p CCRT)	37 (8.0%)	
	uLAR with CAA	104 (22.5%)		Others*	5 (1.1%)	
	ISR	27 (5.8%)	PRM	Mean (cm)	13.55 ± 4.91	
	APR	27 (5.8%)	DRM	Mean (cm)	262 + 218	
lleostomy	Yes	212 (53.3%)	CDM		0.75 + 0.62	
	No	186 (46.7%)	CRIVI	Mean (mm)	8.75 ± 8.03	
Stage	0	54 (13.6%)	Margin (+)	CRM / DRM (9/1)	4 (0.87%)	
	I	135 (33.9%)	Operation time	Mean (min)	365.65 ± 94.92	
	II	75 (18.8%)	Complication	Anastomosis Leak	25 (5.4%)	
	Ш	97 (31.4%)		Bleeding	3 (0.6%)	
	IV	9 (2.3%)		Obstruction & Ileus	17 (3.7%)	
Preop CRT	Yes	204 (44.2%)		Voiding difficulty	6 (1.3%)	
	No	258 (55.8%)		Perirectal abscess	2 (0.4%)	
Total LN	Mean	15.33 ± 8.32	Conversion	Laparoscope (1) Open (4)	5 (1.1%)	
Tumor Size	Mean (cm)	2.73 ± 1.71	* Melanoma 1, GIST 2, Carvenous Hemangioma 1, Neuroendocrine tumor 1			



Conclusion



Should robotic surgery for rectal cancer accepted as the new standard treatment in rectal cancer surgery ?

- Decreases **conversions** (benefit likely more west) in more complicated case.
- May improve **urinary and sexual function.**
- May shortened learning curve
- Easy pelvic dissection under better vision in deepartment for pelvis challenging rectal cancer patients
- Seems to be able to overcome some disadvantages of laparosco pic surgery in deep pelvis and it proved as safe.
- Comparable Long term oncologic outcomes
- High cost

In future, robot can be good treatment options for surgical treatment for challenging rectal cancer patients.





Thank you for your kind attention







<u>RO</u>botic versus <u>LA</u>paroscopic <u>R</u>esection for <u>R</u>ectal Cancer

Trial Results

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Hemi Levator excision



SEVERANCE

[Pathologic Diagnosis]

Status post concurrent chemoradiation therapy with no residual cancer (Mandard grade 1) and residual mucinosis

 \diamond Resection margins, proximal and distal: Free from tumor \diamond Lymph nodes, regional (0/12): Reactive hyperplasia



Robotic Surgery
- Hemilevator Excision-



