

# Colorectale robot-geassisteerde chirurgie

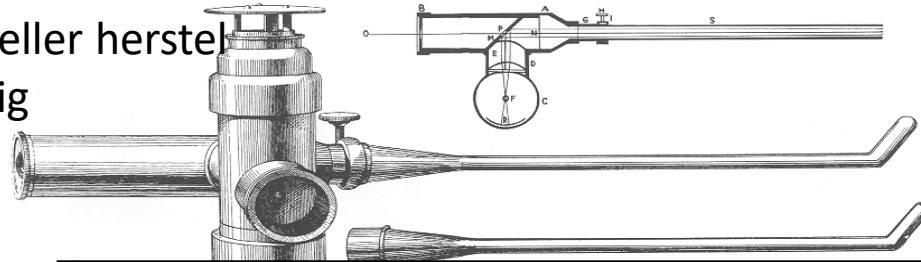
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UMC Groningen, Meander Medisch Centrum,  
MIRECA

# Disclosures




- R.T.J. Geitenbeek: -

# Minimaal invasieve chirurgie

- L-TME vs. Open TME
  - Postoperatief sneller herstellen
  - Oncologisch veilig



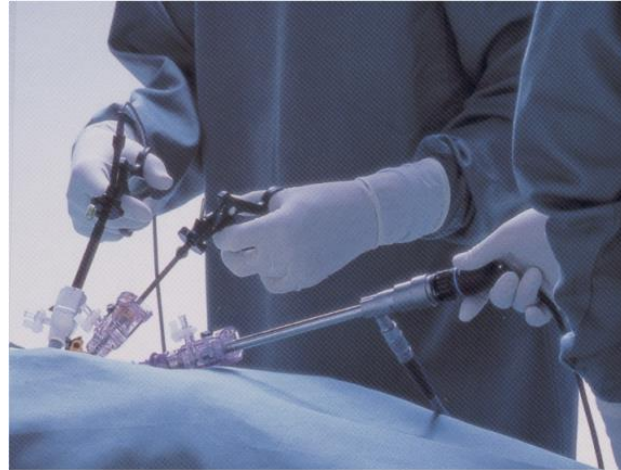
## Oncological outcomes of laparoscopic versus open rectal cancer resections: meta-analysis of randomized clinical trials

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- Technisch uitdagend
  - Anatomie bekken
  - 2D visie
  - Cameraman

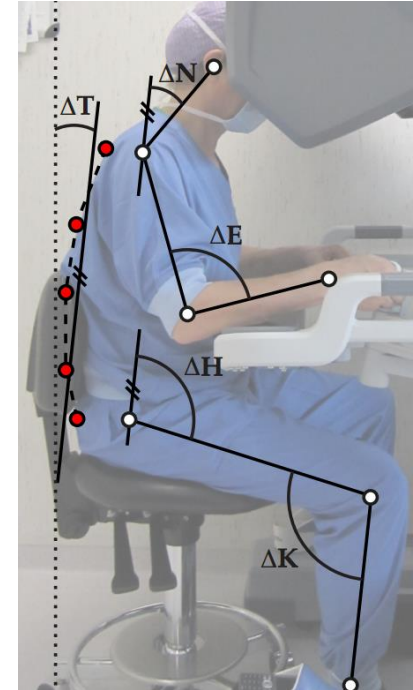
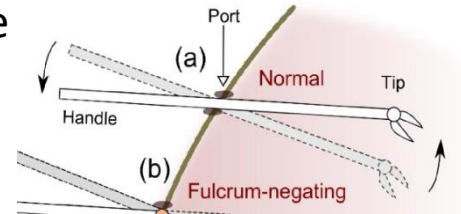




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1006247 RA

- 3D visie
- Endowrist
- Intuitive motion
- Fulcrum effect
- Toekomst: telerobotics, fluorescentie, targeted tracers
- Tremor filter
- Ergonomie (87%)
- Dual console



- Nieuw: veilig, kosten?
- Rectumcarcinoom

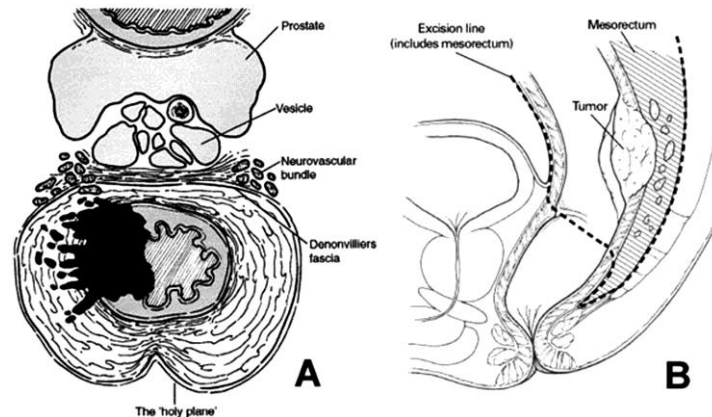
- Doel rectumchirurgie:
  - Complete TME (82)
  - Vrije DRM & CRM

**Radicaliteit**

- Minimale morbiditeit
- Functionele uitkomsten
- Sfincter preservatie

**QoL**

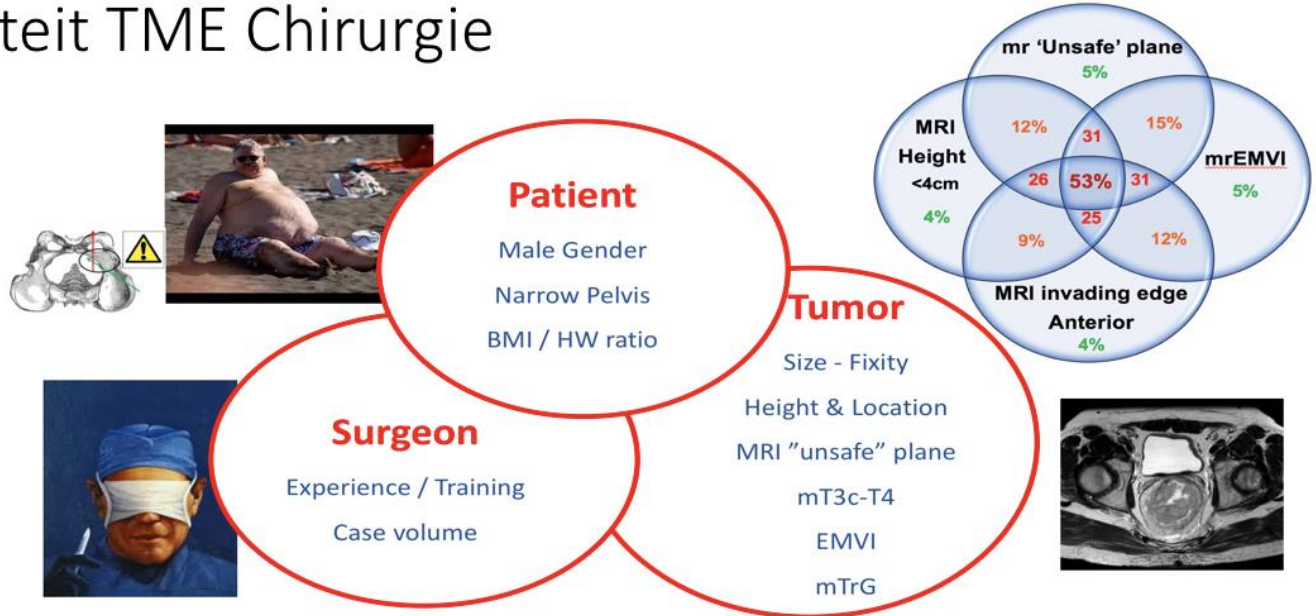
- CRM+ ongunstige oncologische uitkomsten
  - DFS, LR
  - Quality = key



pCRM+: presence of tumor/ malignant lymph node  $\leq 1$  mm from CRM



## Kwaliteit TME Chirurgie



Cecil, Colorectal Disease 2006; 8 (s3): 30-2. Mercery-II Study, Annals of Surgery, 2016  
 Al-Sukhni, Predictors of CRM involvement, review of 23,464 cases. Int J Surg, 2016



# Stap 1: veilig?

- Robot-geassisteerde benadering
  - ROLARR: oncologisch veilig
  - Effect learning curve

L-TME



'90s

R-TME



'00s

## Surgical approach for rectal cancer: A network meta-analysis comparing open, laparoscopic, robotic and transanal TME approaches

Odhrán K. Ryan <sup>a,\*</sup>, Éanna J. Ryan <sup>b</sup>, Ben Creavin <sup>b</sup>, Emanuele Rausa <sup>c</sup>, Michael E. Kelly <sup>b</sup>, Fausto Petrelli <sup>c</sup>, Gianluca Bonitta <sup>c</sup>, Rory Kennelly <sup>b</sup>, Ann Hanly <sup>b</sup>, Seán T. Martin <sup>b</sup>, Des C. Winter <sup>a,b</sup>

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- Problemen leercurve
  - Bias RCT's
  - Effect postoperatieve uitkomsten
- Systematic review
  - L-TME: 50
  - R-TME: 32-75

Corrigan et al. *Trials* (2018) 19:339  
<https://doi.org/10.1186/s13063-018-2726-0>

Trials

RESEARCH

Open Access



Exploring and adjusting for potential learning effects in ROLARR: a randomised controlled trial comparing robotic-assisted vs. standard laparoscopic surgery for rectal cancer resection

Neil Corrigan<sup>1\*</sup>, Helen Marshall<sup>1</sup>, Julie Croft<sup>1</sup>, Joanne Copeland<sup>1</sup>, David Jayne<sup>2</sup> and Julia Brown<sup>1</sup>

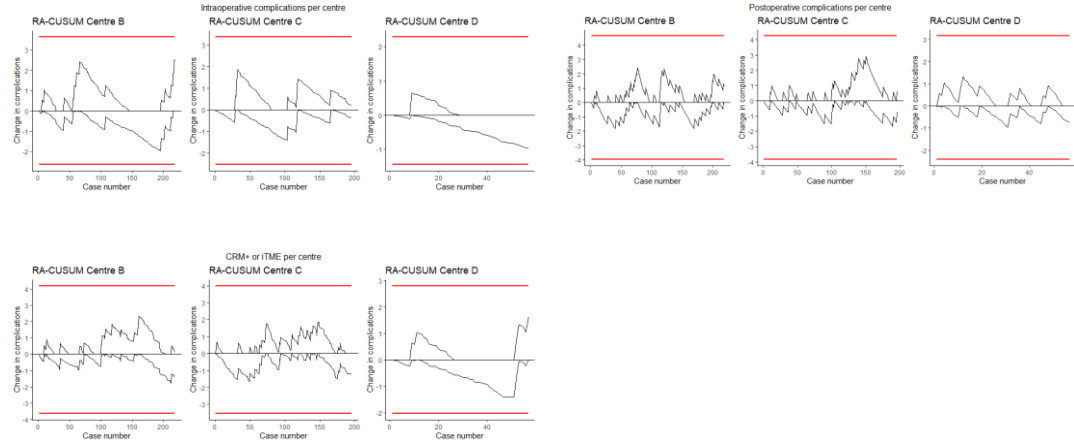
Review > [Surg Endosc.](#) 2022 Sep;36(9):6337-6360. doi: 10.1007/s00464-022-09087-z.

Epub 2022 Jun 13.

## The learning curve of laparoscopic, robot-assisted and transanal total mesorectal excisions: a systematic review

Thijs A Burghgraef<sup>1 2</sup>, Daan J Sikkenk<sup>3</sup>, Paul M Verheijen<sup>3</sup>, Mostafa El Mounni<sup>4</sup>, Roel Hompes<sup>5</sup>, Esther C J Consten<sup>3 4</sup>

- R-TME: korte termijn
  - Intraop complicaties =
  - Postop complicaties =
  - CRM/iTME =
  - ↑ operatietijd (case 0-35)
- R-TME: lange termijn
  - LR c1-10 3/70 (4.3%)
  - LR c11-40 10/189 (5.3%)
  - LR c>40 12/272 (4.4%)



### Retrospectief cohort, 8 ervaren centra (5 L-TME, 3 R-TME)

- Korte termijn

- Gelijkwaardige perop uitkomsten
- Meer primaire anastomoses (40.8% vs 60.8%)

- Lange termijn

- Gelijkwaardige oncologie (6.1% vs 6.4%)
- Minder permanente stoma's (66.2% vs 47.0%)

- Prospectief: Vantage trial
- Lange termijn

- UMCG: 48 NL centra
  - Perioperatieve/oncol uitkomsten
  - QoL/Kosten



**Retrospectief cohort**, 8 ervaren centra (5 L-TME, 3 R-TME)

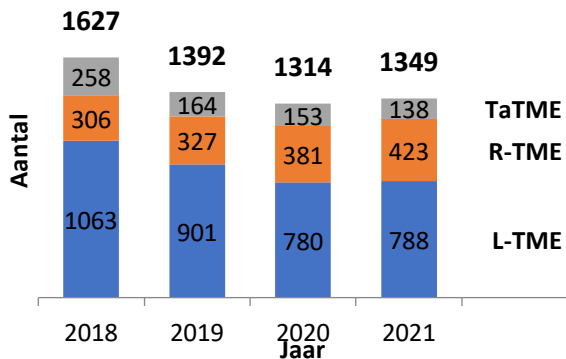
- Korte termijn kosten

- Gelijkwaardige perop uitkomsten
- L-TME €10.556, R-TME €12.918

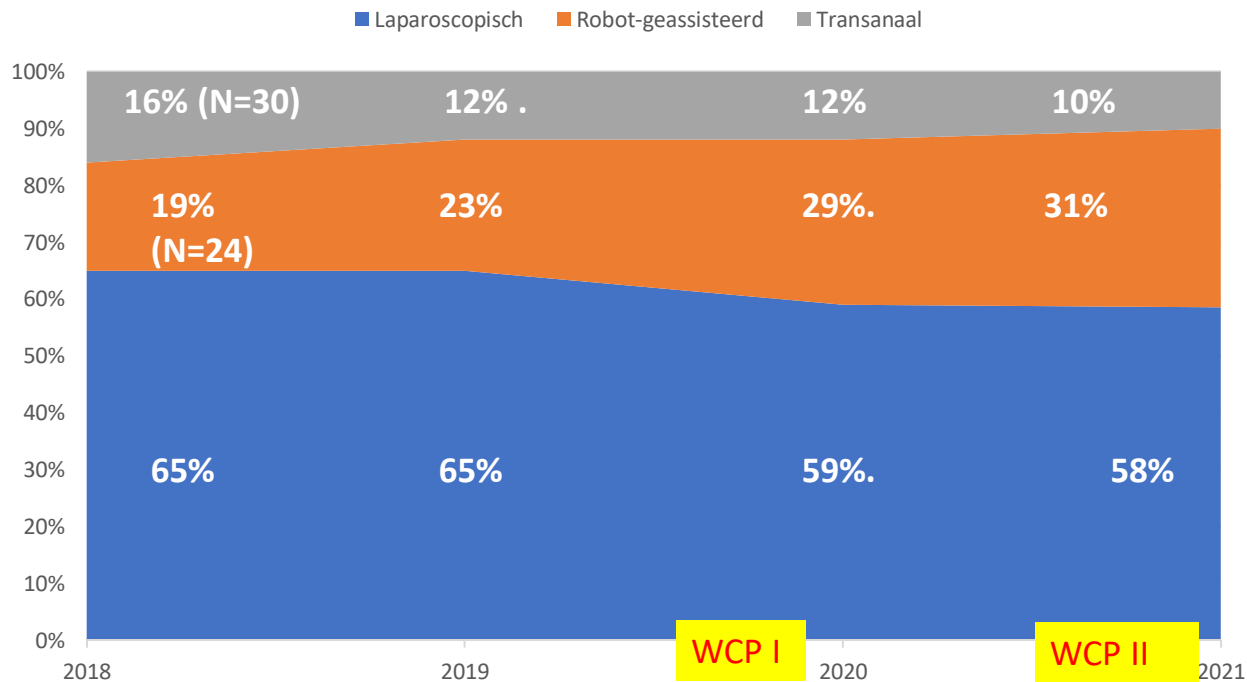
- Lange termijn kosten

- Minder permanente stoma's (66.2% vs 47.0%)
- >€3.500 kostenbesparing per/jr zonder stoma

## Technieken 2018-2021



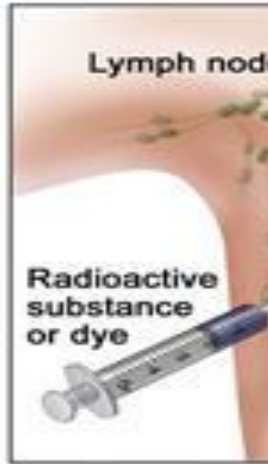
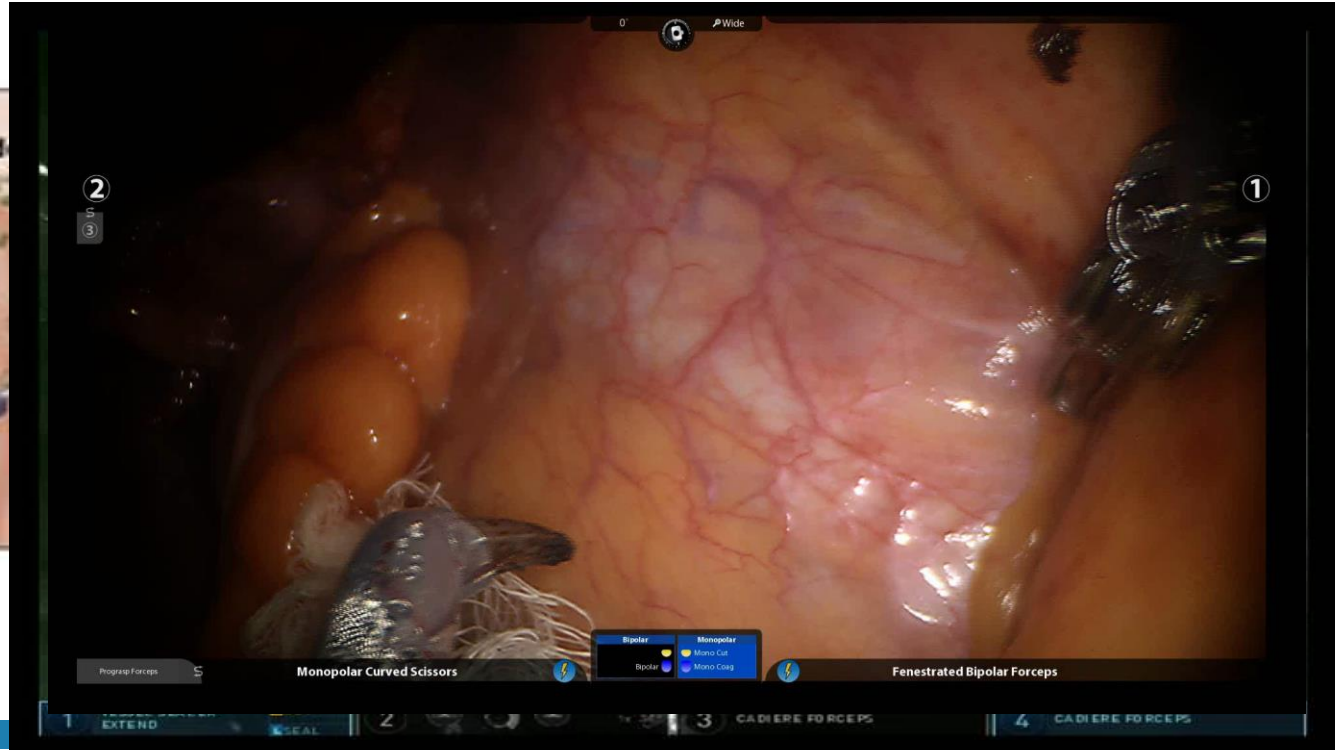
## Overzicht technieken 2018-2021



- Autonome robot
- Grenzen MIS
- High-tech research:
  - Diagnostiek
  - Kunstmatige intelligentie (AI)
  - Training/benchmarking



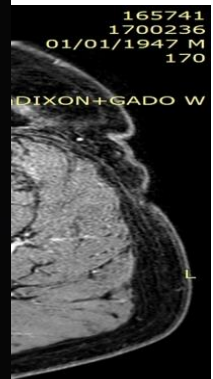
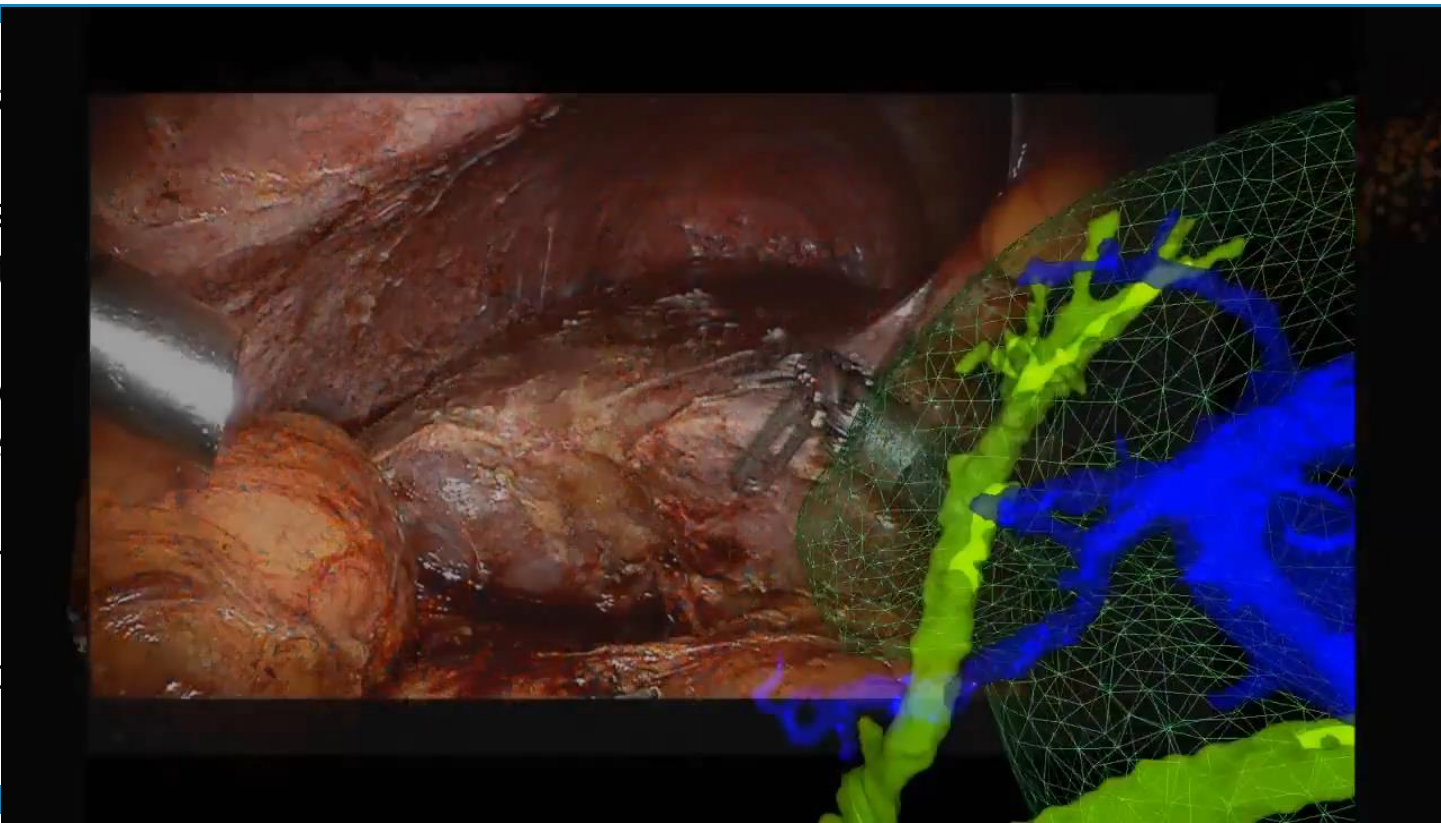




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# Image fusion: Augmented Reality - Hepatic Surgery

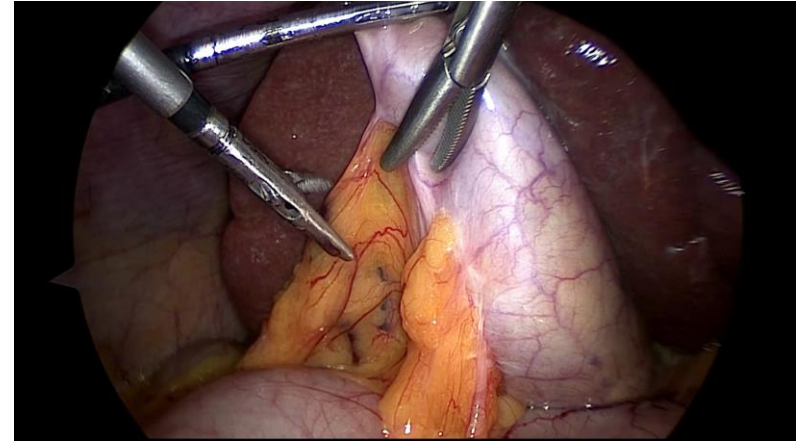
- Preoper
- Critical s  
morbidi
- Tumour,  
improve
- Augr
- Digit



T: 1.0mm L: -73.8mm\*

FS: 1.5  
TR: 10.6 TE: 0.0  
29/11/2018 10:03:10

- Fase detectie → performance assessment
- Automatische video analyse → feedback
- Benchmarks: operatieduur, complicaties
- (Inter)nationale vergelijking chirurgen





ROBOTICS



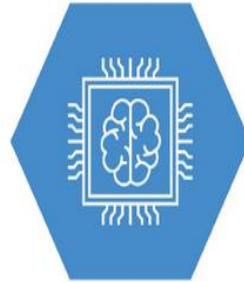
ADVANCED  
INSTRUMENTATION



ENHANCED  
VISUALIZATION



CONNECTIVITY



DATA ANALYTICS &  
MACHINE LEARNING



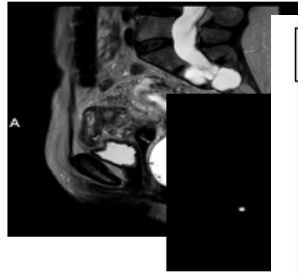


- Minimaal invasieve chirurgie
- Nieuwe techniek introductie
- Veilig en duur(zaam)
- Meer anastomoses/minder stoma's
- Towards digital surgery

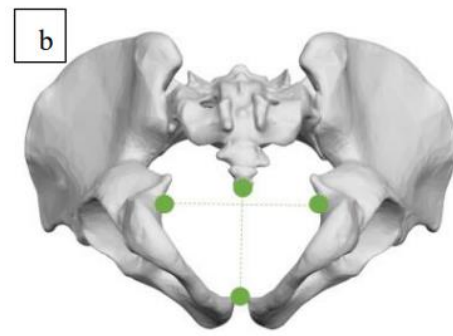
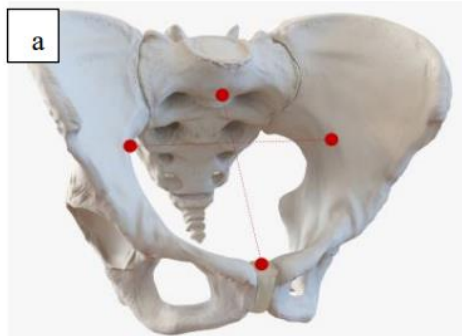


Between linear and 3D pelvimetry:  
 Automatische bepaling bekkenhoofd  
 Deep learning network: 8-point cuboid: pelvic volume estimate

- 3D I
- I
- Reti



Step 1: Da



mance  
on

Step 4: Calculate distance between the two points

Figure 1 a) 4 upper points of the pelvic volume, sacral promontory, top of pubic symphysis, and on that plane two lateral points with the biggest distance on the pelvic brim. b) inferior view of the pelvis, with the 4 lower points of the pelvic volume estimation, end of coccyx, bottom of pubic symphysis and on that plane two lateral points with the biggest distance on the pelvic bone.

117 173 11]

cm

[247 118 11]