Innovations in Rectal Cancer Surgery

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Evolution in Surgery

Open surgery

Laparoscopic surgery

Robotic surgery

disruptive

incremental

SSL

NOSE

TAMIS

recent evidence

TAMIS

NOTES

time

invasiveness

EMR

Endoscopic polypectomy

Endoscopic biopsy

Diagnostic endoscopy
Development of **laparoscopic surgery**

major disruptive change

first CCD-camera
Minimally Invasive surgery in evolution

Hand-assisted + Pfannenstiehl Total Laparoscopic
COLOR II trial  (non-inferiority phase III) 2004-2010

1044 patients randomised (2:1)
   699 in laparoscopic surgery group
   345 in open surgery group

Locoregional recurrence rate at 3 years : 5.0% in both groups

DFS: 74.8% (laparoscopic) and 70.8% (open)

OS : 86.7% (laparoscopic) and 83.6% (open)

Disease free survival

Overall survival
becoming more proficient: CRM positivity (%)
Conversion to laparotomy remains substantial.
Understanding the shortcomings of laparoscopic TME

- Difficult exposure deepest part pelvic dissection
- Troublesome distal rectal transection
- Uncontrolled distal margin

persistent high conversion to laparotomy

Intracorporeal rectal stapling following laparoscopic total mesorectal excision: overcoming a challenge.
Factors affecting suitability for lap TME

- BMI
- Pelvic anatomy
- Previous surgery
- Co-morbidity

- Experience
- Quality
- Assurance

- T size, fixity, level
- Anastomotic level

= patient related

*Colorectal Disease* 2006; 8 (s3): 30-2
Full laparoscopic dissection and transanal specimen extraction (TATA)

……a laparoscopic transanal abdominal transanal radical proctosigmoidectomy and a descending coloanal handsewn anastomosis (TATA).
Transanal Endoscopic Microsurgery (TEM)

A new transanal platform
Endoluminal TAMIS
From TATA to notes, how taTME fits into the evolutionary surgical tree


Transanal TME (taTME)
Transanal natural orifice transluminal endoscopic surgery (NOTES) rectal resection: “down-to-up” total mesorectal excision (TME)—short-term outcomes in the first 20 cases
Hybrid, laparoscopic procedure

S3

R hypogastric nerve
New technologies
Expanding the applicability of the platform
Transanal endoscopic proctectomy
innovative procedure for difficult resection of rectal tumors
in men with narrow pelvis (n=30, jan 2009- june 2011)

Laparoscopic assisted (splenic flexure)

Main causes for TAEP
- narrow pelvis 23
- fatty mesorectum 14
- large anterior tumor 22

Morbidity
urethral Injuries (n=2, 7%)
reoperation (n=2, 7%)

Hospitalization 14d (19-25)

Rouanet Ph et al. *Dis Colon and Rectum* 2013
The bulbar urethra ‘at risk’
Understanding the operative force vectors

Operative vectors, anatomic distortion, fluid dynamics and the inherent effects of pneumatic insufflation encountered during transanal total mesorectal excision

Atalah S et al. Techn Coloproctology 2017
TA-TME Learning Curve - CUSUM
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 Warusavitane, PhD,§ Brendan Moran, FRCS,† George B. Hanna, PhD,¶ Neil J. Mortensen, FRCS,* and Paris P. Tekkis, FRCS||, on behalf of the TaTME Registry Collaborative


5 urethral injuries
2 bladder injuries
1 vaginal perforation
1 hypogastric nerve resection
2 macroscopic rectal tube perforations
The image contains a table and text regarding intra-operative adverse events. The table lists various issues and their occurrences during the perineal phase of a surgical procedure. Here is the data from the table:

- Technical problems: 283 (39.3%)
- Incorrect dissection plane: 56 (7.8%)
- Pelvic Bleeding: 50 (6.9%)
- Visceral Injury: 11 (1.5%)

The text also mentions a total of 1836 cases with an improvement in the insufflation system in 80% and 27% proctored. The table highlights specific injuries:

- 5 urethral injuries
  - 2 bladder injuries
  - 1 vaginal perforation
  - 1 hypogastric nerve resection
  - 2 macroscopic rectal tube perforations

- 14 Urethral injuries
  - 2 bladder injuries
  - 5 vaginal perforations
  - 11 rectal tube perforations

The overall percentage of adverse events is 0.6% and 0.9%.
Incidence Anastomotic Failure
taTME Registry – International database

1594 patients

Overall anastomotic failure rate = 15.7% (and probably underreported)

- early leak rate 7.8%
- delayed leak 2.0%

Independent risk factors
- male sex
- tumor bulk
- obesity
- smoking
- diabetes mellitus
- intraoperative blood loss
- manual anastomosis
- prolonged perineal operative time
Risk for a definitive stoma

Risk factors:
- age > 65 yrs
- preoperative radiotherapy
- anastomotic morbidity and abscess

Celerier B. et al. *Colorectal Dis* 2015; 18
Type 2 - tumour 1–2 cm from dentate margin.

1–1.5 cm

2 cm

IAS

Human Pathol 2016; 52:164-172 distal spread beyond macroscopic tumor edge
## Transanal Total Mesorectal Excision

### International Registry Results of the First 720 Cases

### Cancer patients (n=634)

<table>
<thead>
<tr>
<th>Quality TME specimen, n(%)</th>
<th>Intact</th>
<th>503 (85%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor defects</td>
<td>65 (11%)</td>
<td></td>
</tr>
<tr>
<td>Majors defects</td>
<td>24 (4.1%)</td>
<td></td>
</tr>
<tr>
<td>Rectal tube perforations</td>
<td>12 (2%)</td>
<td></td>
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<tr>
<th>Distal Margin (mm)</th>
<th>Mean +/- SD</th>
<th>19 +/- 14.3</th>
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<tbody>
<tr>
<td>Median (range)</td>
<td>15 (0-97)</td>
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**Positive DRM** 2 (0.3%)

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<th>Circumferential Resection Margin (mm)</th>
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<td>Median (range)</td>
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**Positive CRM** 14 (2.4%)
Transanal Total Mesorectal Excision

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Composite Optimal Pathological Outcome

CRM −, DM −, good specimen

92.6%

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Risk Factors for poor histological outcome after TaTME
Univariate Analysis

Patient
None

Technical
Simultaneous operating
AR vs APE
Conversion
Blood loss > 1L
Extent post abd dissection
Total operative time

Tumour
Tumour height
Tumour location
mT stage
+ CRM MRI
M+
nRCT
Male patient: 75 yrs.
Moderate operative risk, ASA 2
well differentiated adenocarcinoma, juxta-anal (Rullier II) cT2 (3a) N?, M0
Surgical decision making in distal rectal cancer = complex

1. Type and extent of primary tumor
2. Response to chemo-radiation
3. Perceived ability to clear all tumor (adequate margins) DRM / CRM
4. Patient related factors (functional status, comorbidity)
5. Patients preference acceptance suboptimal functional outcome
From... MRI based (static process)

MDT decision on neoadjuvant treatment

Predefined surgery at 6-8 weeks interval
MRI plays a *dynamic* role in defining a dynamic treatment process

- Upfront surgery (flexible interval)
- Neoadjuvant chemo/radiation → MR—response assessment
  - cCR → non-operative
  - resTumour specific Surgery
Incomplete response at 12 weeks

Expand the Interval

local excision
radical surgery (TME)
Early, small

Intentional organ preservation
Chemoradiation

> 50%

Organ Preservation

Advanced tumors

Incidental organ preservation
Chemoradiation + TME = standard

10-25%

Maas et al, *Lancet Oncol* 2010
Functional outcome and QoL after TME surgery

Low rectal cancer & Radiotherapy: 60% bowel-related QoL Impairment
Actual paradox
Indications for preoperative radiotherapy

**Decreased** in early stage tumors
- good local control with TME alone
- RT does not improve survival
- RT causes (surgical) complications
- worse anorectal and urogenital function after TME

**Increased**
- More complete clinical response
- Watch and wait policy
- Organ preservation: better QoL/function
- No postop death and less complications
Comprehensive evaluation of the effectiveness of gene expression signatures to predict complete response to neoadjuvant chemoradiotherapy and guide surgical intervention in rectal cancer

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Cancer Genetics 2015
Conclusion

The **flexible transanal platform** is the next step in MIS to rectal cancer

**MR response assessment** after neoadjuvant treatment first step in a dynamic process to define tailored surgical treatment

We should guide our patients through this dynamic process and take into account their preferences and expectations