Nerve-sparing radical hysterectomy as TMMR: Robotic

Total mesometrial resection and therapeutic lymphadenectomy according to M. Hoeckel

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Disclaimer

Rainer Kimmig is Head of „Epicenter Germany“ (Intuitive Surg. Inc.) taking responsibility for Austria, Germany and Switzerland in gynecologic robotic surgery.
Embryologic development of organ compartments

1. Bladder and ureters and lower vagina
2. Uterus and upper part of vagina (Müllerian)
3. Rectum

Embryologic development:

Müllerian compartment = uterus and mesometria: red
Autonomic nerves: yellow

Höckel et al. Lancet Oncol 2009
Höckel et al. Gynecol Oncol 2011
TMMR = Total Mesometrial Resection

Embryologically defined compartments of the Cervix corresponding to the Müllerian compartment (green)

1. Uterus
2. Fallopian tubes
3. Vagina
4. Fibrofatty mesometria (sacro/rectouterine ligg.)
5. Vascular mesometria (uterine basin)

Höckel et al.  Lancet Oncol 2009
Höckel et al. Gynecol Oncol 2011
TMMR – vascular and fibrofatty mesometria (open)

Original illustration of mesometria and hypogastric nerve in TMMR by M. Höckel (Leipzig, Germany)
TMMR – vesico-uterine vascular junction (open)

Original illustration of division of vesico-uterine vascular junction in TMMR by M. Höckel (Leipzig, Germany)
Robotically-assisted TMMR and tLNE

Skin incisions – positioning of trocars
Complete resection of the vascular mesometrium containing local uterine lymph basin (left side)
1b. Vascular mesometrium (ventrally)

Complete dissection of vesicouterine junctions (left side)
1c. Fibrofatty mesometrium (TMMR)

Complete resection of the fibrofatty mesometrium (left side)
1a-c: Mesometrial compartment

Complete resection uterus, fallopian tube, vascular and fibrofatty mesometria and vaginal cuff
Postoperative situs: Right hypogastric nerve (TMMR)
t-LNE = therapeutic lymphadenectomy:

Embryological defined compartments of lymph basins

1. mesometrial (mm)
2. paravisceral (pv)
3. Iliaca externa (ei)
4. Iliaca communis (ci)
5. praesacral (ps)
6. periaortic inframesenterial (pim)
7. periaortic supramesenterial, infrarenal (pir)
8. periaortic suprarenal (psr)

Höckel et al. Lancet Oncol 2009
Höckel et al. Gynecol Oncol 2011
2. Paravisceral lymph basin

Caudally this basin is developed around the obturatoric vessels Between the mesometrium of the bladder medially and the internal obturator muscle and the pubo- and iliococcygeal muscles up to the prespinal region.
2. Paravisceral lymph basin

Cranially the basin corresponds to region along the internal iliac branches e.g. glutea sup., glutea inf., iliolumbalis, rectalis, pudenda interna etc. and ........
2. Paravisceral lymph basin (preischadiac)

- N. obturatorius
- Foramen infrapiriforme
- Spina ischiadica
- Vasa pudenda interna
- L 5
- S 1
- S 2
- S 3
- S 4
- A. glutea sup.
- A. glutea inferior
- A. iliaca interna
- A. umbilicalis
3. **External iliac basin**

From branching of common iliac artery to the femoral channel

- Pecten ossis pubis
- A. Iliaca externa dextra
4. Common iliac basin (lateral)

Bifurcation of Aorta to bifurcation of common iliac vessels

Right iliac vessels  M. psoas

N. genitofemoralis

n. obturatorius

Truncus lumbosacralis
5. Presacral basin and common iliac basin (medial)

Subaortic basin down to S2

Promontorium
A. sacralis media
V. Iliaca communis sinistra
A. Iliaca communis dextra

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6. Periaortic inframenterial basin

Preservation of superior hypogastric plexus
6. Periaortic inframenterial basin

From mesenteric artery to aortic bifurcation
7. Infrarenal periaortic basin

From renal vessels to mesenteric artery
8. Specimen

Uterus, fallopian tubes, mesometria, pelvic nodes „en bloc“
TMMR = Total Mesometrial Resection
and
t-LNE = therapeutic lymphadenectomy

Höckel et al. 2003 Int J Gynecol Cancer

Höckel et al. 2005 The Lancet

Höckel et al. 2011 Gynecol Oncol
TMMR and t-LNE in cervical cancer
Stage Ib-Iib without any adjuvant radiotherapy
Locoregional control

Fig. 3. Kaplan-Meier plots of locoregional control probabilities for patients treated with TMMR and therapeutic lymph node dissection. Median follow-up 50 months (3-140 months).

Hoeckel et al. Gynecol Oncol 2011
### TMMR and tLNE by robotic surgery (rTMMR and rtLNE)

First, preliminary results of the first consecutive 21 procedures from 07/2010 to 12/2011 (learning phase of robotic surgery)

<table>
<thead>
<tr>
<th>Patient characteristics:</th>
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<tbody>
<tr>
<td>Squamous cell n = 14, Adenocarcinoma n = 7</td>
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<tr>
<td>(pT1a = 7), (pT1b1 = 11), (pt1b2 = 2), (pT2b = 1)</td>
<td>(G1 = 2), (G2 = 14), (G3 = 4)</td>
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<tr>
<td>(pN0 = 17) (pN1 = 4)</td>
<td>Mean lymph node count 35.8 pp</td>
</tr>
<tr>
<td>(R0 = 21)</td>
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| Mortality: n= 0 |  |

| Morbidity: n= 5 | 1 laparoscopic revision for bleeding, 2 minor wound healing disorders, 2 symptomatic lymph cysts |

| Observation time: 18,4 month (mean) and 19 month (median) |  |

| Alive: 21/21 |  |

| Recurrence-free: 20/21 = 95% |  |

1 patient recurred (\(pT2b, pN1, G2, \) squamous cell); adjuvant therapy refused – alive following RCT (5/2011)
rTMMR and rtLNE (by robotic surgery)

Summary

- Highly standardizable and reproducible surgery, applicable without any changes in radicality in cervical cancer (FIGO IB, IIA)
- Robotic surgery enables to perform identical surgery nearly independent of anatomical variations, obesity or adhesions and patients risk situation
- Lower morbidity due to nerve sparing, blood sparing, minimal invasive approach
- Potentially no need for adjuvant radiotherapy even in high risk cases if R₀
- Possible Participation in „Multicentric Prospective Observational Study: TMMR in Cervical Cancer FIGO IB to IIA without Radiotherapy“ by open, laparoscopic or robotic approach

- interested? e-Mail: rainer.kimmig@uk-essen.de or Google: Kimmig and Essen

You’re welcome from all over the world!!!

Educational videos on: www.uk-essen.de/robotic-surgery/
Thank you very much!
Sunny Greetings from Essen to Vancouver!

Hope to see you on SERGS 2014 in Essen . . . !