

Editorial



The basic principles of oncologic surgery during minimally invasive radical hysterectomy

Christhardt Köhler ^{1,2} Achim Schneider,^{3,4} Simone Marnitz,⁵ Andrea Plaikner ²

¹Department of Gynecology, Medical Faculty of the University of Cologne, Köln, Germany

²Department of Special Operative and Oncologic Gynecology, Asklepios Klinik Altona, Hamburg, Germany

³Department of Gynecology and Gynecologic Oncology, Charité University Medicine Berlin, Berlin, Germany

⁴Institute for Cytology and Dysplasia, Fürstenbergkarree, Berlin, Germany

⁵Department of Radiation Oncology, University of Cologne Medical Faculty, Cologne, Germany

⁶Department of Special Operative and Oncologic Gynecology, Asklepios Klinik Altona, Hamburg, Germany

OPEN ACCESS

Received: Dec 1, 2019

Revised: Dec 3, 2019

Accepted: Dec 3, 2019

Correspondence to

Andrea Plaikner

Department of Special Operative and
Oncologic Gynecology, Asklepios Klinik
Altona, Paul-Ehrlich-Straße 1, Hamburg 22763,
Germany.

E-mail: a.plaikner@asklepios.com

Copyright © 2020. Asian Society of
Gynecologic Oncology, Korean Society of
Gynecologic Oncology

This is an Open Access article distributed
under the terms of the Creative Commons
Attribution Non-Commercial License ([https://
creativecommons.org/licenses/by-nc/4.0/](https://creativecommons.org/licenses/by-nc/4.0/))
which permits unrestricted non-commercial
use, distribution, and reproduction in any
medium, provided the original work is properly
cited.

ORCID iDs

Christhardt Köhler

<https://orcid.org/0000-0002-0049-6398>

Andrea Plaikner

<https://orcid.org/0000-0003-4563-3357>

Conflicts of Interest

No potential conflict of interest relevant to this
article was reported.

Author Contributions

Conceptualization: K.C., S.A., M.S., P.A.;
Methodology: S.A.; Supervision: M.S.; Writing -
original draft: S.A., M.S., P.A.; Writing - review &
editing: K.C., P.A.

► See the article “Selection criteria and colpotomic approach for safe minimally invasive radical hysterectomy in early-stage cervical cancer” in volume 31, e7.

Patients with early cervical cancer can be treated either by surgery or by chemoradiation [1]. International guidelines recommend treatment by one oncologic modality rather than combined therapy to avoid treatment-related toxicity (European Society of Gynaecological Oncology, National Comprehensive Cancer Network) [2,3]. Consequently, pretreatment decision for one of these treatment options has to be made by an interdisciplinary tumor board council. Indeed, this recommendation reflects not only tumor-stage and histology-related factors but also “unspoken” arguments like surgical skills, national traditions, availability of radiation oncology and others. Moreover, best treatment for patients with tumor stages IB (\pm lymphovascular invasion) \geq 4 cm, IIA and IIB is not defined yet, that opens the door for a wide spectrum of different strategies. Patients with these potentially operable stages are often undergo adjuvant chemoradiation (up to 85%) according to Peters et al. [4] or Sedlis et al.'s criteria [5], whereas primary chemoradiation could be a single treatment alternative [6]. High-risk features for adjuvant chemoradiation are known as lymph-node positivity, parametrial involvement and R1/R2-resection. Lymph node metastases can be confirmed or excluded with high accuracy by intraoperative frozen section and consequently radical hysterectomy can be continued or abandoned. Transvaginal creation of a tumor-adapted vaginal cuff in iodine-positive area is an ideal tool to avoid vaginal tumor involvement. The most problematic parameter preoperatively is parametrial spread. In accordance to a previously published study by Kong et al. [7] and Woo et al. [8] could demonstrate a pooled sensitivity and specificity of 0.73 and 0.93 for the detection of parametrial invasion.

Radical hysterectomy is the state-of-the-art surgery for patients with early cervical cancer. A standardized surgical approach with curative intent was defined in the last century in Vienna. Whereas Schauta [9] used a transvaginal approach, his disciple, Wertheim [10] propagated a transabdominal route. Both techniques underwent several modifications over the next decades and with the advent of laparoscopic surgery the advantages of an abdominal and transvaginal access could be combined [11,12]. Thereafter a historical change and oncological tragedy occurred: gynecologic surgeons renounced the transvaginal part of radical hysterectomy completely, the main reason being lack of training in vaginal surgery [13-15].

Table 1. Use of transtumoral manipulators and tumor sealing-off according to procedure method

Method	Relation	Sealing off tumor	Transtumoral manipulator	References
Radical abdominal HE	Abd	Yes - transabdominal clamp	No	Wertheim [10]
Radical vaginal HE	Vag	Yes - transvaginal sutures	No	Schauta [9]
LARVH	Vag - Lap	Yes - transvaginal sutures	No	Dargent et al. [11], Hertel et al. [16]
VALRH	Lap - Vag	Yes - transvaginal sutures	No	Koehler et al. [12]
TLRH	Lap	No - intracorporeal colpotomy	Yes	Ramirez et al. [17], Melamed et al. [18]
RRH	Robotic	No - intracorporal colpotomy	Yes	Sert et al. [15], Ramirez et al. [17]

Abd, abdominal; Lap, laparoscopic; LARVH, laparoscopic-assisted radical vaginal hysterectomy; RRH, robotic right hemicolectomy; TLRH, total laparoscopic hemicolectomy; Vag, vaginal; VALRH, vaginal-assisted laparoscopic radical hysterectomy.

Up to that point the principles of oncologic hygiene were guaranteed by sealing off all tumor cells using transvaginal sutures as initially described by Schauta [9]. Now laparoscopic surgeons inserted transtumoral manipulators and performed transabdominal colpotomy exposing the pelvic peritoneum to vital tumor cells, a procedure never recommended by Wertheim (**Table 1**) [9-12,15-18].

This obvious lack of oncologic hygiene was no obstacle for the propagation of laparoscopic radical hysterectomy since the obvious advantages of laparoscopic surgery such as minimal invasiveness, easy preservation of autonomic nerves, bloodless dissection and quick recovery were advantageous for the patients [13-15].

Fortunately for future patients a prospective randomized trial (Laparoscopic Approach to Cervical Cancer; LACC) was performed which showed a significant higher disease-free survival for women after open abdominal surgery as compared to laparoscopic or robotic surgery (99% vs. 94%) [17]. This cornerstone trial brought down the existing opinion of oncologic equivalency of minimal-invasive radical hysterectomy and abdominal radical hysterectomy. Further studies confirmed LACC results [18]. Resulting discomfiture and disbeliefs among gynecologic oncologists worldwide have been addressed in many editorials and comments, trying to explain the unexpected results [19]. Many possible arguments for minimally-invasive inferiority have been debated as different radicality, smaller vaginal cuff, ethnic differences, tumor size as selection criteria, robotic versus straight stick laparoscopy, learning curves, different schools of surgery, data completeness and video review in LAAC trial, circulating CO₂, use of intratumoral manipulators, etc.

In our answer to the results of LACC, we collected prospectively actual data on consecutive 389 patients who underwent combined vaginal-laparoscopic radical hysterectomy with a median follow-up period of 10 years [20]. These patients had a risk profile comparable to the LACC cohort and their recurrence free survival rate is identical to the patients who underwent open surgery in LACC (98.5%). These results can be achieved by avoiding manipulator and transvaginal closure to seal off the cervical cancer cells. Preliminary results from other studies (NCT03958305) support this theory.

These findings are now corroborated by the study of Kong et al. [21]. Authors have evaluated the oncologic outcome of patients with early-stage cervical cancer who underwent minimally invasive radical hysterectomy before and after the application of parametrial invasion criteria defined as disruption of the cervical stroma ring on MRI scans, and patients with intracorporal or vaginal colpotomy.

In agreement with Kong et al. [21] we conclude that patients with early parametrial involvement visible in high solution MRI should rather undergo laparoscopic staging followed by primary

chemoradiation [22]. In patients without parametrial spread that undergo laparoscopic or robotic radical hysterectomy transabdominal intracorporeal colpotomy must be avoided and use of any uterine manipulators should be forbidden. The announced Chinese phase III randomized multicentric trial will prove again if minimally invasive radical hysterectomy is equivalent to open radical hysterectomy and also addresses use of uterine manipulators [23].

REFERENCES

1. Landoni F, Manes A, Colombo A, Placa F, Milani R, Perego P, et al. Randomised study of radical surgery versus radiotherapy for stage Ib–IIa cervical cancer. *Lancet* 1997;350:535-40.
[PUBMED](#) | [CROSSREF](#)
2. Cibula D, Pötter R, Planchamp F, Avall-Lundqvist E, Fischerova D, Haie Meder C, et al. The European Society of Gynaecological Oncology/European Society for Radiotherapy and Oncology/European Society of Pathology guidelines for the management of patients with cervical cancer. *Int J Gynecol Cancer* 2018;28:641-55.
[PUBMED](#) | [CROSSREF](#)
3. National Comprehensive Cancer Network. NCCN guidelines for cervical cancer, version 1.2018 [Internet]. Plymouth Meeting, PA: National Comprehensive Cancer Network; 2017 [cited 2019 Nov 25]. Available from: https://www.nccn.org/professionals/physician_gls/pdf/cervical.pdf.
4. Peters WA 3rd, Liu PY, Barrett RJ 2nd, Stock RJ, Monk BJ, Berek JS, et al. Concurrent chemotherapy and pelvic radiation therapy compared with pelvic radiation therapy alone as adjuvant therapy after radical surgery in high-risk early-stage cancer of the cervix. *J Clin Oncol* 2000;18:1606-13.
[PUBMED](#) | [CROSSREF](#)
5. Sedlis A, Bundy BN, Rotman MZ, Lentz SS, Muderspach LI, Zaino RJ. A randomized trial of pelvic radiation therapy versus no further therapy in selected patients with stage IB carcinoma of the cervix after radical hysterectomy and pelvic lymphadenectomy: a Gynecologic Oncology Group study. *Gynecol Oncol* 1999;73:177-83.
[PUBMED](#) | [CROSSREF](#)
6. Marnitz S, Köhler C, Affonso RJ, Schneider A, Chiantera V, Tsounoda A, et al. Validity of laparoscopic staging to avoid adjuvant chemoradiation following radical surgery in patients with early cervical cancer. *Oncology* 2012;83:346-53.
[PUBMED](#) | [CROSSREF](#)
7. Kong TW, Lee JD, Son JH, Paek J, Chun M, Chang SJ, et al. Treatment outcomes in patients with FIGO stage IB–IIA cervical cancer and a focally disrupted cervical stromal ring on magnetic resonance imaging: a propensity score matching study. *Gynecol Oncol* 2016;143:77-82.
[PUBMED](#) | [CROSSREF](#)
8. Woo S, Suh CH, Kim SY, Cho JY, Kim SH. Magnetic resonance imaging for detection of parametrial invasion in cervical cancer: an updated systematic review and meta-analysis of the literature between 2012 and 2016. *Eur Radiol* 2018;28:530-41.
[PUBMED](#) | [CROSSREF](#)
9. Schauta F. Die erweiterte vaginale Totalexstirpation des Uterus bei Kollumkarzinom. Wien: Verlag Josef Safar; 1908.
10. Wertheim E. Die erweiterte abdominale operation bei carcinoma colli uteri. Berlin: Urban & Schwarzenberg; 1911.
11. Dargent D, Mathevet P. Schauta's vaginal hysterectomy combined with laparoscopic lymphadenectomy. *Baillieres Clin Obstet Gynaecol* 1995;9:691-705.
[PUBMED](#) | [CROSSREF](#)
12. Koehler C, Gottschalk E, Chiantera V, Marnitz S, Hasenbein K, Schneider A. From laparoscopic assisted radical vaginal hysterectomy to vaginal assisted laparoscopic radical hysterectomy. *BJOG* 2012;119:254-62.
[PUBMED](#) | [CROSSREF](#)
13. Wang YZ, Deng L, Xu HC, Zhang Y, Liang ZQ. Laparoscopy versus laparotomy for the management of early stage cervical cancer. *BMC Cancer* 2015;15:928.
[PUBMED](#) | [CROSSREF](#)
14. Nam JH, Park JY, Kim DY, Kim JH, Kim YM, Kim YT. Laparoscopic versus open radical hysterectomy in early-stage cervical cancer: long-term survival outcomes in a matched cohort study. *Ann Oncol* 2012;23:903-11.
[PUBMED](#) | [CROSSREF](#)

15. Sert BM, Boggess JF, Ahmad S, Jackson AL, Stavitzski NM, Dahl AA, et al. Robot-assisted versus open radical hysterectomy: a multi-institutional experience for early-stage cervical cancer. *Eur J Surg Oncol* 2016;42:513-22.
[PUBMED](#) | [CROSSREF](#)
16. Hertel H, Köhler C, Michels W, Possover M, Tozzi R, Schneider A. Laparoscopic-assisted radical vaginal hysterectomy (LARVH): prospective evaluation of 200 patients with cervical cancer. *Gynecol Oncol* 2003;90:505-11.
[PUBMED](#) | [CROSSREF](#)
17. Ramirez PT, Frumovitz M, Pareja R, Lopez A, Vieira M, Ribeiro R, et al. Minimally invasive versus abdominal radical hysterectomy for cervical cancer. *N Engl J Med* 2018;379:1895-904.
[PUBMED](#) | [CROSSREF](#)
18. Melamed A, Margul DJ, Chen L, Keating NL, Del Carmen MG, Yang J, et al. Survival after minimally invasive radical hysterectomy for early-stage cervical cancer. *N Engl J Med* 2018;379:1905-14.
[PUBMED](#) | [CROSSREF](#)
19. Pennington KP, Urban RR, Gray HJ. Revisiting minimally invasive surgery in the management of early-stage cervical cancer. *J Natl Compr Canc Netw* 2019;17:86-90.
[PUBMED](#) | [CROSSREF](#)
20. Köhler C, Hertel H, Herrmann J, Marnitz S, Mallmann P, Favero G, et al. Laparoscopic radical hysterectomy with transvaginal closure of vaginal cuff - a multicenter analysis. *Int J Gynecol Cancer* 2019;29:845-50.
[PUBMED](#) | [CROSSREF](#)
21. Kong TW, Son JH, Paek J, Chang SJ, Ryu HS. Selection criteria and colpotomic approach for safe minimally invasive radical hysterectomy in early-stage cervical cancer. *J Gynecol Oncol* 2020;31:e7.
[CROSSREF](#)
22. Köhler C, Mustea A, Marnitz S, Schneider A, Chiantera V, Ulrich U, et al. Perioperative morbidity and rate of upstaging after laparoscopic staging for patients with locally advanced cervical cancer: results of a prospective randomized trial. *Am J Obstet Gynecol* 2015;213:503.e1-7.
[PUBMED](#) | [CROSSREF](#)
23. Chao X, Li L, Wu M, Ma S, Tan X, Zhong S, et al. Efficacy of different surgical approaches in the clinical and survival outcomes of patients with early-stage cervical cancer: protocol of a phase III multicentre randomised controlled trial in China. *BMJ Open* 2019;9:e029055.
[PUBMED](#) | [CROSSREF](#)