Validity of Laparoscopic Staging to Avoid Adjuvant Chemoradiation following Radical Surgery in Patients with Early Cervical Cancer

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Key Words

Early cervical cancer • Adjuvant chemoradiation • Radical hysterectomy • Risk factors • Radical vaginal trachelectomy

Abstract

Purpose: To determine the rate of unavoidable adjuvant chemoradiation (RCTX) due to histologic results after radical surgery in patients with early cervical cancer. **Patients and Methods:** Between May 2004 and July 2011, 448 consecutive patients diagnosed with invasive cervical cancer stage IA1 L1 to IIA underwent laparoscopic staging at the Department of Gynecology and Gynecologic Oncology at Charité Berlin. Only in patients without lymph node metastases (n = 394) on frozen section, radical operation was continued either by laparoscopic radical hysterectomy (n = 228) or by radical vaginal trachelectomy (n = 166). The decision for adjuvant RCTX was reached among the members of an interdisciplinary tumor board according to the presence of risk factors. The mean age of patients was 39 years. Squamous cell cancer was found in 62.5%, adenocarcinoma in 32.7%, adenosquamous cancer in 3.8% and others in 1% of patients. Adjuvant treatment was indicated if at least one category 1 risk factor (pN1, R1 or RX, parametrial involvement) and/or any combi-

nation of category 2 risk factors (lymphovascular space involvement (LVSI), hemovascular space involvement, grading 3, young age, deep stromal invasion, large tumor size) were present. **Results:** In 39 of 394 patients (9.9%), adjuvant RCTX was recommended due to category 1 risk factors (n = 25/6.4%) and category 2 risk factors (n = 14/3.5%). Tumor-involved (R0) or unclear resection margins (RX) were present in 4 (1%) and 1 (0.3%), parametrial involvement in 12 (3%) and positive lymph nodes in 11 (2.8%) patients, respectively. Hemovascular involvement was found in 14 (3.5%), LVSI in 113 (28.7%) and grading 3 in 122 (31%) patients, respectively. **Conclusion:** Laparoscopic staging is a reliable tool to keep the rate of tri-modal (surgery + chemotherapy + radiotherapy) treatments in patients with cervical cancer stage I and IIA after radical surgery at 10%. This percentage should be used as benchmark for the quality of interdisciplinary treatment of patients diagnosed with cervical cancer.

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Table 1. Literature review of studies with adjuvant therapy after radical hysterectomy

Study (first author), year	Type of radical hysterectomy	Number of patients	FIGO stages	Rate of adjuvant therapy, %
Spiros, 2002 [32]	TLRH	78	IA2–IB	8.9
Hertel, 2003 [33]	LARVH	110	IB1 N0	26.4
Nam, 2004 [34]	LVRH/RH	47/96	IB1	21.3/25
Steed, 2004 [35]	LARVH/RAH	71/205	IA1–IB2	22/21
Yessaian, 2004 [36]	RAH	58	IB2	62
Li, 2007 [37]	LRH	90	IB–IIA	20
Ghezzi, 2007 [38]	LRH/ARH	50/48	IA2–IIA	38/29
Zakashansky, 2007 [39]	TLRH/ARH	30/30	IA1–IIA	33/33
Chen, 2008 [40]	n.i.	295	IA2–IIIB	45.4
Frumovitz, 2008 (obese) [41]	n.i.	408	IA1–IB2	23
Fannig, 2008 [42]	RRH	20	IB–IIA	20
Ko, 2008 [43]	RRH	16	IA1–IB1	19
Kim, 2008 [44]	RRH	32	IA2–IB1	22
Pellegrino, 2009 [45]	TLRH	107	IB1 only	22.4
Persson, 2009 [46]	RRH	64	IA1–IIA	33
Estate, 2009 [47]	RRH/TLRH/ARH	32/17/14	IA1–IB2	34/47/57
Van der Tillaart, 2009 [48]	Not indicated	246	IA–IIA	37
Pahisa, 2009 [49]	Schauta/ARH	23/67	IA2–IIA	17.9/21.7
Yan, 2009 [50]	LRH	117	IB–IIA	29
Sobieszewski, 2009 [51]	TLRH/ARH	22/58	IA–IIA	40/63
Cantrell, 2010 [52]	RRH	71	IA1–IIB	32
Mehra, 2010 [53]	LARVH	51	IB1 only	19.6
Liang, 2010 [54]	LNSRH	163	IA2–IB2	7.4
Lee, 2010 [55]	LRH/ARH	24/48	IA2–IIA	29/27
Yan, 2011 [56]	LRH	240	IA2–IIB	39.4
Tinelli, 2011 [57]	RRH	23	IA1–IIA	8.6
Cibula, 2011 [30]	ARNSH	192	IA2–IIB	22
Sert, 2011 [13]	RRH	35	IA1–IB1	5.7 (but 14% recurrences)
Hong, 2012 [14]	LVRH	90	IB1–IB2	40.7–84.9

TLRH = Total laparoscopic radical hysterectomy; LARVH = laparoscopic assisted radical vaginal hysterectomy; LVRH = laparoscopic vaginal radical hysterectomy; RH = radical hysterectomy; RAH = radical abdominal hysterectomy; LRH = laparoscopic radical hysterectomy; ARH = abdominal radical hysterectomy; n.i. = not indicated; RRH = robotic radical hysterectomy; LNSRH = laparoscopic nerve-sparing radical hysterectomy; ARNSH = abdominal radical nerve-sparing hysterectomy.

Introduction

Radical hysterectomy or radical trachelectomy in combination with pelvic lymphadenectomy is the standard surgical treatment for patients affected by early stage cervical cancer. There has been general consensus after GOG study 109 that patients with positive lymph nodes, parametrial involvement and/or tumor-involved resection margins should undergo adjuvant chemoradiation (RCTX) [1, 2]. According to GOG 92 and other studies, radiation is also recommended if at least 2 of the following risk factors are present: lymphovascular space involvement (LVSI), deep stromal involvement or large

tumor size (>2 or ≥ 4 cm) [3–7]. Previously published data suggest that age, grading 3, adeno- or adenosquamous type and/or DNA index also indicate an increased risk for recurrence [8–12]. Indeed, in clinical practice the percentage of tri-modal therapy, i.e. adjuvant RCTX after radical hysterectomy, varies between 6 and 85% (table 1) [13, 14], which reflects the inconsistency of interpretation of risk factors.

The only randomized study comparing radical hysterectomy and primary radiotherapy in the treatment of early-stage cervical cancer did not show any survival benefit between both treatment modalities but an increased toxicity after combined use of radical hysterectomy and

Table 2. Demographic data

Patients, n	394
Mean age (range), years	39 (16–86)
FIGO stage, n (%)	
IA1	51 (13)
IA2	45 (11.4)
IB1	279 (70.8)
IB2	13 (3.3)
IIA	6 (1.5)
Operation, n (%)	
Radical hysterectomy	228 (58)
Radical vaginal trachelectomy	166 (42)

adjuvant radiotherapy [15]. Up to now, no randomized study comparing RCTX and primary surgery for patients with early stage cervical cancer has been reported. The National Comprehensive Cancer Network (NCCN) guidelines recommend either surgical or radiation therapy for patients with early cervical cancer. However, the NCCN guidelines also give a category 1 recommendation for pelvic radiotherapy for women with negative lymph nodes after surgery in the presence of a large primary tumor, deep stromal invasion and/or LVSI [16].

Laparoscopic lymphadenectomy in combination with given histologic features of cone/tumor biopsy provides comprehensive staging and consecutive best selection of patients either to RCTX or to radical surgery in order to avoid tri-modal (surgery + radiation + chemotherapy) oncologic therapy. However, histopathologic results post-surgery may differ from those of preoperative cone/biopsy and/or intraoperative frozen section of lymph nodes and therefore indicate adjuvant RCTX. It is the aim of this prospective study to analyze the rate of this primarily not intended adjuvant RCTX after radical surgery in patients with early stage cervical cancer.

Patients and Methods

Demographic Data

This prospective study evaluated 448 patients diagnosed with invasive cervical cancer stage IA1 L1 to IIA treated between May 2004 and July 2011 at the Department of Gynecology and Gynecologic Oncology at Charité Berlin. Conization or punch biopsy revealed the following histologic types: squamous carcinoma in 246, adenocarcinoma in 129, adenosquamous carcinoma in 15 and other type in 4 patients. According to our own results on laparoscopic-assisted radical vaginal hysterectomy, patients with neuroendocrine tumors, with positive nodes on frozen section (n = 54) as well as the combination of lympho- and hemovascular

Fig. 1. Flowchart for patients with early cervical cancer at Charité University Berlin. LND = Lymphadenectomy.

space involvement were excluded [17]. The mean age of women was 39 years (16–86). FIGO stages were IA1 L1, IA2, IB1, IB2 or IIA in 51, 45, 279, 13 and 6 patients, respectively (table 2). All patients gave written consent to analyze their data. The study was approved by the institutional review board.

Surgical Data

According to clinical examination and results of cone or punch biopsy, patients were potential candidates for vaginal assisted laparoscopic radical hysterectomy or radical vaginal trachelectomy. Our surgical techniques of the two radical operations have been described previously [18, 19]. Both operations always start with the removal of pelvic lymph nodes and frozen section thereof. Only in patients with tumor-free lymph nodes (n = 394) diagnosed by frozen section, radical operation was continued, whereas in patients with lymph node metastases diagnosed by frozen section, radical hysterectomy/trachelectomy was abandoned. In this situation, lymphadenectomy was extended to the para-aortic region and patients underwent primary RCTX consecutively (fig. 1). These patients were also excluded from the study. Thus, laparoscopic radical hysterectomy was performed in 228 and radical vaginal trachelectomy in 166 patients.

Adjuvant RCTX was recommended after interdisciplinary tumor board discussion if at least one category 1 risk factor (pN1, R1/X, parametrial involvement) and/or any combination of category 2 risk factors (LVSI, hemovascular space involvement, grading 3, young age (≤ 40 years), deep stromal invasion, large tumor size) was found on final histology.

Adjuvant RCTX

For treatment planning, all patients received a planning CT scan (CT scanner LightSpeed®, GE Healthcare) with intravenous contrast media (Xenetix 350®) at a slice thickness of 3.75 mm

Table 3. Histopathological results after radical hysterectomy or radical trachelectomy

Histologic type, n (%)	
Squamous cell carcinoma	246 (62.5)
Adenocarcinoma	129 (32.7)
Adenosquamous	15 (3.8)
Others	4 (1)
Lymph node status, n (%)	
N0	383 (97.2)
N1	11 (2.8)
Grading, n (%)	
G1	64 (16.3)
G2	208 (52.8)
G3	122 (30.9)
LVSI, n (%)	
No	254 (64.5)
Yes	113 (28.7)
Not mentioned	27 (6.8)
Hemovascular space involvement, n (%)	
No	332 (84.3)
Yes	14 (3.5)
Not mentioned	48 (12.2)
Resection status, n (%)	
R0	389 (98.7)
R1	4 (1)
RX	1 (0.3)

from the 2nd lumbar vertebra to the trochanter minor. The planning CT was performed while the patient was in the supine position using a knee and foot positioning device, and patients were asked to have a full bladder.

Target volumes and organs at risk were delineated in all axial CT slices according to the recommendations of the Radiation Therapy Oncology Group (RTOG) and the International Commission on Radiation Units and Measurements (ICRU) Report 50, respectively [20, 21]. The target volumes were defined on the basis of the full-bladder CT scan. The clinical target volume includes the external, internal, common iliac and pre-sacral lymph nodes with a 5-mm margin. The planning target volume was outlined as the clinical target volume with a 1-cm margin in all directions.

The following organs at risk were delineated: spinal cord, femoral heads, bladder, rectum up to the sigmoidal loop, and the small bowel as a whole peritoneal cavity except for lymph nodes, muscles, and organs at risk other than the small bowel. The delineation of the small bowel exceeded the upper and lower border of the planning target volume by 2 slices. Patients with parametric involvement and/or large primary tumor >4 cm underwent vaginal brachytherapy in addition to external beam radiotherapy using Ir-192 HDR brachytherapy with a total dose of 15 Gy (3 fractions at 5 Gy each) delivered to 5 mm mucosal depth in the upper 1/3 of the vaginal stump (Gammamed 12i® and Brachyvision®, Varian Medical Systems, Palo Alto, Calif., USA).

Patients treated before 2007 (n = 10) underwent 3D radiation. Patients treated between 2007 and 2011 underwent linac-based intensity modulated techniques. The total dose prescribed for the

planning target volume was 50.4 Gy delivered in 28 fractions (5 weekly) as single doses of 1.8 Gy each. The lower constraint for planning target volume was 95% of the prescribed dose in 95% of the target volume.

Contouring for both 3D and IMRT modalities was performed with the Therapy Planning System (TPS) of Eclipse (Varian Medical Systems®, Palo Alto, Calif., USA).

Conventional 3D and linac-based IMRT plans were calculated for photon irradiation at 20 MV (until 2008) and 6 MV (from 2009). Patients with 3D planning underwent a four-field plan (0, 90, 180, 270°). IMRT plans were generated for an arrangement of 7 beams with gantry angles of 45, 90, 115, 180, 245, 280, and 320°. The dynamic (sliding window) technique was used. Treatment was given in 5 weekly fractions of 1.8 Gy. Simultaneously, chemotherapy with cisplatin was applied (40 mg/m² body surface area on days 1, 8, 15, 22 and 29 (n = 20) and 20 mg/m² body surface area on days 1–5, weeks 1 and 5 (n = 21), respectively).

Statistical Hypothesis

We postulated that the rate of tri-modal therapy in patients following surgery should not be higher than 10%. When the sample size is 400, a two-sided 95.0% confidence interval for a single proportion using the large sample normal approximation will extend 0.036 from the observed proportion for an expected proportion of 0.160.

Results

Final histopathologic examination of radical hysterectomy/radical trachelectomy specimen and pelvic lymph nodes revealed tumor-free lymph nodes in 383 (97.2%) and at least micrometastasis in 11 (2.8%) patients (table 3). Distribution of grading 1, 2, and 3 was 16.3, 52.8 and 30.9%, respectively. Hemovascular involvement was found in 14 (3.5%) and LVSI in 113 (28.7%) patients. In the majority of patients, resection was in sound margins (98.7%), whereas in 4 and 1 patients tumor-involved or close margins were found, respectively. Microscopic parametric tumor spread was demonstrated in 12 patients (3%). In 39 out of 394 patients (9.9%) adjuvant RCTX was recommended due to category 1 (n = 25/6.4%) or category 2 risk factors (n = 14/3.5%). A comparison between preoperative FIGO stages, postoperative TNM findings and reasons for adjuvant RCTX recommendation in all 39 patients is given in table 4.

Discussion

Patients with cervical cancer FIGO stage I or IIA can be treated either by radical operation or by primary radiotherapy with equal oncologic results but different treatment-related side effects [15]. Up to now there has

Table 4. Preoperative FIGO stage, postoperative TNM stage and reasons for recommendation of adjuvant RCTX in 39 patients after radical operation of early stage cervical cancer

No.	Tumor stage after biopsy/conization/laparoscopic lymphadenectomy	Type of surgery	Definitive histology	Indication for adjuvant RCTX
1	IB1 G3 L0 V0 N0	RH	pT1b1 N1 (sn+, 1/40) G3 R0 L1 V0 SCC	pN1 L1 <35 years
2	IB1 G2 L1 V0 N0	RH	pT1b1 N1 (1/38) G2 R0 L1 V0 adenosquamous	pN1 L1
3	IB1 G2 L1 V0 N0	RH	pT1b1 N1 (2/62) G2 R0 L1 V0 SCC	pN1 L1
4	IB2 G2 L0 V0 N0	RH	pT2b N0 (0/64) G2 R0 L0 V0 SCC	pT2b
5	IB2 G2 L1 V0 N0	RH	pT1b2 N1 (2/32) G2 R0 L1 V0 adeno	pN1 adeno <35 years
6	IIA G3 L0 V0 N0	RH	pT2a N0 (0/51) G3 R0 L0 V0 SCC	Tumor size G3 <35 years
7	IB1 G3 L1 V0 N0	RH	pT2b N0 (0/23) G3 R0 L1 V1 SCC	pT2b L1 V1 G3 <35 years
8	IIA G2 L1 V0 N0	RH	pT2b N0 (0/63) G2 R0 L1 V0 SCC	pT2b L1
9	IB1 G1 L0 V0 N0	RVT	pT1b2 N0 (0/39) G1 R1 L0 V0 adeno	pT1b2 R1 adeno
10	IIA G3 L1 V0 N0	RH	pT2b N0 (0/40) G3 R0 (close margins) L1 V0 SCC	pT2b G3 L1 close margins
11	IB1 G3 L1 V0 N0	RH	pT2a N0 (0/56) G3 L1 V0 R0 SCC	Tumor size G3 L1
12	IB1 G2 L1 V0 N0	RH	pT1b2 N1 (1/75) G2 R0 L1 V0 SCC	pT1b2 pN1 L1
13	IB1 G3 L1 V0 N0	RH	pT2b N0 (0/30) G3 R0 L1 V0 SCC	pT2b G3 L1
14	IB1 G2 L1 V0 N0	RH	pT2b N0 (0/48) G2 R1 L1 V0 SCC	pT2b R1 L1
15	IB1 G1 L0 V0 N0	RVT	pT1b1 N0 (0/20) G1 R0 L1 V1 SCC	L1 V1 <35 years
16	IB1 G2 L1 V0 N0	RH	pT2a N0 (0/43) G2 R0 L1 V1 SCC	Tumor size L1 V1
17	IB1 G3 L1 V0 N0	RH	pT1b1 N0 (0/66) G3 R0 L1 V1 adenosquamous	G3 L1 V1
18	IB1 G3 L0 V0 N0	RH	pT2a N0 (0/46) G3 R0 L1 V0 clear cell adeno	Tumor size G3 L1 adeno <35 years
19	IB1 G3 L0 V0 N0 (squamous)	RVT	pT1b1 N0 (0/20) G3 R0 L1 V0 neuroendocrine	G3 L1 small cell neuroendocrine
20	IB1 G3 L0 V0 N0	RH	pT1b2 N0 (0/16) G3 R0 L0 V0 adeno	pT1b2 G3 adeno
21	IB1 G2 L0 V0 N0	RH	pT2b N0 (0/58) G2 R0 L0 V0 adeno	pT2b adeno
22	IB1 G2 L1 V0 N0	RVT	pT2a N0 (0/24) G2 Rx (close margins) L1 V0 SCC	Tumor size Rx L1 <35 years
23	IB1 G3 L1 V0 N0	RH	pT1b1 N1 (4/29) G3 R0 L1 V0 adenosquamous	pN1 L1 G3
24	IB1 G3 L1 V0 N0	RH	pT1b1 N0 (0/26) G3 R0 (close margins) L1 V0 SCC	G3 L1 close margins
25	IB1 G2 L1 V0 N0	RH	pT1b1 N1 (1/44) G2 R0 L1 V0 SCC	pN1 L1
26	IB1 G2 L0 V0 N0	RH	pT1b2 N0 (0/33) G2 R0 L1 V0 adeno	pT1b2 L1 adeno
27	IB1 G2 L0 V0 N0	RH	pT1b2 N0 (0/36) G3 R0 L1 V0 SCC	pT1b2 L1 G3
28	IB1 G3 L1 V0 N0	RH	pT2b N0 (0/37) G3 R0 L1 V0 SCC	pT2b G3 L1
29	IB1 G2 L1 V0 N0	RH	pT1b2 N0 (0/52) G3 R0 L1 V0 SCC	pT1b2 G3 L1
30	IIA G2 L1 V0 N0	RH	pT2b N0 (0/38) G2 R0 L1 V0 SCC	pT2b L1 <35 years
31	IB1 G3 L1 V0 N0	RH	pT1b1 N0 (0/52) G3 R0 L1 V0 SCC	G3 L1
32	IB1 G3 L1 V0 N0	RVT	pT1b1 N1 (1/34) G3 R0 L1 V0 SCC	pN1 G3 L1 <35 years
33	IB1 G3 L1 V0 N0	RH	pT2b N0 (0/62) G3 R0 L1 V1 SCC	pT2b G3 L1 V1
34	IB1 G3 L0 V0 N0	RH	pT1b1 N1 (2/23) G3 R0 V0 L0 adeno	pN1 G3 adeno
35	IB1 G3 L0 V1 N0	RH	pT2b N0 (0/14) G3 R1 L0 V1 SCC	pT2b G3 R1 V1
36	IB1 G2 L0 V0 N0	RVT	pT1b2 N0 (0/16) G2 R1 L0 V0 adeno	R1 adeno <35 years
37	IA2 G2 L0 V0 N0	RVT	pT1b1 N1 (1/15) G2 L0 V0 SCC	pN1 <35 years
38	IB1 G2 L0 V0 N0	RH	pT2b N1 (2/23) G2 R0 L0 V0 adeno	pT2b pN1 adeno <35 years
39	IB1 G2 L0 V0 N0	RH	pT1b1 N0 (0/47) G2 R0 Lx V1 SCC	V1 <35 years

RH = Radical hysterectomy; RVT = radical vaginal trachelectomy; SCC = squamous cervical cancer; adeno = adenocarcinoma. LVSI: L0 = no, L1 = yes; hemovascular space involvement: V0 = no, V1 = yes. G = Grading; N = nodal status.

been no prospective randomized trial comparing radical hysterectomy versus primary RCTX. However, morbidity after combined use of radical hysterectomy and adjuvant radiotherapy is significantly higher than therapy by one modality. Therefore, selection criteria for patients with surgically curable cervical cancer must be defined.

Diagnosis of early cervical cancer is done by clinical examination for tumor size and extension and by punch biopsy or conization for histologic type, grading, LVSI and hemovascular space involvement. However, lymph node status cannot be determined preoperatively despite the fact that node involvement is the main prognostic factor (5-year overall survival in stage IB1 with and without lymph node metastases: 75.9 vs. 94.8%) and one of the accepted major indications for adjuvant RCTX [22]. Laparoscopic pelvic lymphadenectomy in combination with frozen section has the potential to fill this gap and help avoid tri-modal therapy in patients with early cervical cancer. Indeed, in daily practice 20–50% (up to 85%) of patients undergo adjuvant RCTX after radical surgery. There are 3 possible reasons for this high percentage:

(1) Despite careful clinical examination and adequate surgical radicality, histologic features of the removed uterus or specimen after radical trachelectomy differ from those of cone or biopsy with respect to parametrial or lymph node involvement, grading, histologic type, LVSI and hemovascular involvement. Micrometastasis and isolated tumor cells in lymph nodes can only be found after immunohistochemical staining and their detection may influence oncologic prognosis [23, 24]. Even though these changes are probably unavoidable they may indicate adjuvant therapy.

(2) Even with meticulous technique microscopically tumor-involved surgical margins cannot always be avoided. Furthermore, a number of gynecologic oncologists start radical hysterectomy with radical removal of the uterus and end with harvesting lymph nodes, often without frozen section. Following this approach all patients with positive surgical margins or positive lymph nodes on final pathology have to undergo adjuvant RCTX.

(3) Indications for adjuvant therapy after radical hysterectomy are not clearly defined and inconsistent. In the GOG 109 study 127 patients with positive lymph nodes, positive resection margins, or parametrial involvement experienced a significant improvement of disease-free survival and overall survival. Thus, RCTX became the standard adjuvant treatment in so-called 'high-risk' situations [1]. Sevin et al. [25] found in 370

patients, besides status of lymph nodes, margin and parametrium depth of invasion, LVSI and age >40 years to be important prognostic factors on multivariate analysis. As a result of GOG study 92, Sedlis et al. [3] and Rotman et al. [26] defined more than 1/3 stromal invasion, LVSI and tumor diameter >4 cm as 'intermediate risk' factors and could demonstrate in 277 patients a significant reduction of recurrences after adjuvant radiotherapy, especially in patients diagnosed with adenocarcinomas. Another possible categorization was recommended by Lai et al. [11] in 1999 after retrospective analysis of 891 patients with cervical cancer TNM stages IB or II. Previously and recently published data give either affirming or contradictory statements regarding one or more risk factors [2, 7, 12, 27–29]. Ryu et al. [4] confirm intermediate risk factors but limit tumor size to ≥ 2 cm. In a study by Delgado et al. [5] disease-free survival correlated with grading, nodal status, depth of invasion, tumor size, parametrial status, and LVSI but not with age or surgical margins. In other studies patients' age was differentially judged [6, 8, 27]. Also the histologic type of tumors is differently assessed [8, 9, 27, 28, 30] as well as grading 3 [12, 27, 31]. Thus, differences between high and intermediate risk factors are obliterated. Especially in the case of combined occurrence of risk factors no clear statements exist. Therefore, our recommendation for adjuvant RCTX is potentially overtreatment in some of the 39 patients but reflects the controversies in this field.

The potential drawbacks of the present study are the respective analysis of data and the lack of information on deep stromal invasion, which was not assessed in the majority of patients.

In conclusion, laparoscopic staging and meticulous pathologic examination allows avoiding adjuvant RCTX after radical surgery in 90% of patients and should be used as a routine staging procedure in all patients with cervical cancer FIGO stages I–IIA. For this purpose there is a strong need for interdisciplinary cooperation between gynecologic oncologists, radiooncologists and pathologists. Adjuvant therapy in 10% of those patients seems to be unavoidable and this percentage can be used as benchmark. Indications for adjuvant RCTX, especially in the presence of multiple prognostic risk factors, have to be defined more exactly.

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