

Abdominal Radical Trachelectomy (ART): What's the role in fertility-sparing surgery for cervical cancers?

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VERBAL DISCLOSURE

- The authors have no conflicts of interest to report.

Operative Cervical Cancer Primary Treatment



Fertility sparing

non-fertility sparing



NCCN Guidelines Version 2.2013 Cervical Cancer

CLINICAL STAGE	PRIMARY TREATMENT (FERTILITY SPARING) ^c
Stage IA1 (no lymphovascular space invasion [LVSI])	Cone biopsy with negative margins (preferably a non-fragmented specimen with 3-mm negative margins) (If positive margins, repeat cone biopsy or perform trachelectomy)
Stage IA1 (with LVSI) and Stage IA2	Cone biopsy with negative margins (preferably a non-fragmented specimen with 3-mm negative margins) + pelvic lymph node dissection or Radical trachelectomy + pelvic lymph node dissection (± para-aortic lymph node sampling [category 2B])
Stage IB1 ^d	Radical trachelectomy + pelvic lymph node dissection ± para-aortic lymph node sampling

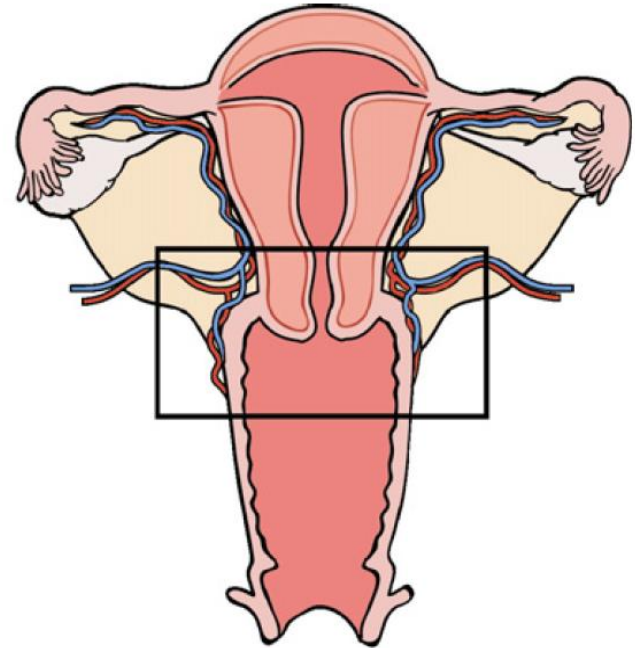


NCCN Guidelines Version 2.2013 Cervical Cancer

CLINICAL STAGE	BIOPSY RESULTS	PRIMARY TREATMENT (NON-FERTILITY SPARING)
Stage IA1 (no LVSI)	Negative margins and inoperable	Observe
	Negative margins and operable	Extrafascial hysterectomy
	Positive margins for dysplasia or carcinoma	Extrafascial or modified radical hysterectomy + pelvic lymph node dissection (category 2B for node dissection)
Stage IA1 (with LVSI) and Stage IA2		Modified radical hysterectomy + pelvic lymph node dissection ± para-aortic lymph node sampling (category 2B)
		or Pelvic RT ^{e,f} + brachytherapy (total point A dose: 70-80 Gy) ^g

Radical Trachelectomy (RT)

1. Vaginal: **VRT**
2. Abdominal: **ART**
3. Laparoscopic: **LRT**
4. Robotic: **RRT**



Eligibility criteria for VRT

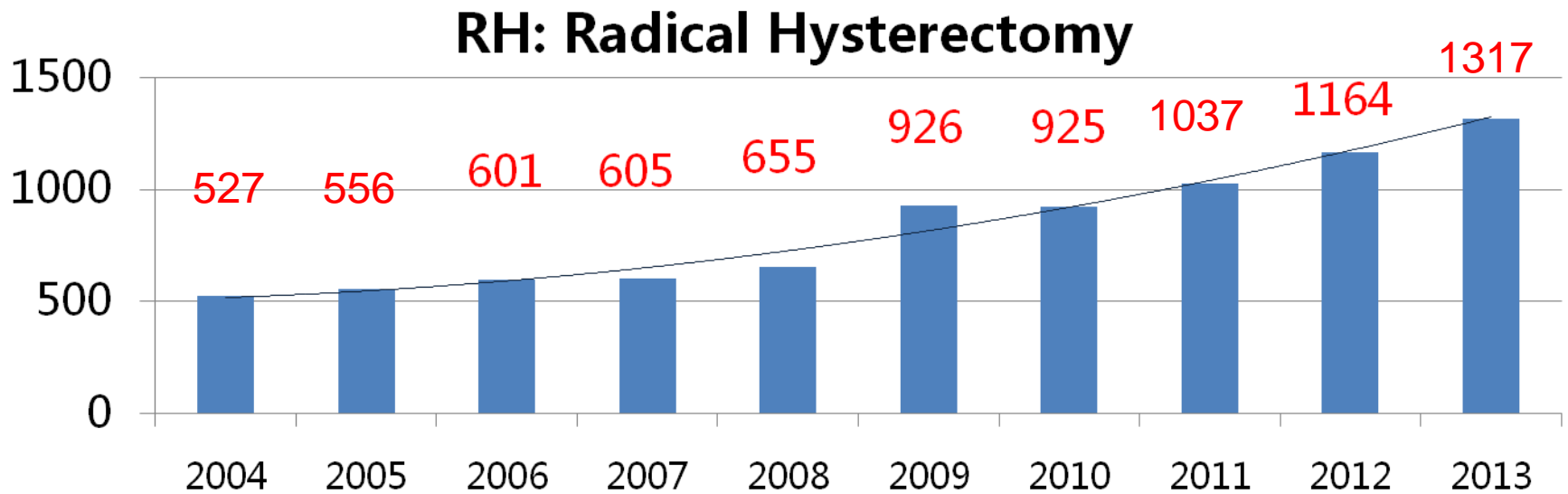
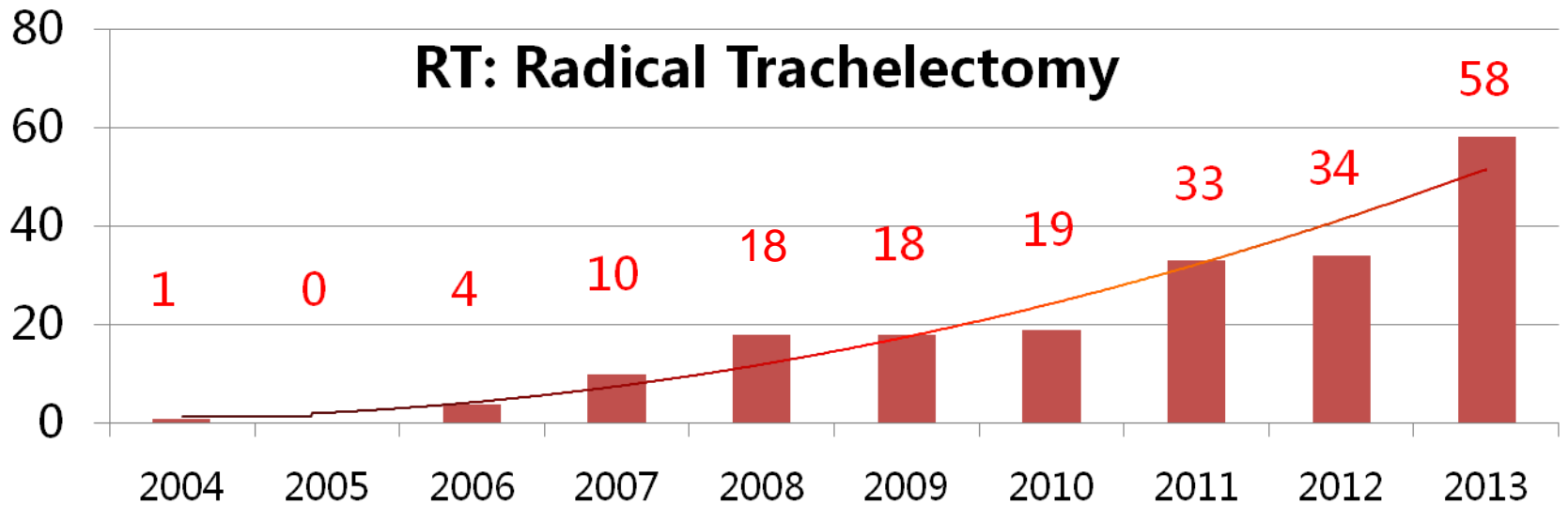
1. A desire for future fertility.
2. A proven diagnosis of cervical cancer.
3. Squamous cell carcinoma, adenocarcinoma, or adenosquamous carcinoma.
4. Tumor size less than 2 cm.
5. Stage IA1 disease with lymph vascular space invasion, stage IA2 disease, or stage IB1 disease.
6. Tumor limited to the cervix as confirmed by preoperative pelvic magnetic resonance imaging (MRI).
7. No evidence of pelvic lymph node metastases.
8. No previous documentation of infertility.

Eligibility criteria for ART

Suggested clinical eligibility criteria for radical abdominal trachelectomy

1. Confirmed invasive cervical cancer: squamous, adenocarcinoma, or adenosquamous
2. FIGO Stage IA2 to IB1
3. Age <45 years and strong desire to preserve fertility
4. No clinical evidence of impaired fertility
5. Lesion size ≤ 4 cm
6. Chest X-ray with no evidence of metastasis. At attending's discretion, preoperative MRI of pelvis+abdomen, or appropriate imaging protocol
7. 4–6 weeks post conization with adequate resolution of acute inflammation

RT/RH performed each year in FUSCC



Objectives

- To describe the surgical, oncologic, and fertility outcomes in 207 pts with ART at FUSCC
- questions
 - Is it safe for IB1 cervical cancer with Tumors ≥ 2 centimeters?
 - Which parametrium removed is more radical comparing ART with ARH?
 - On what scale does it benefit the patients if uterine arteries were preserved?

Study Design and Data Collection

- A retrospective review of a prospectively maintained database
- From 04/2004 to 06/2014, a total of 207 pts with cervical malignancies intended to undergo ART

Suggested eligibility criteria for ART

1. Confirmed invasive cervical cancer: squamous, adenocarcinoma, or adenosquamous
2. Tumor size less than 4 cm
3. FIGO stage IA1 disease with lymph vascular space invasion, or positive surgical margin and distorted cervicovaginal anatomy after conization; stage IA2 or IB1 disease.
4. Desire to preserve fertility.
5. Age \leq 45 years
6. Chest X-ray with no evidence of metastasis.

Suggested eligibility criteria for ART

(Continued)

7. MRI with no evidence of pelvic lymph node metastases and confirmation of tumor limited to the cervix.
8. Patient is not proper candidate for a vaginal surgery (**eg, pediatric/adolescent pts with cervical sarcoma**)
9. Four to six weeks after previous conization with adequate resolution of acute inflammation
10. No clinical evidence of impaired fertility

Patients Characteristic

Characteristic

Median Age , years	(11-44,median 28.9)
Histology	207 total cases
Squamous cell carcinoma	168(80.2%)
Adenocarcinoma	22(10.6%)
Adenosquamous	9 (4.4%)
Sarcoma	10 (4.8%)
FIGO Stage for Cervical Cancer Group	197 cases of cervical cancer
IA1(with LVSI/positive margin)	43 (21.8%)
IA2	19 (9.6%)
IB1	135 (68.6%)
Tumor size<2cm	44 (22.3%)
2cm ≤Tumor size≤4cm	91 (46.3%)

Oncological Results

- 16 pts converted to RH (Radical Hysterectomy)
- 5 (5/207, 2.4%) recurrence so far (median follow-up: 42.3m)

	Case 1	Case 2	Case 3	Case 4	Case 5
Histology	adenosquamous	adenosquamous	squamous	Adenocarcinoma	Adenocarcinoma
Tumor size	≥2cm	≥2cm	<2cm	≥2cm	<2cm
Recur-free survival	39m	24m	28m	19m	11
Treatment of recurrence	Salvage surgery+ chemoradiation	Salvage surgery+ chemoradiation	Salvage surgery+ chemoradiation	Salvage surgery+ chemoradiation	Salvage surgery+ chemoradiation

Obstetric Outcome

- 55 ptes attempted to conceive
- Nine (9/55, 16.4%) ptes have become pregnant
- Three employed assisted reproductive techniques
- Six delivered by cesarean section at 27- 39 weeks (1 at 27w and the other 5 at 37- 39w)
- Two ptes miscarriaged at 10 and 13 weeks, respectively

Tumor size ≥ 2 cm was statistically significant for the risk of recurrence

*Plante and Dargent et al. / Gynecol Oncol 2004;94(3):614–23.
& Bull Cancer 2002;89(12):1027–30)*

Most experiences are from VRT, ART could remove wider parametrial tissue than that of VRT

Saso S, et al. / BJOG 2012;119:187–193.



Is ART Safe for IB1 Cervical Cancer with Tumor ≥ 2 Centimeters ?

91 pts with tumor size ≥ 2 cm

80 succeeded with ART, including 3 LN(+) on final pathologic result

11 converted to RH

30 (32.9%) with adjuvant chemo, including 2 with positive LN who refused radiation

1 with adjuvant chemoradiation

79 (86.8%) preserved fertility potential

12 lost fertility

Expanding the Indications for Radical Trachelectomy A Report on 29 Patients With Stage IB1 Tumors Measuring 2 to 4 Centimeters

Stephanie L. Wethington, MD, Yukio Sonoda, MD,*† Kay J. Park, MD,‡ Kaled M. Alektiar, MD,§
William P. Tew, MD,†|| Dennis S. Chi, MD,*† Mario M. Leitao, Jr, MD,*† Elizabeth L. Jewell, MD,*†
Richard R. Barakat, MD,*† and Nadeem R. Abu-Rustum, MD*†*



110 pts for planned RT; Age 31 y; 83% nulliparous
 13 squamous, 12 adenocarcinoma, 4 adenosquamous
 13 PLNM (45%)
 29 (26%) pts with tumor measuring 2-4cm
 13 (45%) Converted to RH, 7 (24%) underwent chemoradiation
 9 (31%) preserved their fertility
 No recurrence was observed at a median follow-up of 44m

Expanding RT inclusion criteria to women with 2 to 4 cm tumors allows for a fertility-sparing procedure in 30% of patients who would otherwise have been denied the option, with no compromise in oncologic outcome.

Use of Abdominal Radical Trachelectomy to Treat Cervical Cancer Greater Than 2 cm in Diameter

Balazs Lintner, MD, Srdjan Saso, BSc, MRCS,† Laszlo Tarnai, MD,* Zoltan Novak, MD,*
Laszlo Palfalvi, PhD, MD,* Giuseppe Del Priore, MD, MPH,‡ J. Richard Smith, MD, FRCOG,§
and Laszlo Ungar, PhD, MD**



45 pts with tumor > 2 cm; IB1-2; 32 yo ;
17 squamous, 4 adenocarcinoma, 5 adenosquamous
31 (69%) underwent RT; 14 (31%) underwent RH
Follow-up: 90 months
5-y OS : 93.5% (29/31) ; 5-y DFS: 87.1% (27/31)

The 5-year survival (93.5%) for this series is equal (or better) to rates reported in the literature for patient treated with RH.
The data seem to support the hypothesis that ART is a safe treatment option for patients with invasive cervical cancer lesions of more than 2 cm.

Summary 1

- ART is safe for selected patients with IB1 cervical cancer whose tumor ≥ 2 cm and < 4 cm
- Pts with adenosquamous cancer ≥ 2 cm may carry certain risk of recurrence after ART
- 1/3 of those patients underwent adjuvant chemo

LI J., WU XH, et al. Gynecol Oncol 131(1), 2013

Does ART remove as similar parametrial tissue as ARH?

Choice and Grouping

- >18 years or older
- After biopsy, conization or LEEP
- Invasive epithelial cervical carcinoma
(Squamous, adenocarcinoma, and adenosquamous carcinomas)
- Stage IA1 with LVSI or positive margin, Stage IA2、IB1(tumor size <4 cm),
- No evidence of metastasis on MRI, PET-CT, or CT.

fertility-preserve or not?

Abdominal Radical Trachelectomy
(ART)
+
pelvic lymphadenectomy 47 cases

Abdominal Radical Hysterectomy
(ARH)
+
pelvic lymphadenectomy 105 cases

ART

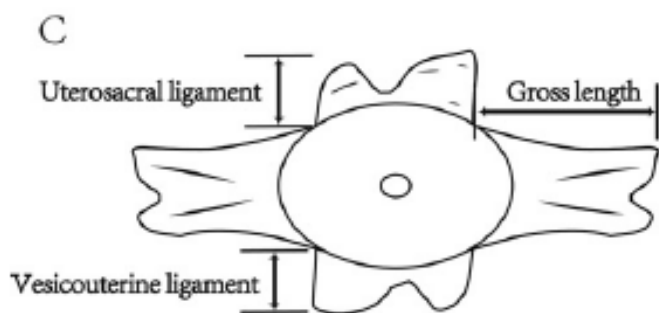
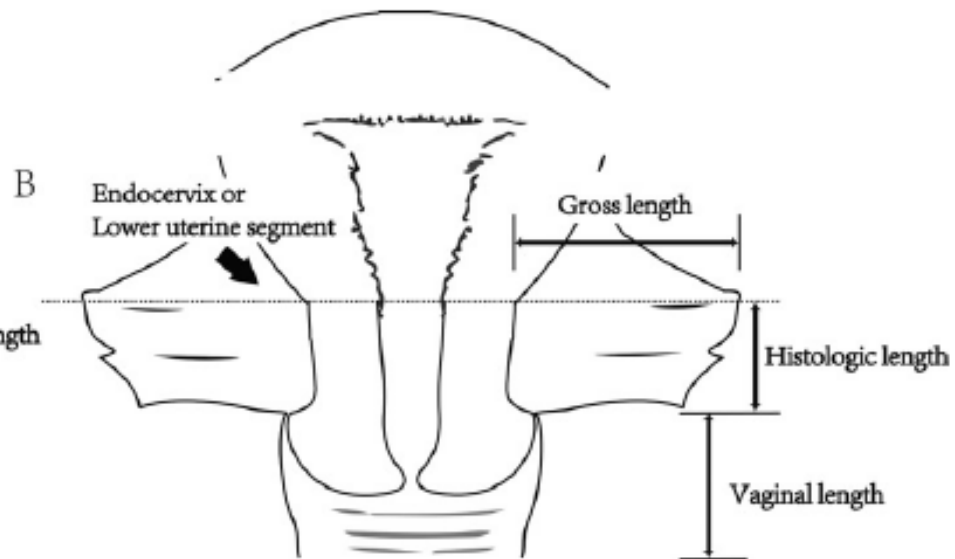
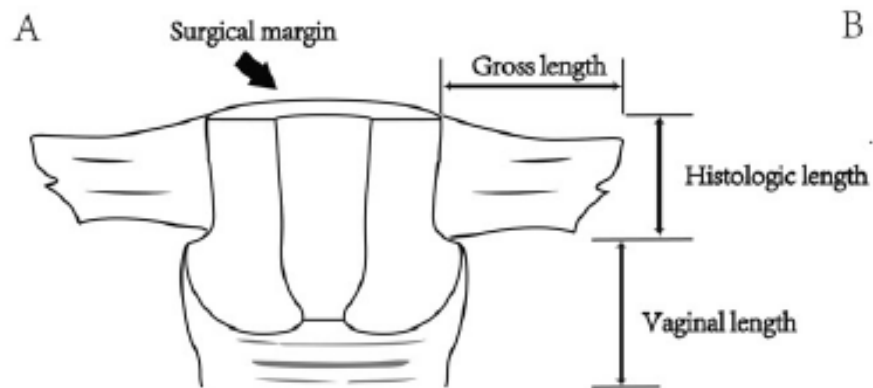
- metastatic lymph node
- positive endocervical margin
- Metastatic in enterocoelia

ARH

Surgical and Pathological Outcomes

ART: n= 47

ARH: n= 105



The lengths of ligament and vagina removed was fixed and measured

Pathologic results of the trachelectomy and hysterectomy specimens with bilateral parametrial measurements by the pathologists.

	ART (mm)	ARH (mm)	P value
Medial gross length (average)	44.08±17.52	44.96±20.77	0.432
Left	45.49±18.20	43.48±17.27	0.649
Right	44.79±22.28	45.03±20.20	0.246
Medial histologic length	25.74±5.24	26.09±5.11	0.361
Medial vesicouterine ligaments length	3.85±1.76	4.01±2.06	0.647
Medial uterosacral ligaments length	13.30±4.86	12.88±4.51	0.605
Medial vaginal length			
12 o'clock	17.34± 6.27	17.47± 5.92	0.904
3 o'clock	21.53± 5.76	21.27± 4.65	0.761
9 o'clock	22.21± 5.41	22.11± 4.78	0.906
6 o'clock	24.43± 7.41	24.80± 6.07	0.743

Three-segment Technique:

Parametrial Lymph nodes

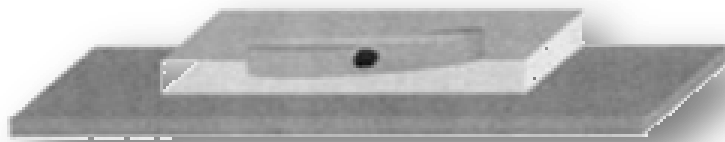
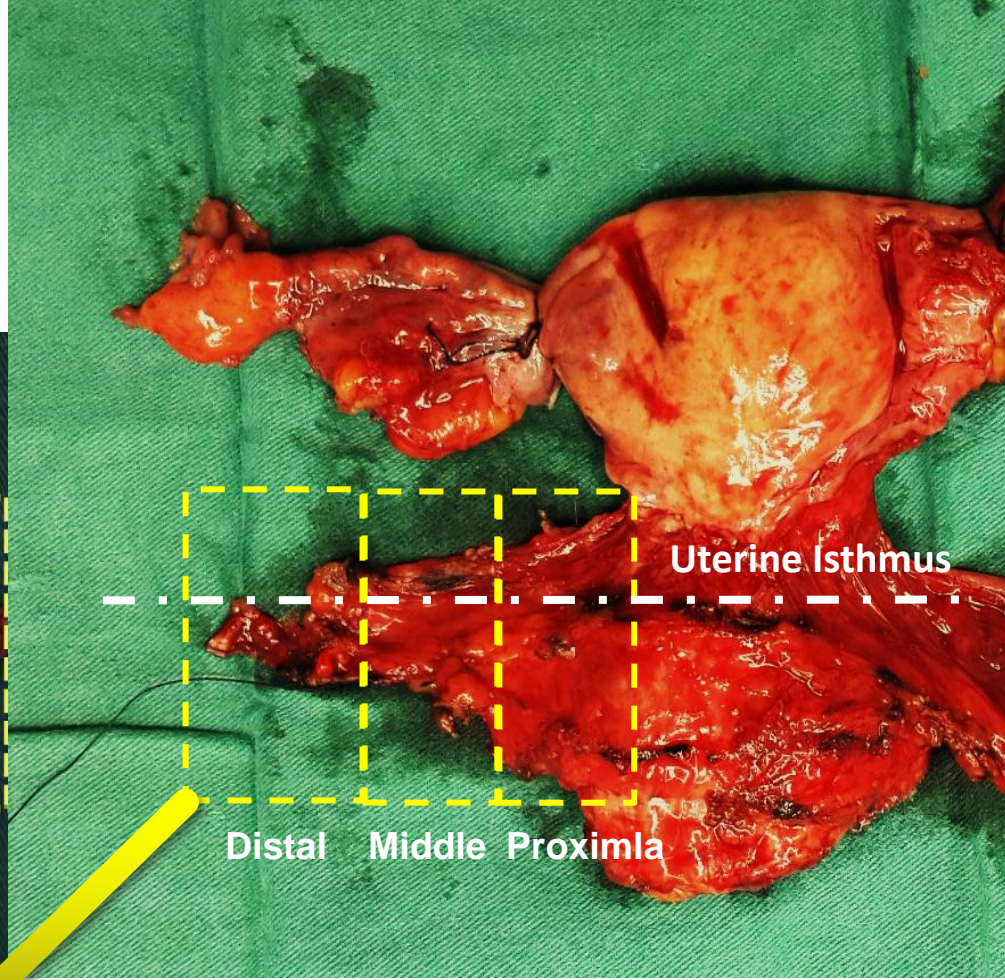
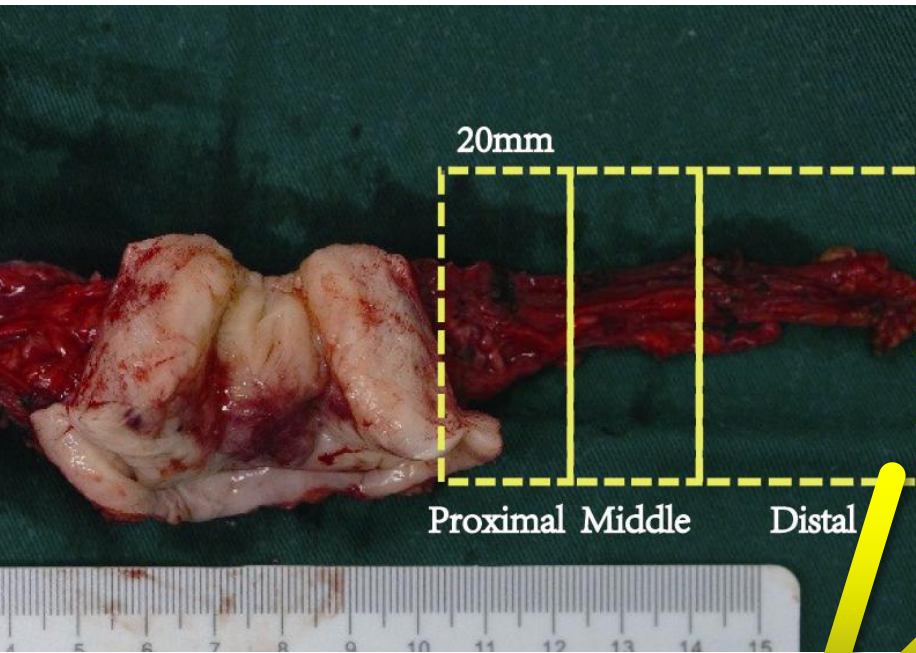


TABLE 3. Pathologic results of the trachelectomy and hysterectomy median lymph node count

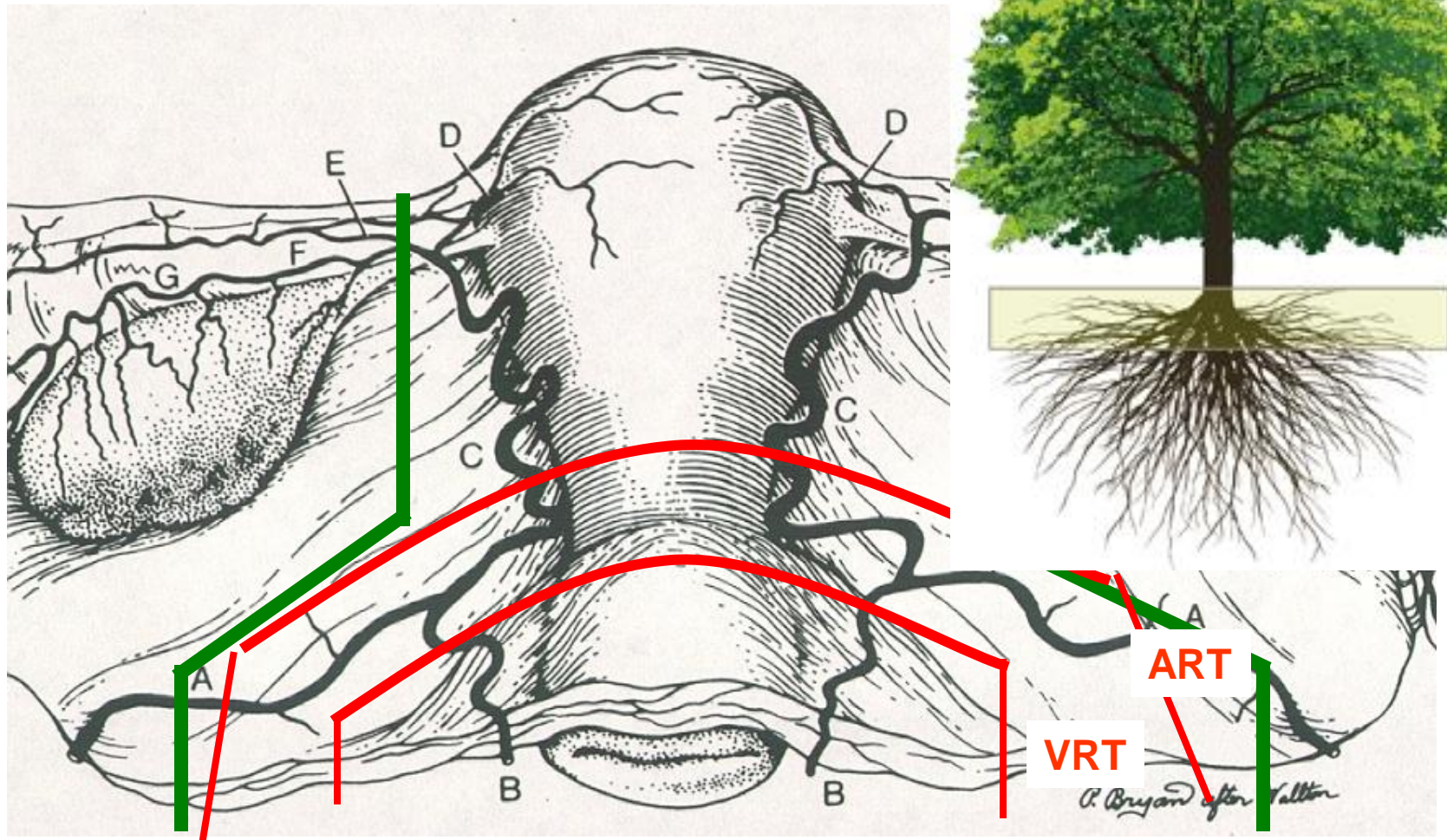
	ART (n), Median (Range)	ARH (n), Median (Range)	<i>P</i>
Total lymph node	18 (7–34)	24 (8–54)	0.013
PLN			
Left	6 (2–12)	7 (2–20)	0.007
Right	5 (1–13)	8 (1–17)	0.001
Common iliac lymph node			
Left	3 (1–9)	3 (1–15)	0.941
Right	3 (1–10)	3 (1–12)	0.633
PMLN			
Total	1 (0–11)	2 (0–17)	0.180
Left	1 (0–4)	1 (0–6)	0.079
Right	1 (0–5)	1 (0–6)	0.131
Uterosacral	0 (0–2)	0 (0–3)	0.847
Vesicouterine	0 (0–1)	0 (0–2)	0.969
Size, mean (SD), mm	2.54 (1.80)	3.53 (2.83)	0.190
Inner region, n (%)	63/86 (73.26)	212/301 (69.51)	
Medial region, n (%)	16/86 (18.60)	58/301 (19.27)	
Lateral region, n (%)	6/86 (6.98)	31/301 (10.30)	

PMLN: ART: 80.9% vs ARH: 96.3%
Proximal: 73.3% vs 69.5%

Summary 2

- Using standardized techniques, ART provides similar surgical and pathological outcomes as ARH.
- For the patients with tumors of 2 cm or greater, PMLNs should be examined carefully.

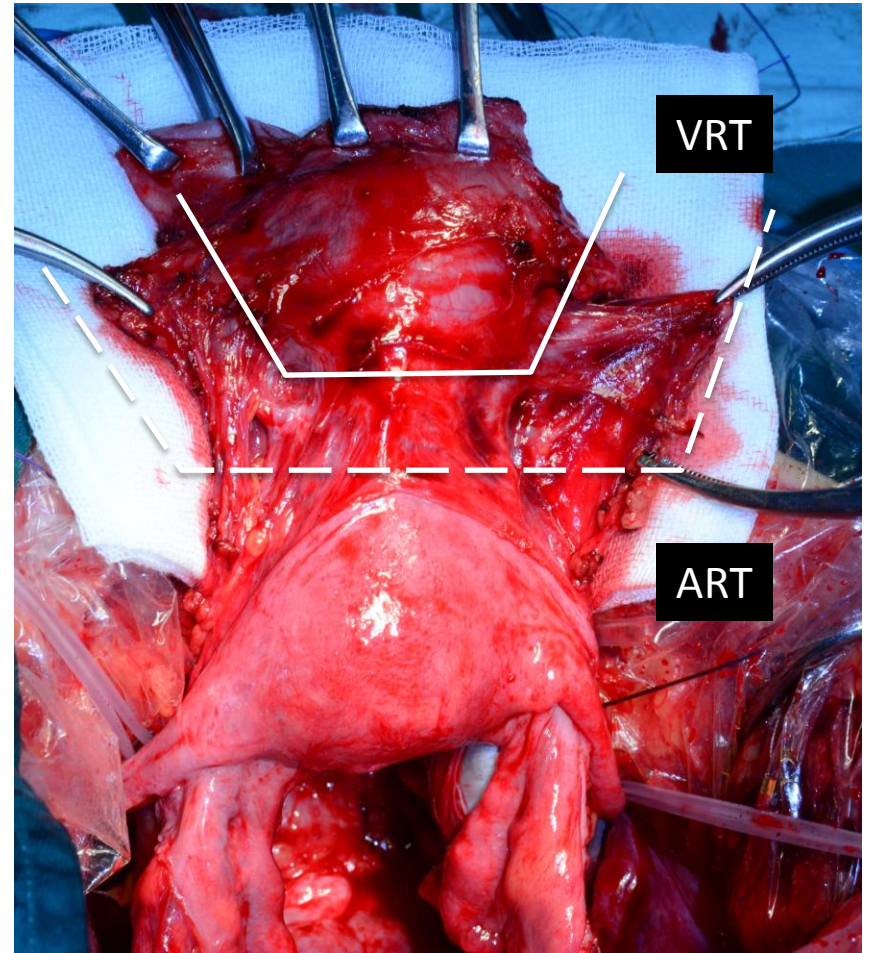
RH vs ART vs VRT



On what scale does it benefit the patients if uterine arteries were preserved?

Relatively large tumore

- Sacrifice uterine arteries
- Keep round ligament intact

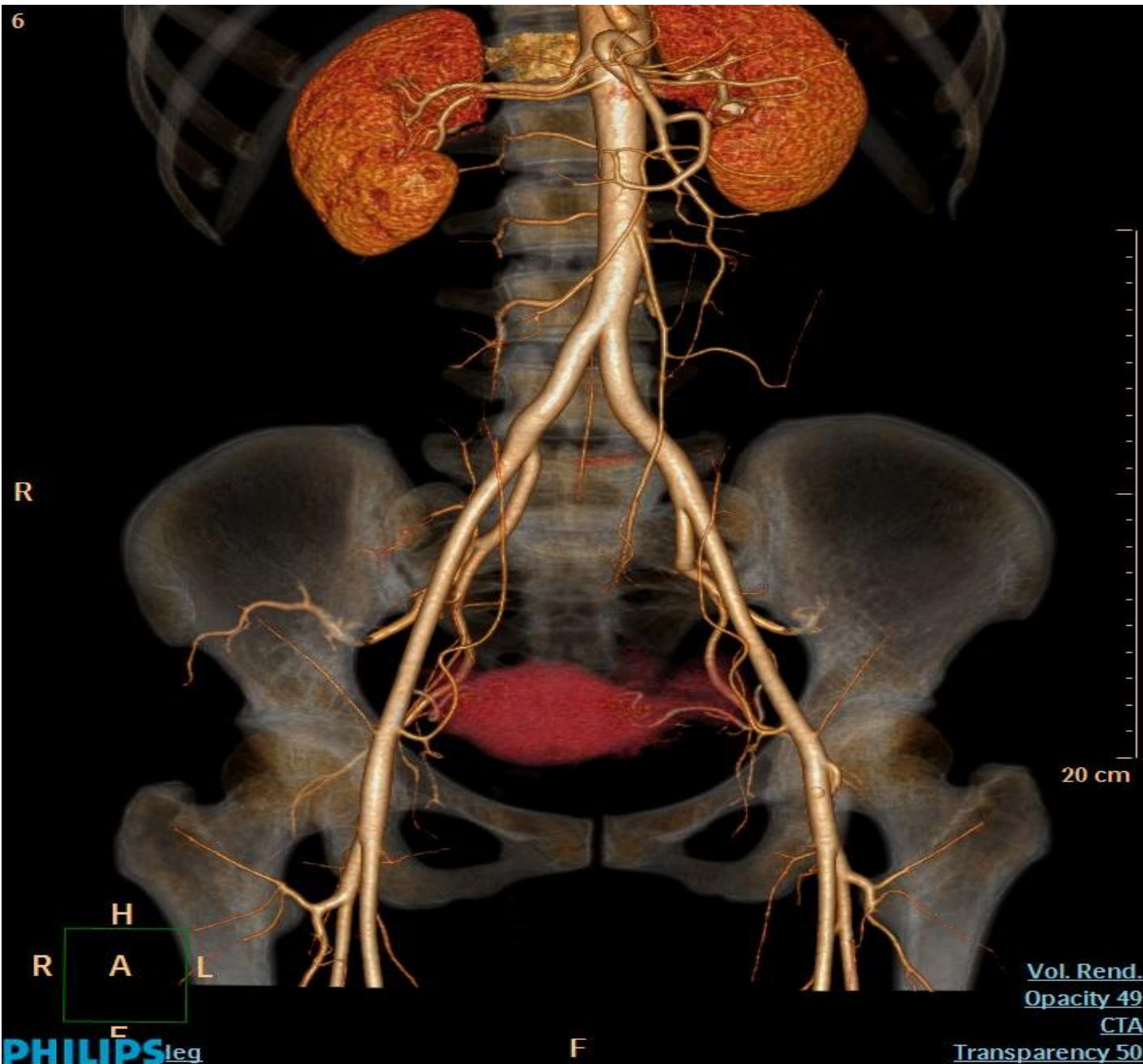


Patients and CTA scanning

- From Jun. of 2012 to Mar. of 2013
- 26 consecutive post-ART patients included from the out patient service
- CTA scan mainly 6 months post-operatively
- Analysis the 3D reconstructed results

Tang J. ... Wu HX. Gynecologic Oncology 134(1): , 2014

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R

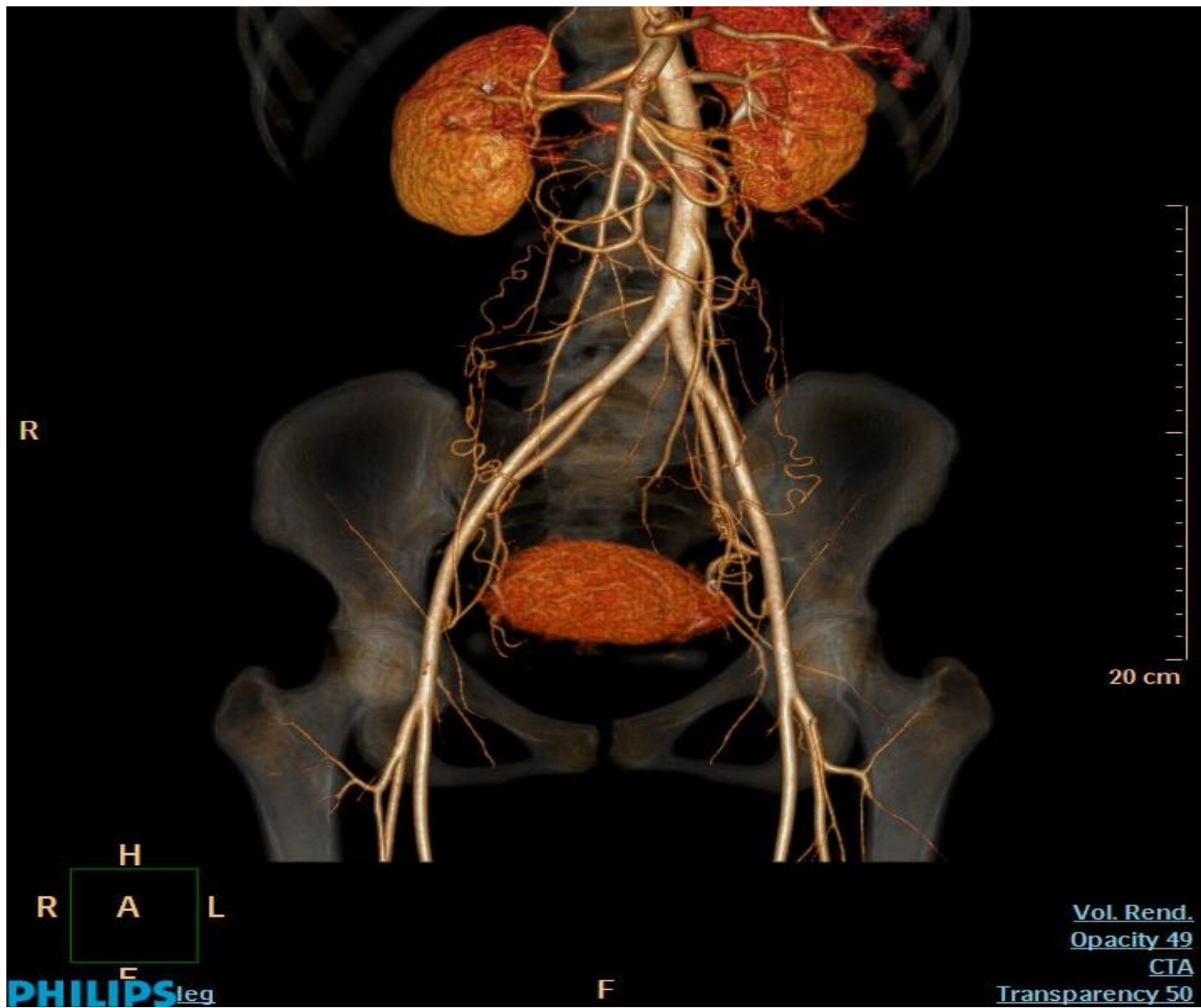
20 cm

H
R A L
F

PHILIPS_{leg}

F

Vol. Rend.
Opacity 49
CTA
Transparency 50



R

20 cm

R

H

A

L

F

F

Vol. Rend.
Opacity 49
CTA
Transparency 50

PHILIPS_{leg}

Grouping by Supplying patterns

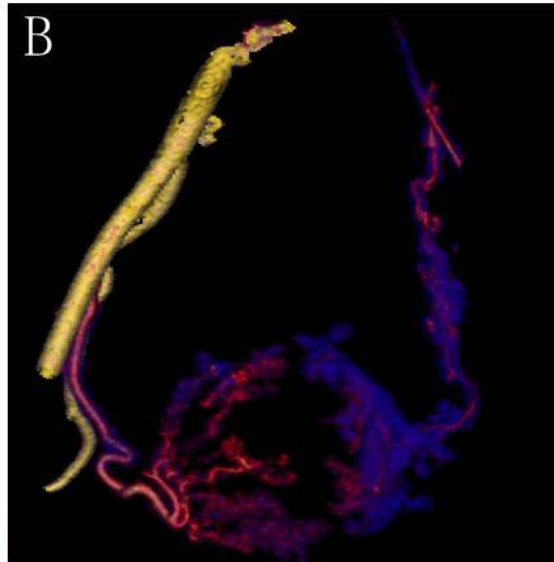
Ovarian arteries
supplying group



65.4%

2 pregnancies

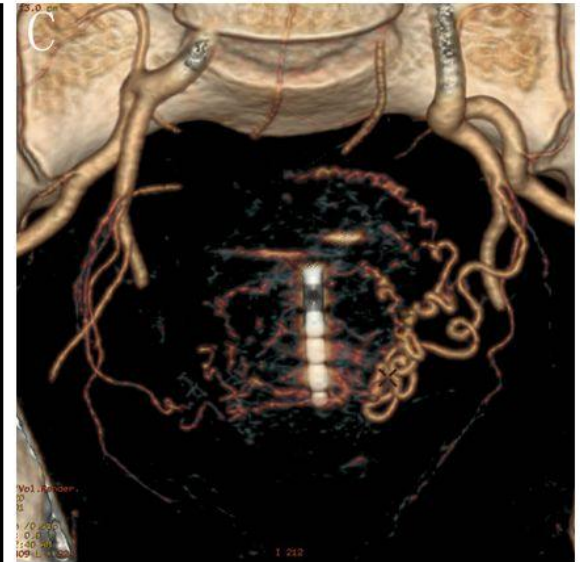
Hybrid supplying group



26.9%

1 pregnancy

Uterine arteries
supplying group



7.7%

0 pregnancy

Summary 3

- The ovarian artery became the dominant supplying vessel after ART.
- the contributing uterine artery did not show any functional superiority.
- the benefit of preserving the uterine arteries during ART is probably very limited.

Acknowledgments

Drs. J. Li, J. Tang, D. Zhang, X. Ju, X. Han, Z. Li, H. Wang, R. Zang, H. Ge, S. Wang



Thank you for your attention



Fudan University Shanghai Cancer Center