KOREA UNIVERSITY MEDICAL CENTER

Laparoscopic Surgery in Early Stage Ovarian Cancer



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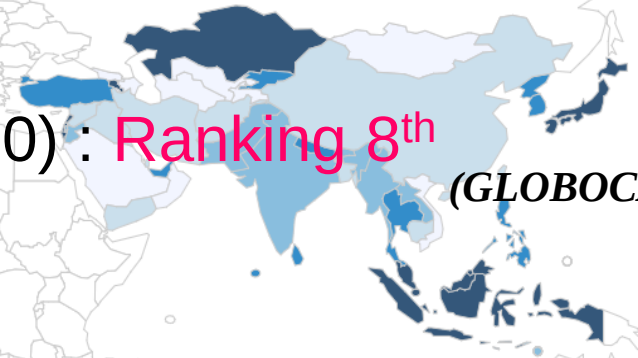
Ovarian Cancer in 2012

KUMC

- **Worldwide**
  - Incidence
    - New cases: 238,719 (6.8/100,000)
    - 8th most common in 2008 → 7th in 2012
  - Mortality
    - Deaths: 151,905 (4.3/100,000) : Ranking 8th



(GLOBOCAN 2012)

- **In Korea**
  - Incidence: 8.0/100,000 (in 2011): Ranking 10th
  - Mortality: 2.7/100,000: Ranking 8th

(Statistics Korea)

Poor Survival in Ovarian Cancer

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- In a large data of 1,815,584 patients

Europe, country-weighted observed and relative survival (%), by age at diagnosis (years)

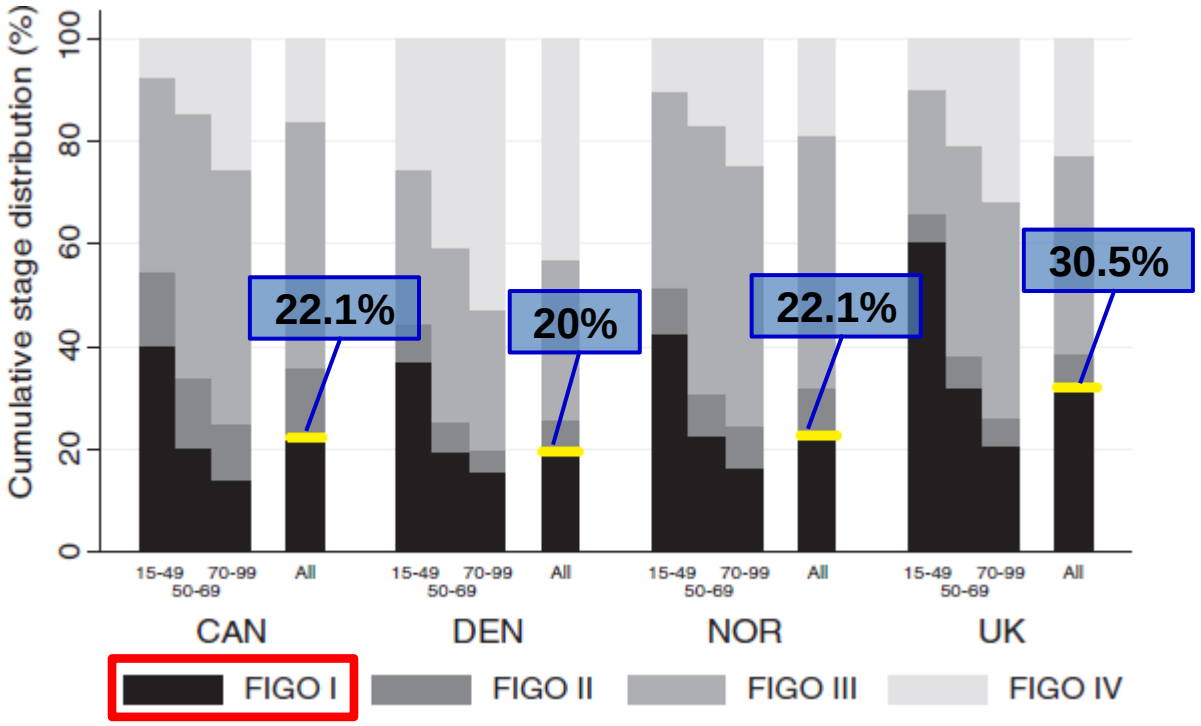
	AGE	15-44		45-54		55-64		65-74		75-99		All ages 15-99	
		obs	rel	obs	rel	obs	rel	obs	rel	obs	rel	obs	rel
Women	One year	88	**89**	83	**84**	72	**73**	60	**61**	35	**38**	65	**66**
	Three years	74	**74**	60	**61**	45	**46**	33	**35**	18	**23**	42	**45**
	Five years	69	**70**	49	**50**	35	**37**	25	**28**	13	**20**	34	**38**

➡ Just about 1/3 women are alive 5 years after diagnosis.

EUROCARE-3. Annals of Oncology 2003

Distribution by stage

- Poor survival: Largely because most women are diagnosed when the cancer is already at an advanced stage.



Gynecol oncol 2012;127:75

Diagnosis in Early Stage

- Diagnosis is usually made by accidental discovery at sonography, CT scanning or during laparoscopy.

- Incidence of accidental discovery at laparoscopy for an adnexal mass

  - 0.65% – 0.9% of premenopausal women

  - 3% of postmenopausal women

J Minim Invasive Gynecol 2005;12:81

Standard Management

- **Intention of surgical staging**
  - To assess the extent of the disease
  - To remove as much gross tumor as possible

- **Surgical Treatment**
  - Comprehensive surgical staging
    by laparotomy, a midline abdominal incision

  - Includes…
    total hysterectomy, BSO, cytology, omentectomy,
    retroperitoneal (pelvic & para-aortic) LN dissection or sampling,
    biopsy of all suspicious areas including mesentery, liver & diaphragm

Laparoscopic Surgery

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Minimally Invasive Surgery:

always been a hot issue in GY era, now even in GY cancer!

- **Endometrial cancer**
  - In a meta-analysis of 8 RCTs:

    "Laparoscopic approach is safer than the traditional abdominal approach with particular regard for postoperative complications."

    Am J Obstet Gynecol 2012;207:94

- **Cervical Cancer**
  - Recently many studies about laparoscopic radical op.

In Ovarian Malignancies

(1) Borderline ovarian tumor

- Evidence mostly based on retrospective series suggest : Laparoscopic surgery in BOT *seems feasible and safe.*

- **But,** BOT is distinct from ovarian cancer
  - Excellent prognosis:

    Overall survival: 98% in stage, 92% in advanced stage
  - High proportion of early stage: stage I (50-85%)

(2) Invasive ovarian cancer

Invasive Ovarian Cancer

(1) Laparoscopy in early stage

(2) Laparoscopy in advanced stage

- Role of laparoscopy has been primarily described in 4 areas:
  - Triage tool for resectability
  - Second-look surgical evaluation
  - Primary or secondary cytoreduction
  - Insertion of intraperitoneal catheters

J Minim Invasive Gynecol 2009;16:250

- PubMed 30 articles about laparoscopy in advanced ovarian cancer

Early Stage Ovarian Cancer

- Stage I ovarian cancer is a rare disease

  & laparoscopy for staging is a relatively new field of clinical study, so data are scarce.

- Laparoscopy in ovarian cancer *remains controversial.*

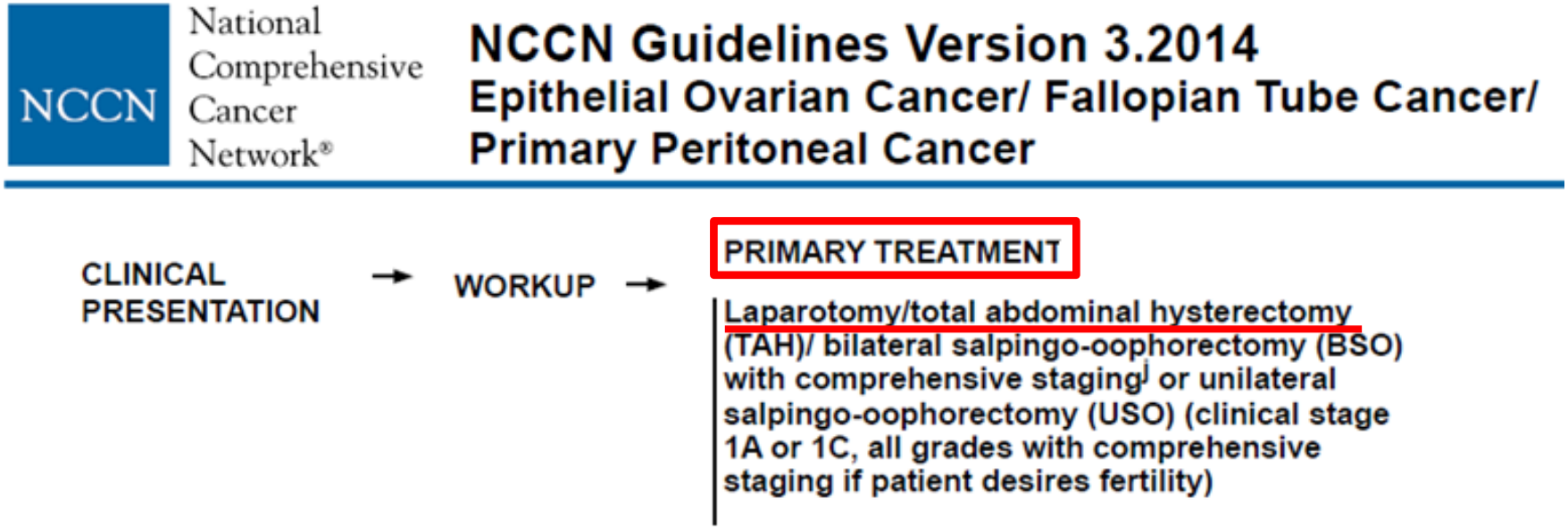
  & Unclear how the risks & benefits compare with the conventional open approach by laparotomy.

- Different guideline about standard procedure

Difference in the Guidelines

- **Recent UK Guidelines**
  - Not consider laparoscopy as an approach to the surgical staging of early ovarian cancer

- **German Gynecological Oncology Group**
  - For selected patients & only when performed by expert laparoscopic oncology surgeons, pending further evidence



- In most instances, a vertical midline abdominal incision *should* be used in patients with a suspected malignant ovarian.

- *For select patients*, a minimally invasive surgical approach may be employed by an experienced surgeon.

Current Status of Studies

- First report: *Querleu* in 1993

  for two women with borderline ovarian tumors

- A meta-analysis (Cochrane review)

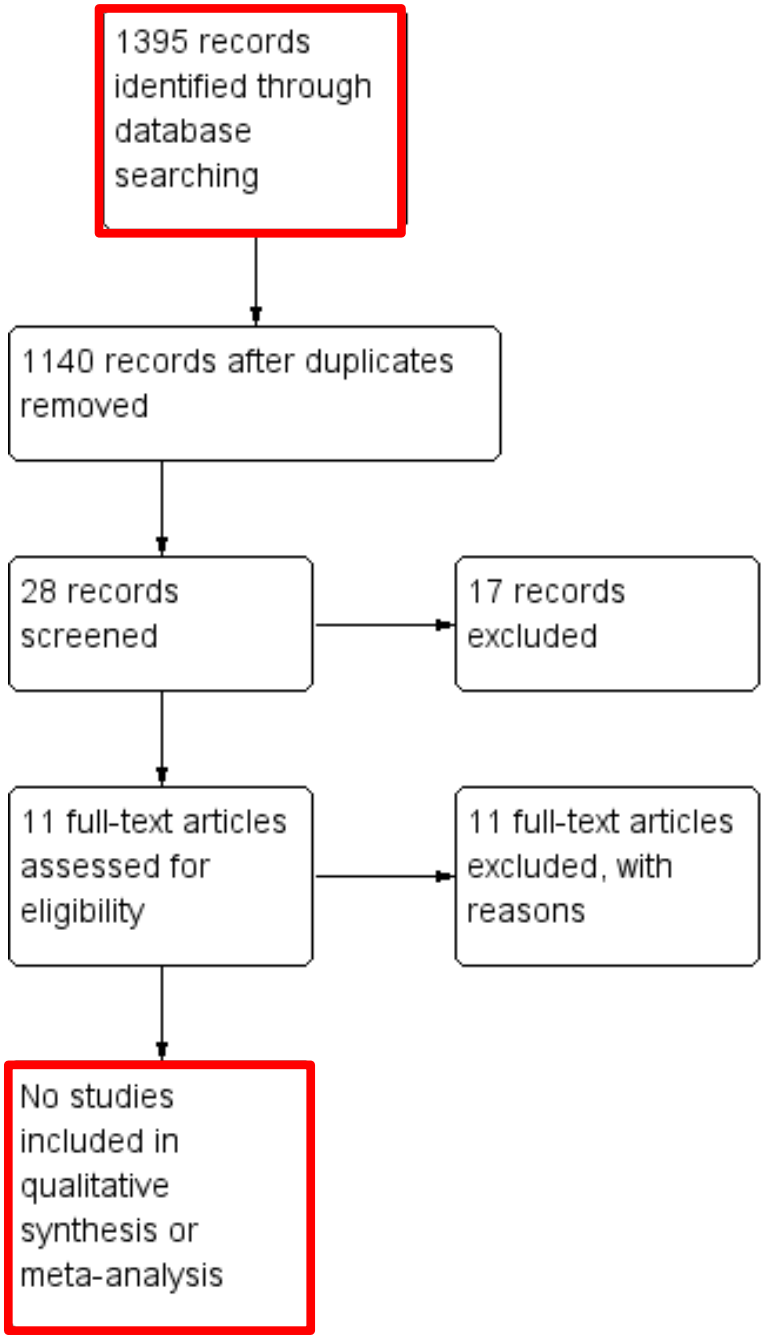
  - 2008: No RCTs were identified.

    3 observational studies were identified.
  - 2013: This review has found no good-quality evidence.

Meta-analysis

- 1,395 records
- **None** of the comparative studies reported adjusting results for baseline characteristics, considered to be at a high risk of selection bias and other bias

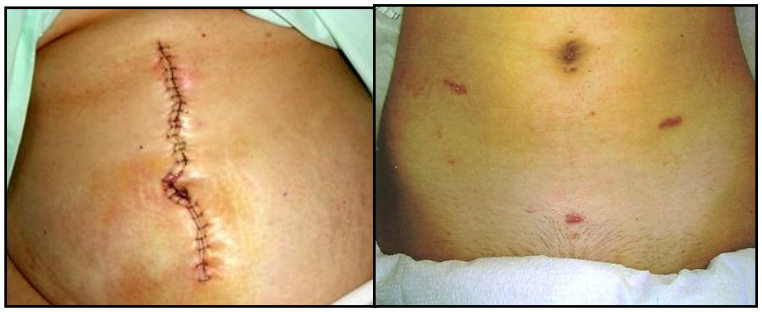
- Summarized the relevant case series, case-control studies, & retrospective cohort studies



Cochrane Database Syst Rev 2013

Possible Advantages

1. Less blood loss
2. Fewer complications
   - Less postoperative infection



3. Faster recovery
   - Shorter hospital stay, faster return of bowel function
   - Chemotherapy can be commenced sooner

   ➡ Potentially resulting in a favorable effect on survival ?

4. Smaller incisions ➡ Improve patient's satisfaction ?
5. Laparoscopy image can be magnified.

   ➡ Better visualization of the tumor inside the abdomen ?

1. Blood Loss

3 Case-control studies & 5 Retrospective cohort of LPS vs. open staging of early ovarian cancer

	Study period	No. Case		Blood loss (ml)			Transfusion (n, %)		
		LPS	LPT	LPS	LPT	*P*	LPS	LPT	*P*
Hua 2005	2002 -2004	10	11	280 ↓	346	<0.05	-	-	-
Chi 2005	2000 -2003	20	30	235 ↓	367	0.003	-	-	-
Ghezzi 2007	2003 -2006	15	19	250	400	0.28	1 (6.7)	2 (10.5)	1.0
Park[a] 2008	2001 -2006	17	19	231 ↓	505	0.001	0	2 (11)	-
Park[b] 2008	2004 -2007	19	33	240 ↓	569	0.005	1 (5) ↓	10 (30)	0.04
*Park 2010**	2004 -2008	40	76	301 ↓	494	0.004	6 (15)	23 (30)	0.071
*Park 2011**	2004 -2010	84	128	207 ↓	262	<0.001	6 (13) ↓	36 (28)	0.012
Lee 2011	2005 -2010	26	87	230 ↓	475	<0.001	0 ↓	20 (23)	0.006

*These studies are expansions of the original data set.

*LPS (laparoscopy) vs. LPT (laparotomy)

2. Complication

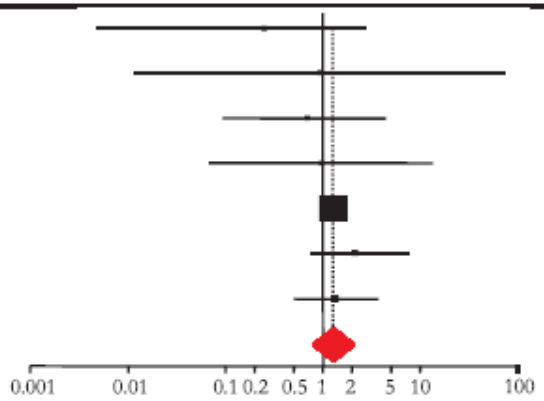
	Study period	No. Case		Conversion to LPT (n)	(Postop) Complications		
		LPS	LPT	LPS	LPS	LPT	*P*
Hua 2005	2002 -2004	10	11	-	2 (20%) ⬇	7 (72.7%)	< 0.01
Chi 2005	2000 -2003	20	30	0	0	3 (10%)	-
Ghezzi 2007	2003 -2006	15	19	0	2 (13.3%)	8 (42.1%)	0.13
Park[a] 2008	2001 -2006	17	19	0	0	4 (21%)	-
Park[b] 2008	2004 -2007	19	33	1	2	9	0.290
*Park 2011**	2004 -2010	84	128	-	6 (7.1%) ⬇	25 (20%)	0.013
Lee 2011	2005 -2010	26	87		2	20	-

*These studies are expansions of the original data set.

❖ 8 RCTs of Endometrial cancer

A Intraoperative complications

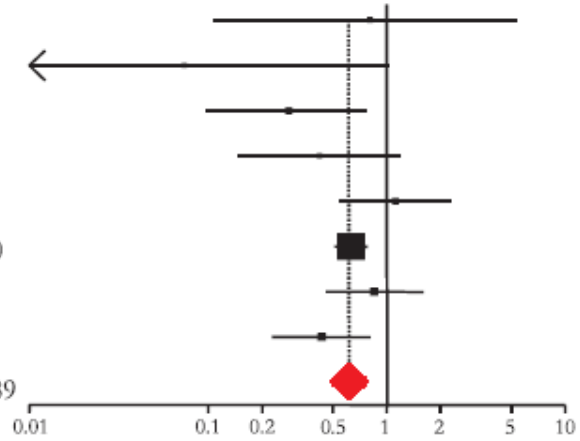
Study (ref.)	N. events/N. entered LS	LT	OR (fixed effect) 95%CI	Weight %	OR (fixed effect) 95%CI
Fram et *al.* (14)	1/29	4/32		3.25	0.28 (0.04 to 1.71)
Tozzi et *al.* (16)	1/63	1/59		0.88	0.94 (0.10 to 8.86)
Zullo et *al.* (17)	3/40	4/38		4.37	0.69 (0.10 to 4.42)
Malzoni et *al.* (18)	2/81	2/78		1.74	0.96 (0.17 to 5.36)
Walker et *al.* (21)	160/1696	69/920		78.55	1.32 (1.02 to 1.72)
Mourits et *al.* (22)	20/185	5/94		3.39	1.35 (0.40 to 4.65)
Janda et *al.* (23)	14/190	8/142		7.81	1.31 (0.58 to 2.98)
Total	201/2284	93/1363		100	1.25 (0.99 to 1.56)



B Post-operative complications

Significant advantage of laparoscopy

Study (ref.)	N. events/N. entered LS	LT	OR (fixed effect) 95% CI	Weight %	OR (fixed effect) 95%CI
Fram *et al.* (14)	3/29	4/32		0.72	0.82 (0.22 to 3.06)
Zorlu *et al.* (15)	0/26	5/26		1.09	0.09 (0.00 to 0.71)
Tozzi *et al.* (16)	8/63	20/59		3.94	0.37 (0.18 to 0.76)
Zullo *et al.* (17)	11/40	18/38		3.52	0.84 (0.51 to 1.40)
Malzoni *et al.* (18)	29/81	26/78		5.05	1.07 (0.70 to 1.65)
Walker *et al.* (21)	240/1696	191/920		65.74	0.70 (0.61 to 1.65)
Mourits *et al.* (22)	40/185	23/94		8.59	1.05 (0.76 to 1.46)
Janda *et al.* (23)	22/190	33/142		11.34	0.46 (0.31 to 0.67)
Total	353/2310	320/1389		100	0.71 (0.63 to 0.79)



Am J Obstet Gynecol 2012;207:94

3. Recovery

	Return to bowel movement (days)			Hospital stay (days)			Time to Adj CTx (days)		
	LPS	LPT	*P*	LPS	LPT	*P*	LPS	LPT	*P*
Chi 2005	-	-	-	3.1 ↓	5.8	< 0.01	-	-	-
Ghezzi 2007	-	-	-	3 ↓	7	0.001	-	-	-
Park[a] 2008	3.8 ↓	2.0	<0.001	9.4 ↓	14.1	0.002	11.1	14.3	0.140
Park[b] 2008	1.3 ↓	3.6	<0.001	8.9 ↓	14.5	0.002	12.8 ↓	17.6	0.049
*Park 2010**	1.7 ↓	3.6	<0.001	7.9 ↓	14.5	0.002	15.8 ↓	20.7	<0.001
*Park 2011**	1.8 ↓	3.1	<0.001	6.3 ↓	13.5	<0.001	15.8 ↓	20.7	<0.001
Lee 2011	-	-	-	6.4 ↓	12.4	<0.001	8.5 ↓	10.3	0.007

*These studies are expansions of the original data set.

Potential Disadvantages

1. **Feasibility:** Technical challenge
   - Longer operating time
   - Longer learning curve
   - Difficulty in comprehensive surgical staging
     - Particularly LND, Up-staging rate
   - Higher rate of intraoperative cyst rupture & tumor spillage

2. **Safety issues**
   - Laparoscopy-specific complications
     - Effect of CO_2 for pneumoperitoneum
     - Possibility of port-site metastases
   - Insufficient survival data that guarantee the oncologic safety

3. **Higher cost**

1. Operating time

	Study period	No. Case		OP time (min)		
		LPS	LPT	LPS	LPT	*P*
Hua 2005	2002 -2004	10	11	298 ↑	182	<0.05
Chi 2005	2000 -2003	20	30	321 ↑	276	0.04
Ghezzi 2007	2003 -2006	15	19	377 ↑	272	0.002
Park[a] 2008	2001 -2006	17	19	303	290	0.706
Park[b] 2008	2004 -2007	19	33	221 ↓	275	0.012
*Park 2010**	2004 -2008	40	76	230 ↓	278	0.001
*Park 2011**	2004 -2010	84	128	207 ↓	262	<0.001
Lee 2011	2005 -2010	26	87	228 ↑	184	0.016

*These studies are expansions of the original data set.

Measures of the technical feasibility have included:
- LN yields,
- Size of the omental specimen,
- Intra-operative tumor spillage,
- & Operating time.

These differences reflect differences in surgeons' skills & LS techniques between investigator teams.

2. Learning curve

THE JOURNAL OF MINIMALLY INVASIVE GYNECOLOGY

- Endometrial cancer

Variable	Traditional total abdominal n=56	Robotic-assisted n=36	Laparoscopic n=56	p Value
Operating time, min	136.9 (32.3)	162.5 (53.0)	192.3 (55.5)	<.001
Estimated blood loss, mL	266.0 (145.1)	89.3 (45.4)	209.1 (91.8)	<.001
No. of lymph nodes retrieved				
Pelvic	30.8 (14.0)	19.2 (7.9)	24.1 (11.8)	<.001
Para-aortic	25.0 (13.7)	12.9 (7.6)	20.9 (12.1)	<.001

2010;17:739
Lim et al in U.S

Procedure	Case 1-20 Mean (SD)	Case 21-40 Mean (SD)	Case 41-56 Mean (SD)	p Value
Operating time				
Traditional abdominal hysterectomy	139.7 (33.5)	133.3 (31.5)	NA	.56
Robotic-assisted hysterectomy	183.2 (69.0)	152.7 (39.8)	148.8 (36.7)	.09
Laparoscopic hysterectomy	196.7 (32.4)	181.4 (49.0)	200.9 (83.3)	.54
Pelvic lymph node retrieval				
Traditional abdominal hysterectomy	29.3 (15.6)	32.8 (12.2)	NA	.56
Robotic-assisted hysterectomy	18.0 (6.9)	22.2 (7.8)	17.2 (8.5)	.12
Laparoscopic hysterectomy	20.6 (9.7)	22.9 (11.6)	30.6 (12.7)	.03
Para-aortic lymph node retrieval				
Traditional abdominal hysterectomy	23.6 (15.0)	26.8 (12.2)	NA	.50
Robotic-assisted hysterectomy	12.8 (7.1)	16.2 (7.9)	10.2 (8.7)	.47
Laparoscopic hysterectomy	15.8 (7.2)	20.8 (11.1)	28.0 (15.5)	.01

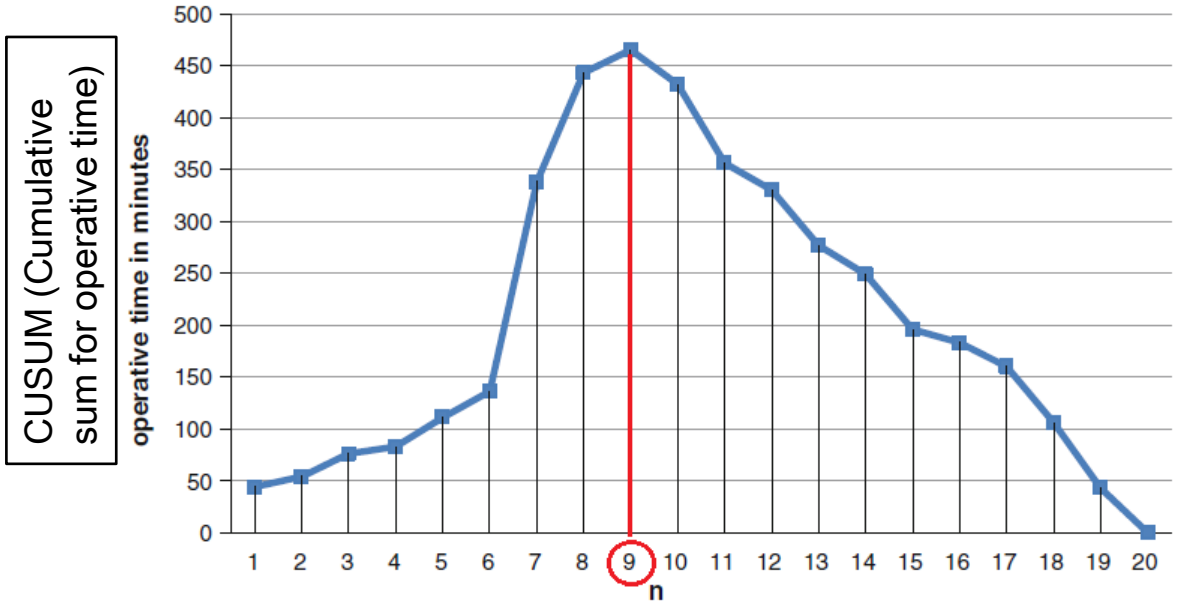
- The learning curve of LS staging surgery seems to be more difficult than that of open surgery, even than robotic surgery.

2010;17:739
Lim et al in U.S

- *Then, how many cases are enough?*

GYNECOLOGIC ONCOLOGY

Arch Gynecol Obstet (2013) 288:635–642



- 20 patients with LS hysterectomy and PLND (±PALNS) for early cancer : 13 cervical & 7 endometrial

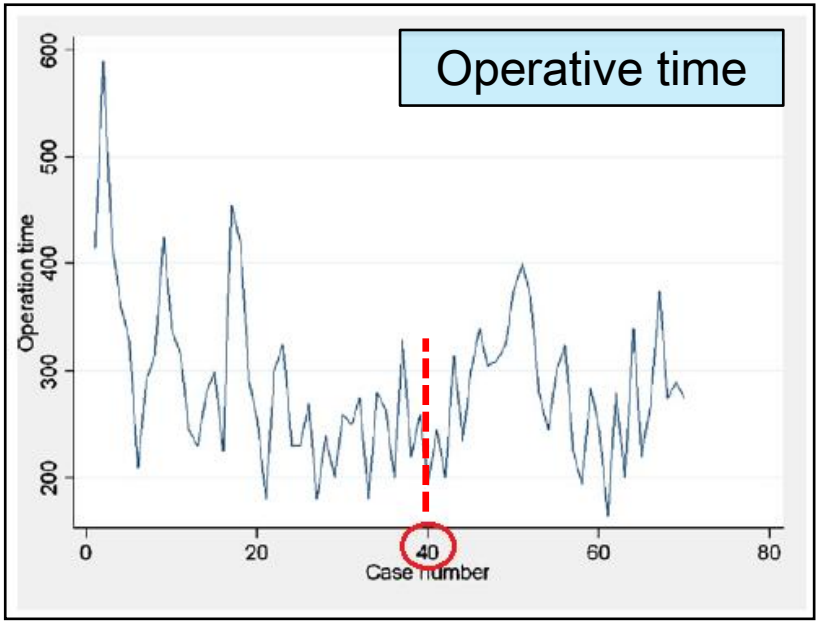
- After a learning curve of 9 patients, a relevant improvement at least regarding the duration of the operation can be achieved.

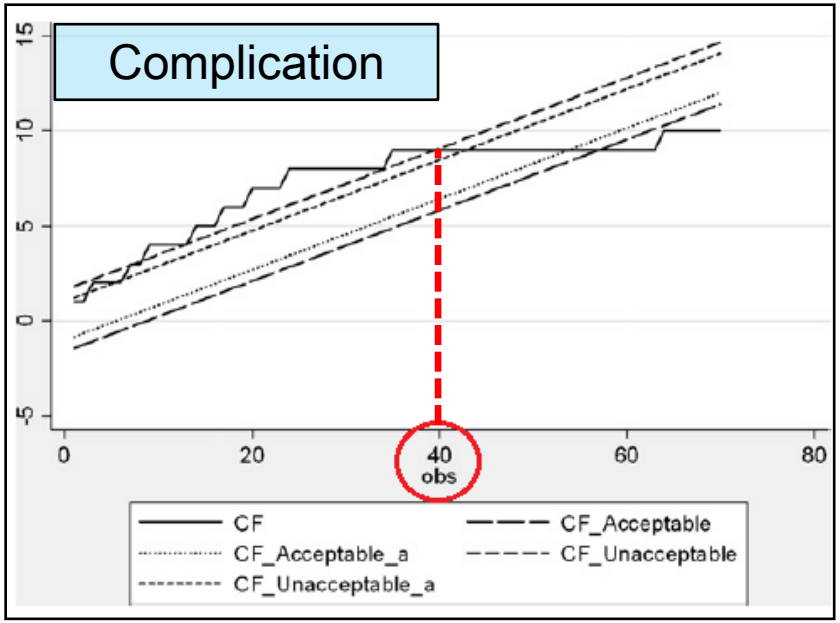
Arch Gynecol Obstet 2013;288:635
Tahmasbi et al. in Germany

European Journal of Obstetrics & Gynecology and Reproductive Biology

2012;163:219

- 70 patients with LS RH and PLND for early cervical cancer





- An extended learning period is required for LRHND.
- After a learning curve of 40 cases, the surgeon may achieve a higher level of competence.

Hwang et al.

Comprehensive Surgical Staging

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- Meta-analysis of 4 RCTs in early ovarian cancer

  – Benefits of adjuvant platinum-based chemotherapy
    - OS: HR 0.71; 95% CI 0.53 to 0.93
    - PFS: HR 0.67; 95% CI 0.53 to 0.84
  – But, optimally staged women *were unlikely to* benefit from adjuvant chemotherapy.
  – So, adjuvant chemotherapy is indicated when staging is considered to be inadequate.

➡ Hence, comprehensive surgical staging has an important impact on the subsequent management

Cochrane Database Syst Rev 2012

Lymph Node Dissection/Sampling

	Pelvic lymph Nodes (n)			Para-aortic nodes (n)			Omental specimen (cm^3)		
	LPS	LPT	*P*	LPS	LPT	*P*	LPS	LPT	*P*
Hua 2005	25	27	NS	-	-	-	-	-	-
Chi 2005	12.3	14.7	NS	6.7	9.2	NS	186	347	0.09
Ghezzi 2007	25.2	25.1	0.96	6.5	7	0.78	-	-	-
Park[a] 2008	13.7	19.3	0.052	8.9	6.4	0.187	-	-	-
Park[b] 2008	27.2	33.9	0.079	6.6	8.8	0.324	160	274	0.113
*Park 2010**	-	-	NS	-	-	NS	-	-	NS
*Park 2011**	-	-	NS	-	-	NS	-	-	NS
Lee 2011	23.5	22.8	0.867	9.9 ⬆	4.8	0.003	-	-	-

- Similar between LPS vs. LPT,
  but, the result can be different according to the surgeon's skill as well as intention to achieve complete LND.

- But, Systematic retroperitoneal LND is ***not*** *uniformly* considered a standard staging procedure in all centers.

  – Because therapeutic effect of LND in women with early stage ovarian cancer is still debated, and associated risks and cost effectiveness.

Ex) **In UK , NICE** (National Institute for Health and Clinical Excellence) guideline

"Do not include systematic LND

as part of standard treatment in suspected stage I ovarian cancer"

– If a palpable abnormality, sampling from PLN ± PALN

– If there is no palpable abnormality, random sampling

Limitation on Lymphadenectomy

- **But, palpation?**

: It is an inherent shortcoming of laparoscopy…

  – Inability to palpate LN & other peritoneal surfaces

- However, intraoperative direct visualization and evaluation of nodes by palpation is inherently subjective.

Accuracy of Lymph Node Palpation for Each Surgeon Based on Years of Experience

Surgeon	N	TN	TP	FN	FP	Sens	Spec	PPV	NPV	Years exp
1	32	20	8	1	3	88%	87%	72%	95%	13
2	28	14	6	3	5	67%	74%	55%	82%	7
3	66	42	9	5	10	64%	81%	47%	89%	8
Total	126	76	23	9	18	72%	81%	56%	89%	

❖ *Conclusion*: LN palpation has low sensitivity & positive predictive value even when done by experienced GY oncologists.

Obstet Gynecol 2000;95:553

Upstaging Rate

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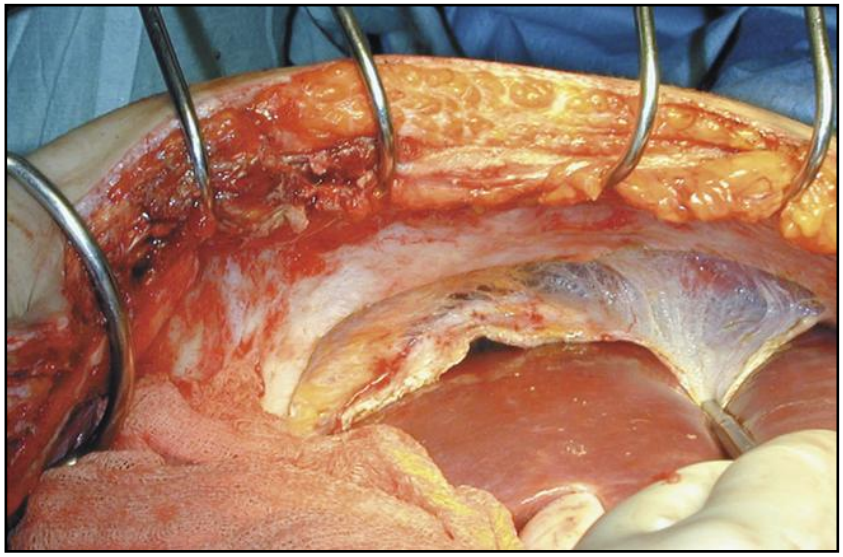
- LN yield & upstaging rate
  : Potentially used as a surrogate marker for adequacy of staging
- But, the means of radiological assessment of metastasis prior to LS staging is variable within previously published studies.

	Study period	No. Case		Tumor upstaged, n (%)			Final diagnosis = stage I (n, %)	
		LPS	LPT	LPS	LPT	*P*	LPS	LPT
Hua 2005	2002 -2004	10	11	0	0	-	10 (100)	11 (100)
Ghezzi 2007	2003 -2006	15	19	4 (26.7)	6 (31.6)	1.0	11 (73.3)	13 (68.4)
Park[a] 2008	2001 -2006	17	19	1 (5.9)	6 (31.6)	0.092	16 (94.1)	13 (68.4)
Park[b] 2008	2004 -2007	19	33	4 (21)	7 (21.2)	0.936	15 (78.9)	26 (78.8)
Lee 2011	2005 -2010	26	87	1 (3.8)	5 (5.7)	0.212	25 (96.2)	82 (94.3)

Better Visualization due to Magnification

- But, limitation on examination of these part:
  - Diaphragmatic peritoneum behind the liver & spleen, liver dome
  - Although isolated metastases to these areas are rare



**Picture: The Trocar (Official OnLine Video Journal of ISGE)*

AOGS
ACTA Obstetricia et Gynecologica Scandinavica

Learning curve and pitfalls of a laparoscopic score to describe peritoneal carcinosis in advanced ovarian cancer

❖ Prospective study in advanced ovarian cancer
: Estimated the agreement
between a fellow in training & a senior surgeon
performing a LS score to describe peritoneal carcinosis

Parameter	Higher evaluation No. of cases	Lower evaluation No. of cases	Not evaluable No. of cases	Cohen's kappa	Disagreement (%)
Bowel infiltration	4	5	3	0.70	13.3
Mesenteral retraction	2	5	3	0.70	11.1
Omental cake	3	3	2	0.81	8.8
Stomach infiltration	2	1	5	0.84	8.8
Liver metastases	1	2	1	0.78	4.4
Diaphragmatic carcinosis	2	1	1	0.88	4.4
Peritoneal carcinosis	1	0	0	0.96	1.1

Acta Obstet Gynecol Scand 2011;90:1126

5. Tumor rupture

The clinical impact of intraoperative tumor rupture *is still debated*.

KUMC

- Laparoscopy has been associated with a higher rate of cyst rupture for apparently benign and borderline tumors

Ann Oncol 2005;16:403

- Intraoperative rupture of stage I ovarian cancer tumor
  - May result in upstaging from stage Ia or 1b to Ic
  - The most powerful prognostic indicators of DFS in stage
    - Grade & tumor rupture (HR: 2.65, 95% CI: 1.53-4.56)

Lancet 2001;20:176

	Study period	No. Case		Tumor size (cm)			Intra-operative tumor spillage, n (%)		
		LPS	LPT	LPS	LPT	*P*	LPS	LPT	*P*
Hua 2005	2002 -2004	10	11				0	0	-
Ghezzi 2007	2003 -2006	15	19				3 (20)	2 (10.5)	0.63
Park[a] 2008	2001 -2006	17	19	4.0	4.5	0.618	0	0	-
Park[b] 2008	2004 -2007	19	33	8.9	11.0	0.254	2 (10.5)	4 (12.1)	1.000
*Park 2010**	2004 -2008	40	76	-	-	-	-	-	NS
*Park 2011**	2004 -2010	84	128	-	-	-	-	-	NS
Lee 2011	2005 -2010	26	87	9.1 ⬇	14.0	0.010	0 ⬇	13 (14.9)	0.037

- To properly assess these outcomes, future studies should clarify:

Clear description of technique & adjusting other factors (e.g. tumor size)

6. CO_2 pneumoperitoneum

Whether it enhances wound recurrence *remains unclear.*

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- **Possible mechanisms:**

  - CO_2 has been shown to lower the peritoneal pH, which may activate enzymes that increase tumor cell mitosis & growth factor production. *Surg Endosc 2008;22:359*

  - Mechanical damage to the mesothelium
  - Mechanical pressure to disseminate the cancer cells

Cancer 1999;86:770

➡ Stimulate port-site metastasis

Tumor Biol 2014 Epub. Mo et al.

❖ A recent meta-analysis: 20 RCTs involving 1,229 animals

- *Wound* recurrence rate

  – Laparoscopy vs. Gasless laparoscopy
    - OR: 2.23, 95 % CI: 0.90–5.55, P=0.08

  – Laparoscopy vs. Laparotomy
    - OR: 0.97, 95 % CI: 0.31–3.00, P=0.08

  – Laparoscopy vs. (Gasless laparoscopy + Laparotomy)
    - OR:1.47, 95 % CI, 0.74–2.92; P=0.28

➡ CDP is **not** responsible for these tumors.

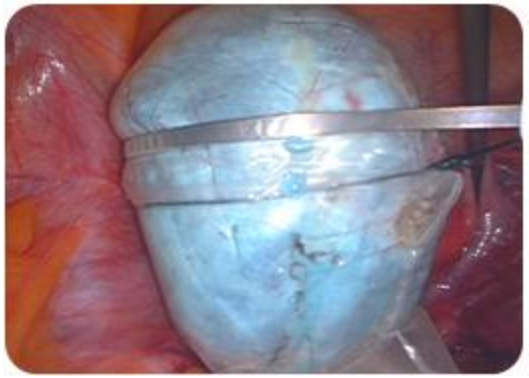
7. Port-site metastases

- First report of port-site metastases:
  - Found in a patient with *ovarian cancer* in 1978 *Endoscopy 1978;10:127–30*

- Port-site recurrence rate after laparoscopy: 1-16%
  - 1.96% in 796 women with ov/tubal/peritoneal ca by Zivanovic et al.
  - Comparable rate to laparotomy *Gynecol Oncol 2008;111:431–7*

- Maybe technique-related & limited mostly to advanced stage
  - Nearly no case of port-site metastasis in stage I
  - Suggested method to prevent:
    (1) Using an endoscopic bag to retrieve intact specimens
    (2) A layered closure of the trocar site

8. Oncological outcome - Survival



	Median F/U (mo, range)		PFS (n, %)			OS (n, %)		
	LPS	LPT	LPS	LPT	*P*	LPS	LPT	*P*
Ghezzi 2007	16 (4-34)	60 (32-108)	15 (100)	15 (78.9)	-	15 (100)	19 (100)	-
Park[a] 2008	19 (5-56)	14 (5-61)	15 (88)	19 (100)	-	16 (94)	19 (100)	-
Park[b] 2008	17 (2-40)	23 (1-44)	19 (100)	33 (100)	-	19 (100)	33 (100)	-
*Park 2010**	-	-	37 (92)	71 (93)	0.876	38 (96)	71 (94)	0.841
*Park 2011**	-	-	66 (78)	100 (78)	0.873	75 (89)	110 (86)	0.731
Lee 2011	12 (1-42)	25 (1-74)	26 (100)	79 (91)	0.195	-	-	-

<Average rate of survival in ov ca>

FIGO stage	OS (%)		
	1Y	2Y	5Y
IA	98.4	96.2	89.6
IB	100	93.9	86.1
IC	96.3	91.4	83.4

Int J Gynaecol Obstet 2006; 95:S161
** Case number: IA (632), IB (69), IC (72)*

Survival Outcome

- Laparoscopic surgery for early stage ovarian cancer *seems safe*

  with similar rate of tumor recurrence & overall survival compared to laparotomy.

- But, the available survival data have very low quality, hence it is not possible draw any conclusions

  regarding the relative effect of laparoscopic staging on ovarian cancer survival from the existing literature.

9. Cost

Staging in Early Ovarian Cancer

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Variables	Laparoscopy Group (n = 26)	Laparotomy Group (n = 87)	*P*
Total hospital costs	9893 (3681)	8218 (3354)	0.031
Charge for stay	438 (87)	638 (183)	<0.001
Average operative cost	1998 (678)	1237 (465)	<0.001
Disposable instrument cost	1320 (452)	544 (276)	<0.001
Instrument depreciation cost	58	16	<0.001
Direct material cost	1469 (503)	340 (173)	<0.001
Labor cost	917 (426)	603 (200)	0.016

Values are given as median (range) in US dollars.

- **Hospital stay** (mean): 6.4 days in LPS vs. 12.4 days in LPT ($p<0.001$)

- Operation costs for LPS were significantly higher.
- Where bed costs are higher, this difference in cost might be eliminated.

Int J Gynecol Cancer 2011;21:251

Cost effectiveness in EM ca

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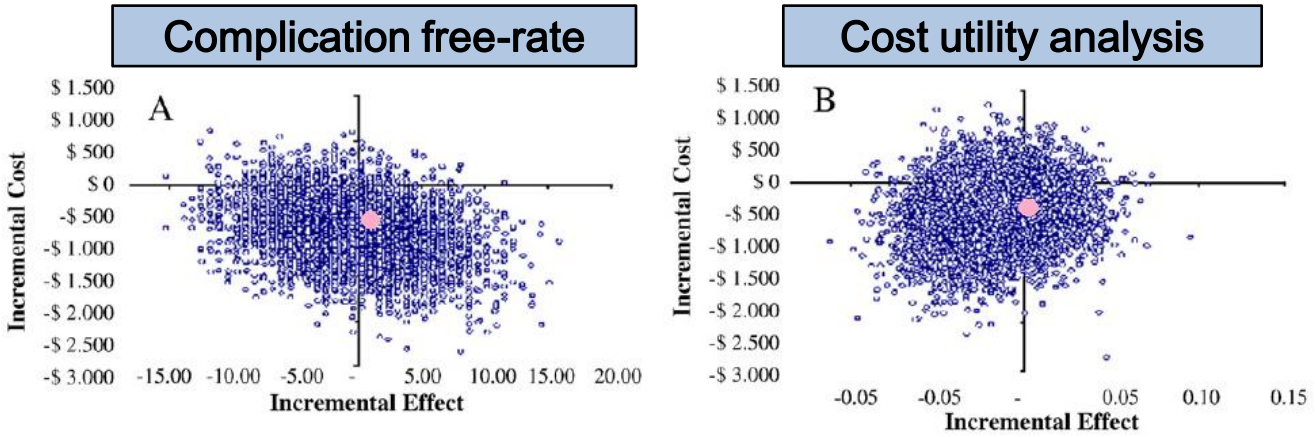
- Multi-center RCT: 279 patients (TLH n=185 vs. TAH n=94)
- Previous perception:
  - LPS is more costly than open procedures.
  - ➡ A major reason for the slow acceptance of LPS



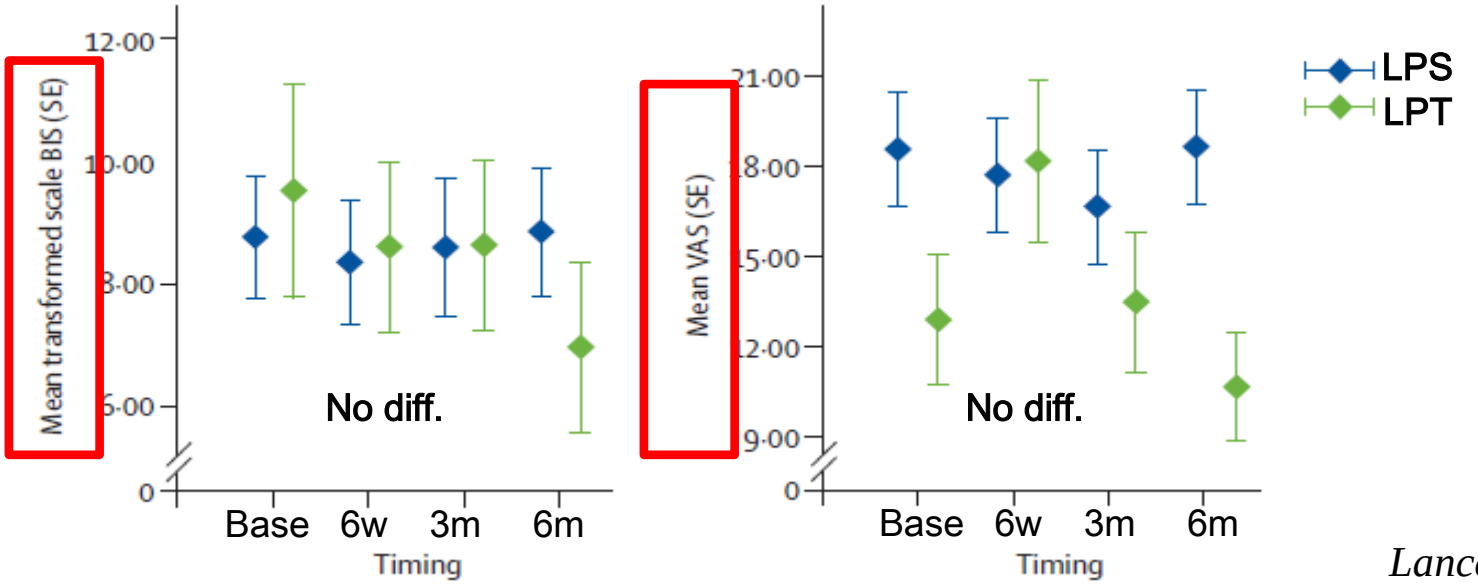
- **Conclusion:** LPS appears to be preferable over LPT as $52 will be saved per additional major complication-free patient.
- Higher costs were compensated by the lower costs for hospital stay.

Gynecol Oncol 2011;121:76

10. Quality of life

- QoL can be assessed with various indicators.
  - Body image scale, pain score, role-physical score, physical functioning, role-emotional score, social functioning, mental health, etc.

- EM ca: RCT showed that the summed QoL dimensions did not differ between LPS vs. LPT.



Lancet Oncol 2011

Arch Gynecol Obstet (2013) 288:635–642

- Retrospective, 28 cases with **EM & Cx cancer**

	"Laparoscopy" group		"Open" group *n* (%)	Phase 1 versus "open" group	Phase 2 versus "open" group
	Phase 1 *n* (%)	Phase 2 *n* (%)			
Post-operation pain				0.4	0.01
Until 1 week	4 (44)	(72.7)	.1)		
Until 1 month	3 (33)	3 (27.3)	14 (53.8)		
Until 1 year	2 (22)	0	6 (23.1)		
Pain strength				0.3	0.001
0–3	5 (55.5)	10 (90.9)	7 (26.9)		
4–6	3 (33)	0	12 (46.2)		
7–9	1 (11)	1 (9.1)	7 (26.9)		
Return to normal life in				0.3	0.003
2 weeks	0	8 (72.7)	3 (11.5)		
4 weeks	4 (44)	1 (9.1)	5 (19.2)		
6 weeks	2 (22)	1 (9.1)	11 (42.3)		
>6 weeks	3 (33)	1 (9.1)	7 (26.9)		
Cosmetic satisfaction				0.007	0.03
High	6 (66.7)	6 (54.5)	4 (15.4)		
Fair	3 (33)	4 (36.4)	12 (46.2)		
Low	0	1 (9.1)	10 (38.5)		

First 9 cases

First 9 cases

Later 11 cases

- Retrospective, 113 **Early Ovarian Cancer**
  - Postoperative pain score were lower in the LS group.

	Laparoscopy Group (n = 26)	Laparotomy Group (n = 87)	*P*
Port number, mean ± SD, n	3.2 ± 1.6		
Pain at 6 hours, median (range), score	5 (3–8)	6 (4–8)	<0.001
Pain on day 1	3 (1–6)	4 (3–5)	0.002
Pain on day 2	2 (1–6)	3 (2–4)	0.001

LNs, lymph nodes.

Int J Gynecol Cancer 2011;21:251

Summary

- **Laparoscopic staging surgery for early stage ovarian cancer**
  - *Advantages* of minimally invasive surgery in surgical outcomes
    ; lower blood loss, faster recovery
  - *Feasible,* but wide regional variation in the skills, slow learning curve
    - Operative time is not longer, when performed by expert surgeons.
    - Potential imitation in visualization
  - *Safe,* but large well-designed data is lacking, especially for survival
  - *More costly, but more cost-effective,* considering lower post-operative complications & shorter hospital stay
  - *Higher quality of life* in terms of better cosmesis & less pain

Further Studies

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- In endometrial cancer, a meta-analysis of RCTs demonstrated that laparoscopy is feasible & safe.
  - *It is possible that similar conclusions, in time, for stage I ovarian cancer* although the evidence for this is not currently enough.

- Future studies
  - Subgroup according to LN dissection or sampling
  - Detailed outcomes: OS, PFS, patient satisfaction, quality of life, costs, complications (intra-, post-operative), use of adjuvant chemotherapy

- Major barrier to conducting RCTs
  - Recruiting sufficient numbers of participants
  - Standardizing the quality of the surgery & skill of the surgeons

Laparoscopy-related Trials

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Protocol	Title	Status/ Year Published
KGOG 3028	**Retrospective-Laparoscopic Surgery in Epithelial Ovarian Cancer**	Active
LACC = KGOG 1031	A Phase III Randomized Clinical Trial of Laparoscopic or Robotic Radical Hysterectomy versus Abdominal Radical Hysterectomy in Patients with Early Stage **Cervical** Cancer	Active
GOG-LAP2	Laparoscopy compared with laparotomy for comprehensive surgical staging of **uterine** cancer	2011
GOG-9402	Laparoscopic staging in patients with incompletely staged cancers of the **uterus, ovary, fallopian tube, and primary peritoneum**	2007
GOG-9206	Feasibility of laparoscopic management of presumed stage I **endometrial** carcinoma and assessment of accuracy of myoinvasion estimates by frozen section	2006
GOG-9207	Laparoscopic retroperitoneal lymphadenectomy followed by immediate laparotomy for women with **cervical** cancer	2004

Asian Society of Gynecologic Oncology

Thank you for you attention.