



如何避免腹腔鏡併發症

住院醫師教育訓練

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2024.03.10





住院醫師教育訓練

住院醫師**訓練宗旨**：在培養具備婦產科學診療能力及積極創新思維之婦產科專科醫師，與培養具備婦產科界未來領導人才。



Clavien–Dindo classification of surgical complications

Grade	
1	<p>Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions.</p> <p>Acceptable therapeutic regimens are: drugs as antiemetics, antipyretics, analgetics, diuretics and electrolytes and physiotherapy.</p> <p>This grade also includes wound infections opened at the bedside.</p>
2	<p>Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions, antibiotics and total parenteral nutrition are also included.</p>
3	<p>Requiring surgical, endoscopic or radiological intervention</p>
3a	<p>Intervention under regional/local anesthesia</p>
3b	<p>Intervention under general anesthesia</p>
4	<p>Life-threatening complication requiring intensive care/intensive care unit management</p>
4a	<p>Single organ dysfunction</p>
4b	<p>Multi-organ dysfunction</p>
5	<p>Patient demise</p>

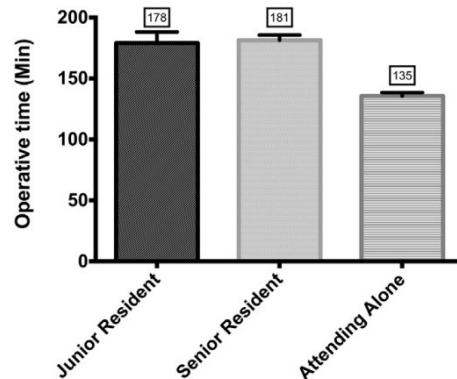
Resident participation in laparoscopic hysterectomy: impact of trainee involvement on operative times and surgical outcomes

Elena Igwe, MD; Enrique Hernandez, MD; Stephen Rose, MD; Shitanshu Uppal, MD



National Surgical Quality Improvement Program (NSQIP) database
2008.1~2011.12, 3441 hysterectomy

FIGURE 2
Operative time by resident involvement



Igwe. Resident participation in laparoscopic hysterectomy. *Am J Obstet Gynecol* 2014.

TABLE 3

Complications, morbidity, and death with attending alone vs resident involvement

Complication	Attending alone (n = 1850), n (%)	Resident involved (n = 1591), n (%)	P value	Unadjusted odds ratio (95% confidence interval)
No. of complications				
≥1	100 (5.4)	108 (6.8)	.052	NS
≥3	0	5 (0.3)	NA	NA
Severe morbidity	18 (1)	20 (1.3)	.26	NA
Death at ≤30 d	1 (0.1)	0	NA	NA
Type of complication				
Wound	14 (0.8)	21 (1.3)	.07	NS
Cardiopulmonary	9 (0.5)	11 (0.7)	.29	NS
Infectious	86 (4.6)	67 (4.2)	.29	NS
Thromboembolic	4 (0.2)	8 (0.5)	.12	NS
Neurorenal	58 (3.1)	39 (2.5)	.13	NS
Transfusion >4 units packed red blood cells	7 (0.4)	32 (2.0)	< .0001	5.4 (2.38–12.28)
Septic	8 (0.4)	7 (0.4)	.59	NS
Reoperation	24 (1.3)	35 (2.2)	.048	1.7 (1.01–2.89)
Readmission (n = 1213)	19 (2.9)	34 (5.5)	.015	1.94 (1.09–3.44)

NA, not available; NS, not significant.

Igwe. Resident participation in laparoscopic hysterectomy. *Am J Obstet Gynecol* 2014.

GYNECOLOGY

Trainee participation and perioperative complications in benign hysterectomy: the effect of route of surgery

Emma L. Barber, MD; Benjamin Harris, MD; Paola A. Gehrig, MD

TABLE 3
Specific perioperative complications among patients without and with trainee involvement in surgery

	No trainee (n = 13,028)	Trainee (n = 9471)	P value
Major complication			
MI	5 (0.04%)	3 (0.03%)	NS
PNA	26 (0.2%)	13 (0.1%)	NS
VTE	42 (0.3%)	41 (0.4%)	NS
Deep/organ space SSI	125 (0.2%)	109 (0.2%)	NS
Fascial dehiscence	36 (0.3%)	27 (0.3%)	NS
Return to OR	193 (1.5%)	149 (1.6%)	NS
Stroke	2 (0.02%)	0 (0.0%)	NS
Renal failure	8 (0.06%)	5 (0.05%)	NS
Cardiopulmonary arrest	1 (0.008%)	1 (0.01%)	NS
Sepsis	52 (0.4%)	61 (0.6%)	.02 ^a
Prolonged/reintubation	9 (0.1%)	19 (0.1%)	NS
Nerve injury	7 (0.05%)	6 (0.06%)	NS
Minor complication			
Superficial wound infection	164 (1.3%)	160 (1.7%)	.007 ^a
Transfusion	329 (2.5%)	404 (4.3%)	<.001 ^a
Urinary tract infection	313 (2.4%)	320 (3.4%)	<.001 ^a

Postoperative complications are not mutually exclusive. Patients may have experienced more than 1 postoperative complication.

MI, myocardial infarction; NS, not significant; OR, operating room; PNA, pneumonia; SSI, surgical-site infection; VTE, venous thromboembolism.

^a Statistical significance with $P < .05$.

Barber et al. Trainee participation in benign hysterectomy. *Am J Obstet Gynecol* 2016.

The American College of Surgeons NSQIP database, 2010.1~ 2012.12
22,499 patients: 42.1% trainee participation.

TABLE 4
Unadjusted and adjusted odds ratios for the association between trainee involvement and perioperative complication

	Unadjusted OR	95% CI	Adjusted OR	95% CI
Major complication				
Vaginal	1.46 ^a	1.04–2.04 ^a	1.4 ^a	1.03–2.04 ^a
Laparoscopic	1.03	0.82–1.30	1.09	0.86–1.37
Open	1.25	0.98–1.60	1.19	0.92–1.53
Minor complication				
Vaginal	1.37 ^a	1.09–1.72 ^a	1.30 ^a	1.03–1.63 ^a
Laparoscopic	1.37 ^a	1.15–1.63 ^a	1.36 ^a	1.14–1.63 ^a
Open	1.61 ^a	1.38–1.87 ^a	1.56 ^a	1.33–1.82 ^a

Binary logistic regression model with adjusted odds ratios adjusted for age, BMI, hypertension, smoking, cardiac comorbidity, pulmonary comorbidity, neurologic comorbidity, infectious comorbidity, ASA score, and surgical complexity.

ASA, American Society of Anesthesiologists; BMI, body mass index; CI, confidence interval; OR, odds ratio.

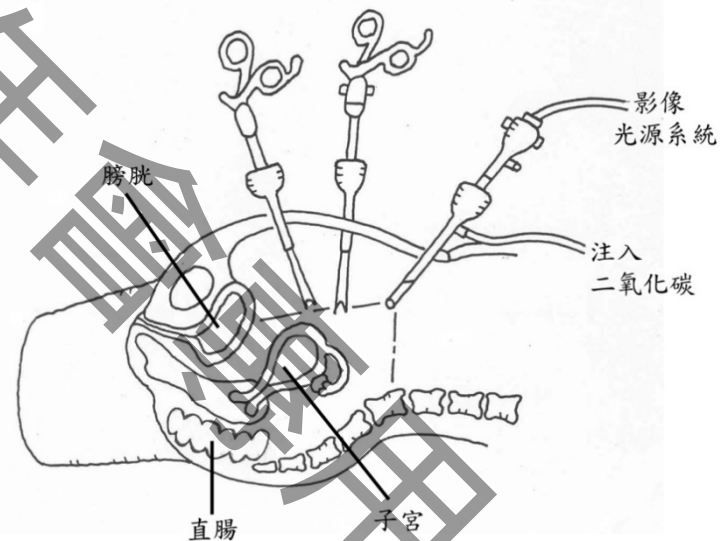
^a Statistical significance with $P < .05$.

Barber et al. Trainee participation in benign hysterectomy. *Am J Obstet Gynecol* 2016.

腹腔鏡併發症

The reported overall complication rates range from **0.2% to 10.3%**

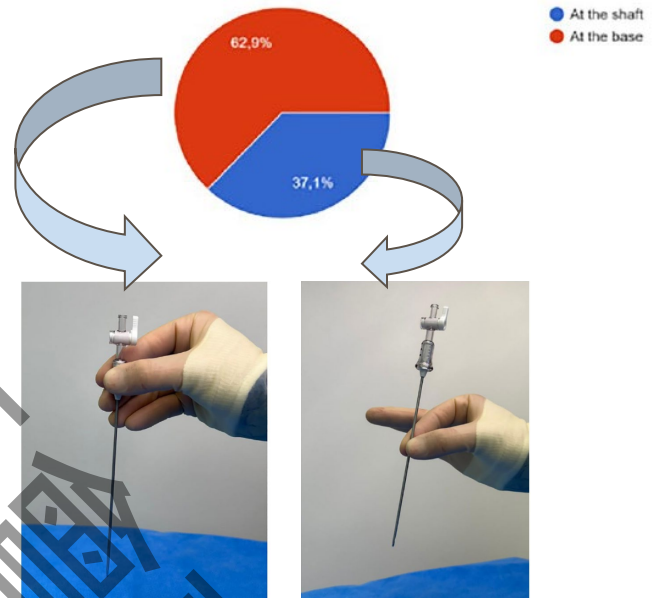
- First Trocar (Veress needle) entrance
- Vessel injury
- Bowel injury
- Urinary tract injury
 - Bladder and ureter injury
- Trocar site herniation
- Laparoconversion



First Trocar (Veress needle) entrance

- How do you hold your Veress needle?
- Location of entrance
- Angle of entrance
- Assistance technique to avoid complications
- Open or close method

How do you hold the Veress needle (see images below)? *



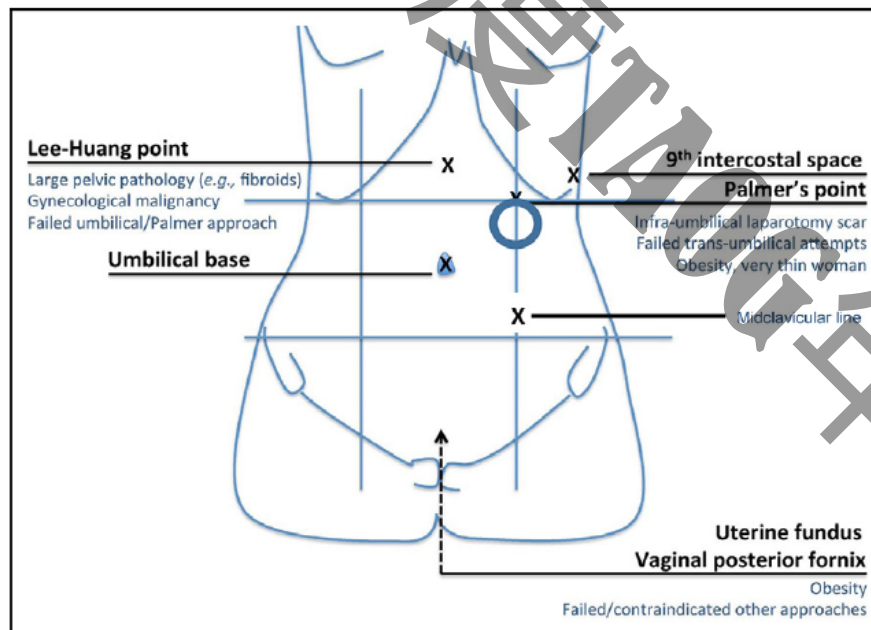
Scientific Reports | (2023) 13:17471
Netherlands.

3621 active members of the EAES,

Guideline No. 412: Laparoscopic Entry for Gynaecological Surgery

No. 412, March 2021

Figure. Anatomy of the anterior abdominal wall and Veress needle insertion sites.

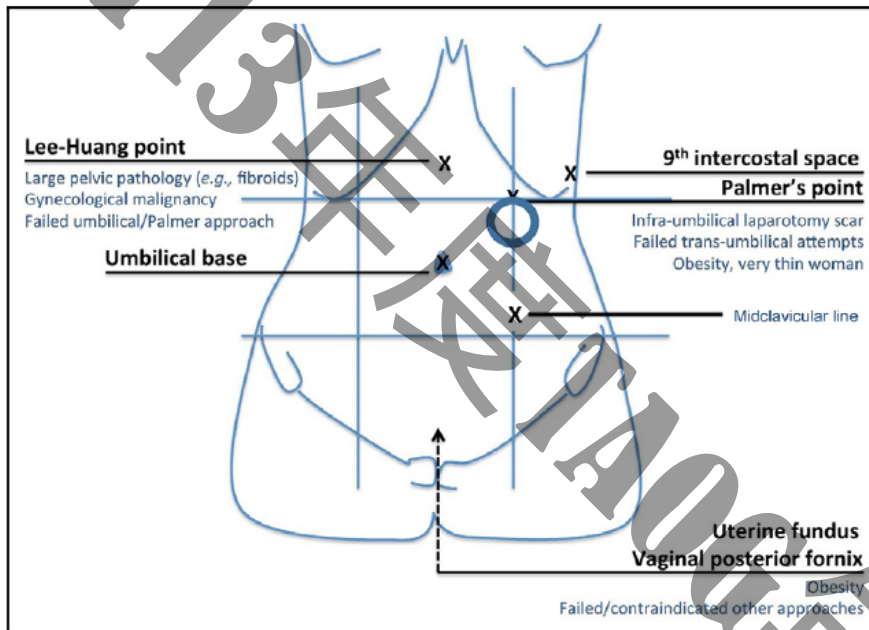


Adhesions at the **umbilical area** are found in approximately **10%** of LSC surgery.

in patients with a history or presence of umbilical or ventral hernia, midline surgical incisions, known or suspected periumbilical adhesions, high or low body mass index (BMI), or a palpable mass, or (2) after 3 attempts to establish pneumoperitoneum have failed. The most common alternative site is the left upper quadrant (LUQ; **Palmer's point**

Adapted from Taskforce for Abdominal Entry ([https://www.ejog.org/article/S0301-2115\(16\)30138-5/fulltext](https://www.ejog.org/article/S0301-2115(16)30138-5/fulltext)).

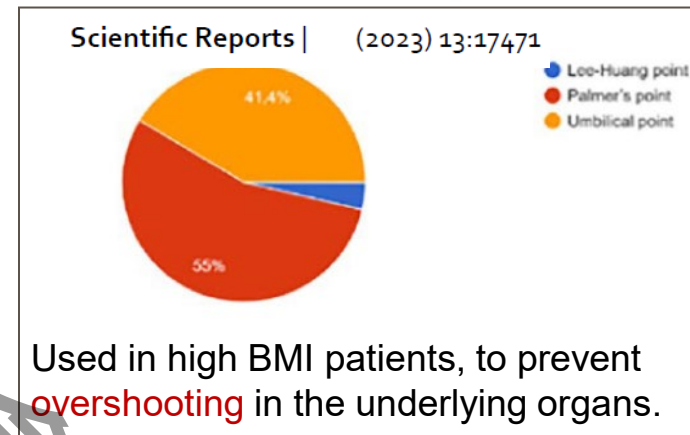
Figure. Anatomy of the anterior abdominal wall and Veress needle insertion sites.



Adapted from Taskforce for Abdominal Entry ([https://www.ejog.org/article/S0301-2115\(16\)30138-5/fulltext](https://www.ejog.org/article/S0301-2115(16)30138-5/fulltext)).

Palmer's point:
3 cm below the left subcostal border in the midclavicular line

What is your preferred (primary) entry location in High BMI patients? *



1. Emptying the stomach by **nasogastric** (or orogastric) suction
2. Introducing the Veress needle **perpendicular** to the abdominal wall.
3. **contraindicated** in patients with previous splenic or gastric surgery, significant hepatosplenomegaly, portal hypertension, or gastro-pancreatic masses.

Close versus open entry

Table 2. Estimated complication rates associated with techniques and instruments during laparoscopic entry

Complication	Closed entry			Open entry	Optical trocar	Visual threaded cannula
	Veress needle or trocar	Veress needle	Direct trocar insertion			
Bowel	0.04%–0.2%	0.0024% ^a	0.11%	0.06%–0.1%	0.8%	0.001%
Major vessel	0.01%–0.2%	0.006%	Cases reported; rate unknown	Cases reported; rate unknown	Cases reported; rate unknown	0.0%
Preperitoneal insufflation		>3.0%	Not applicable	Not applicable		
CO ₂ embolism		0.001%				

^a Approximately 20% of all bowel or major vessel injuries associated with the closed laparoscopic entry technique are attributed to the Veress needle.

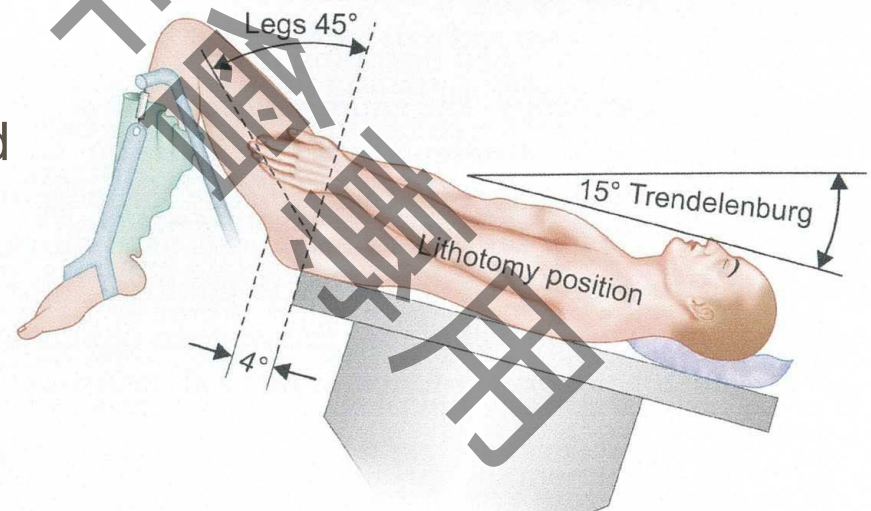
Based on CT image on 38 women,
Distance between the umbilicus and
aortic bifurcation:

Normal (BMI <25): 0.4 cm

Overweight: (BMI 25–30): 2.4 cm

Obese (BMI >30): 2.9 cm

Obstet Gynecol 1992;80:48–51.



First, close, umbilical trocar entry

- When inserting the Veress needle, consider shifting or **elevating** the umbilicus caudally to minimize retroperitoneal vascular injury.
- Previously recommended Veress needle safety checks or tests, such as the **saline drop test and aspiration for fluid**, have not been found to confirm position and therefore are no longer recommended as best practice
- Because the position of the umbilicus in relation to the aortic bifurcation varies according to the patient's body mass index, the angle of insertion of the Veress needle at the umbilicus should be adjusted accordingly—from **45° in women of normal body mass to 90° in women with obesity**.
- Use an initial Veress intraperitoneal pressure of <10 mmHg as the most reliable indicator of correct intraperitoneal placement of the Veress needle.
- Use **transient high intraperitoneal pressure** of 20–30 mmHg or 2–4 L of CO₂ entering just before inserting a trocar.
- Use the non-disposable threaded cannula for visual entry.

First, open, umbilical trocar entry

- Hasson entry (1971)
- prevention of gas embolism, preperitoneal insufflation, and visceral and major vascular injury, but a potentially **higher** incidence of **bowel injury**.
- essentially a mini-laparotomy
- Some surgeons believe that the open-entry method is more **difficult** and **time-consuming** in patients who are **obese**.

Vascular injury

(Abdominal Wall and Intra-abdominal Vessels)

Table I. Causes and sites of injury during laparoscopic surgery in 19 cases reported by Penfield (1985)

Cause	n	Site	n
Primary trocar	6	Aorta	8
Veress needle	6	Iliac artery	7
Secondary lower abdominal trocar	3	Common iliac vein	1
		Superior mesenteric vessel	1
Unspecified	4	Duodenal vessel	1
		Abdominal wall artery	1
Total	19	Total	19

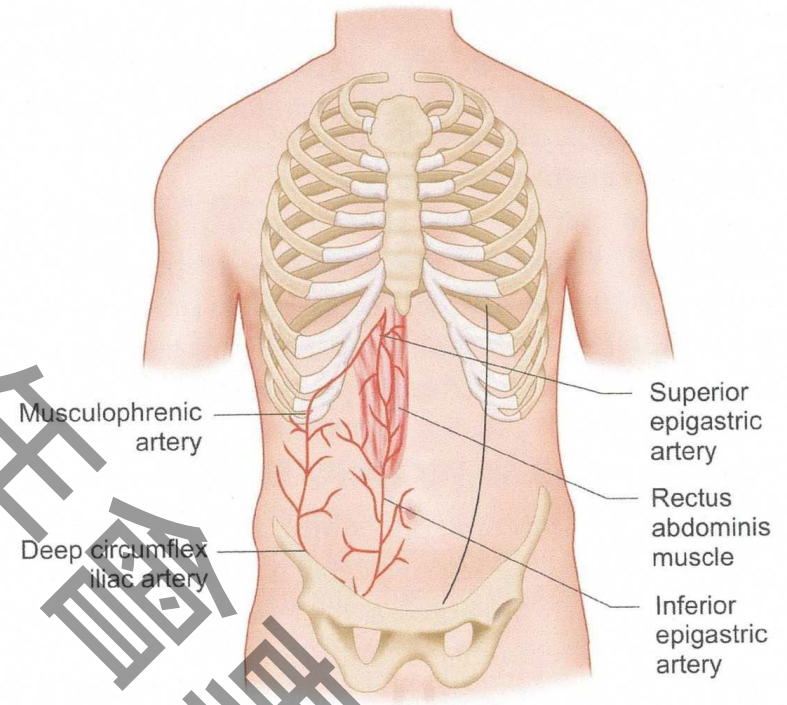
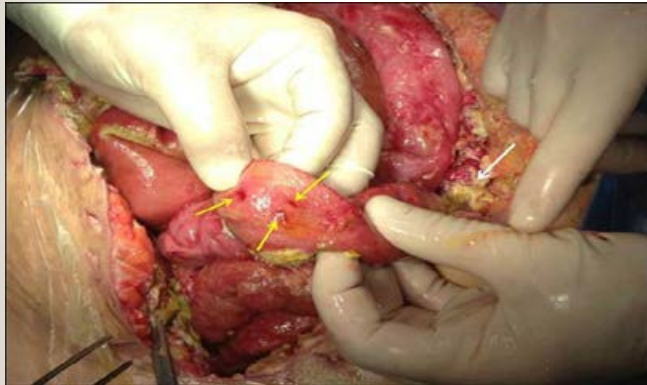


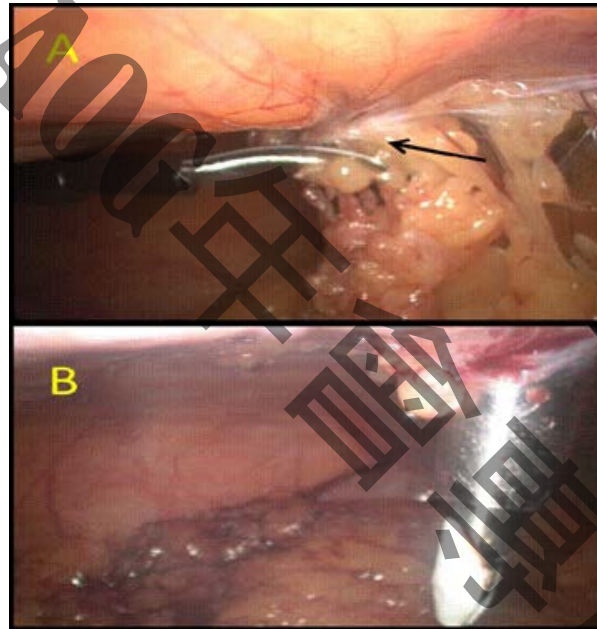
Fig. 1: Anterior abdominal wall anatomy.

Bowel injury

- Rate: laparoscopic sterilization: 0.03%, hysterectomy: 0.39%.
- The majority occurred in the small bowel.
- Intraoperative bowel injuries are caused by abdominal access methods in 55% of cases
- Early recognition of bowel injury is crucial for a favorable clinical outcome.



Multiple fine penetrations of a small bowel that were caused by the Veress needle having difficulty in insertion (yellow arrows).



Identification and dividing of omental and bowel adhesion due to previous surgery is important prior to insertion of lateral ports

Monopolar Electrosurgery through Single-Port Laparoscopy: A Potential Hidden Hazard for Bowel Burns

Basim Abu-Rafea, MD*, George A. Vilos, MD, Omar Al-Obeed, MD, Abdulmalik AlSheikh, MD, Angelos G. Vilos, MD, and Hazem Al-Mandeel, MD

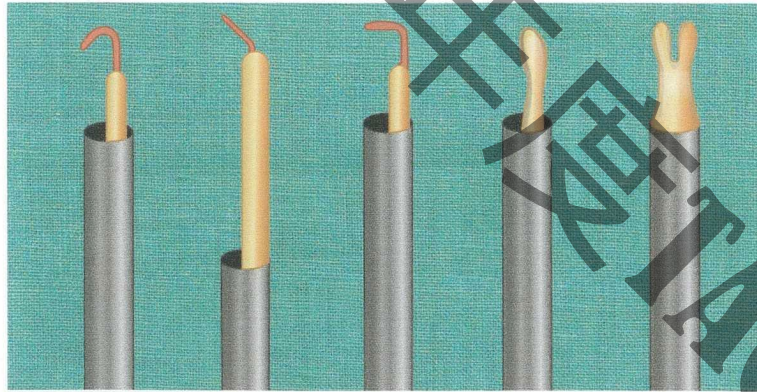


Fig. 4: Spatula.

Fig. 4

Corona discharge formation from capacitive coupled current from activated scissors to suction irrigation-cannula (Courtesy of Encision Inc., Boulder, CO).

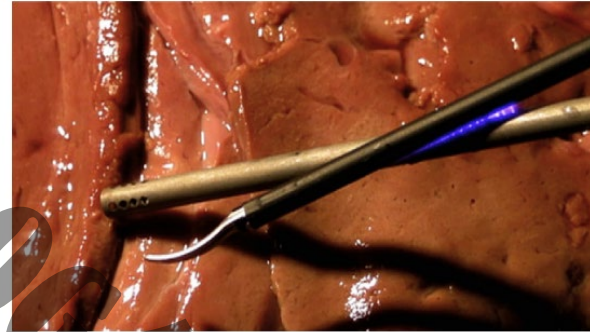
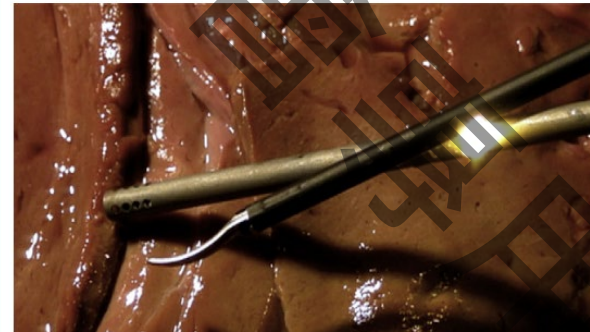


Fig. 5

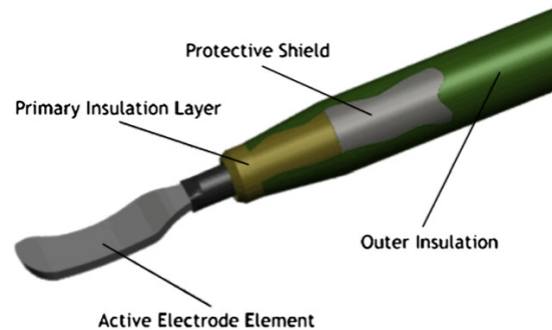
Arcing (spark) and insulation breakdown after corona discharge formation from activated scissors to suction-irrigation cannula. (Courtesy of Encision Inc., Boulder, CO).



700~1000°C

Fig. 6

Active electrode monitoring instrument with integrated “Protective Shield” to sense and divert stray electrosurgical capacitive and insulation failure current back to the ESU (courtesy of Encision Inc., Boulder, CO).

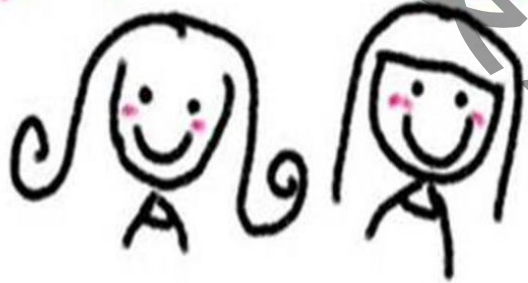


Prevention and management of bowel injury during gynecologic laparoscopy: an update

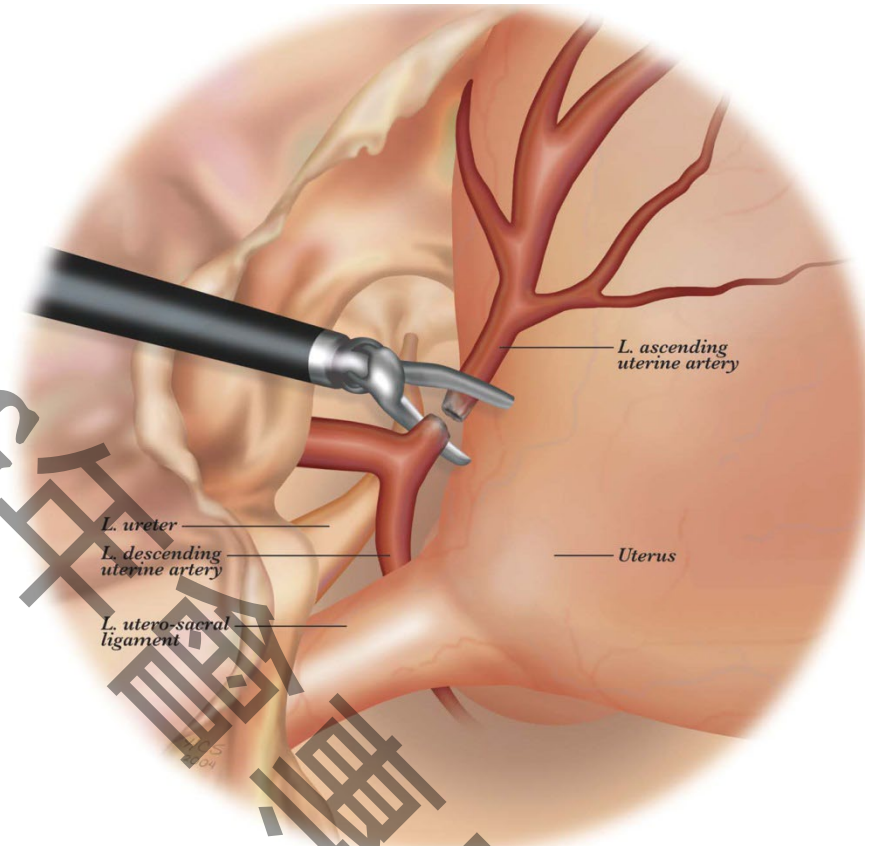
1. **Consult** a general surgeon or gynecologic subspecialist with more experience in bowel surgery.
2. Small serosal tears, sites of thermal injuries and partial thickness injuries: with **3-0 delayed absorbable suture** in an interrupted fashion, in a single layer.
3. Full thickness small bowel injuries up to **1 cm**: repaired in **two layers**, the second imbricating over the first, gentle traction, and **interrupted** sutures placed in a fashion **perpendicular to the axis** of the bowel.
4. Primary two-layer repair of large bowel can be performed even in the absence of a **bowel preparation preoperatively**.
5. Bowel resection, reanastomosis, and diversion may become necessary for full-thickness defects **greater than 1 cm**, **thermal injuries with a potentially large spread**, or areas concerning for **devascularization of bowel**.

Urinary tract injury

Friend!



A clear understanding of the female genitourinary tract (**anatomy**) and sound surgical **technique** are the keys to primary prevention of urinary tract injury.

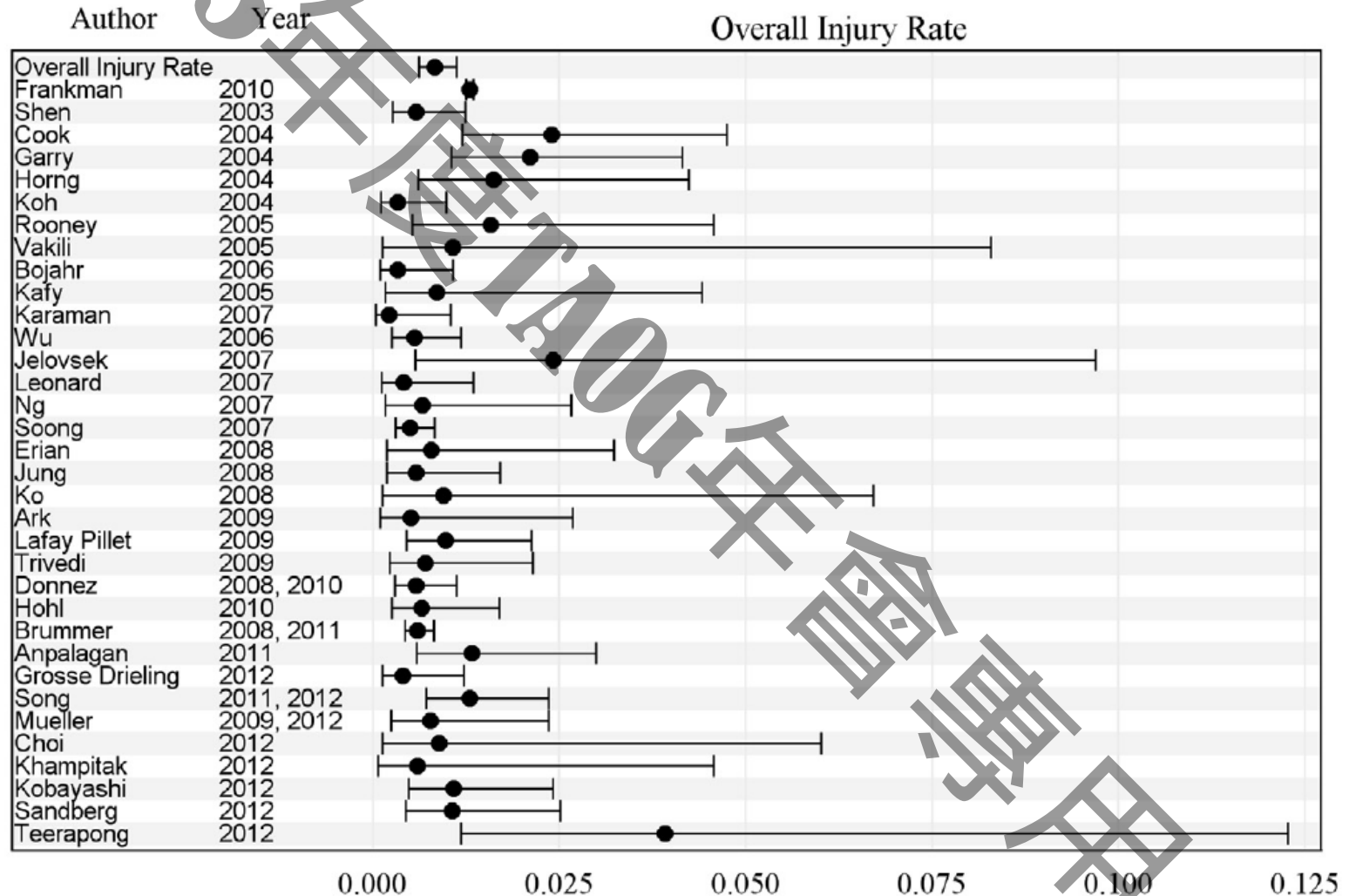


Am J Obs Gyn
2004;191,1875–84

Urinary Tract Injuries in Laparoscopic Hysterectomy: A Systematic Review

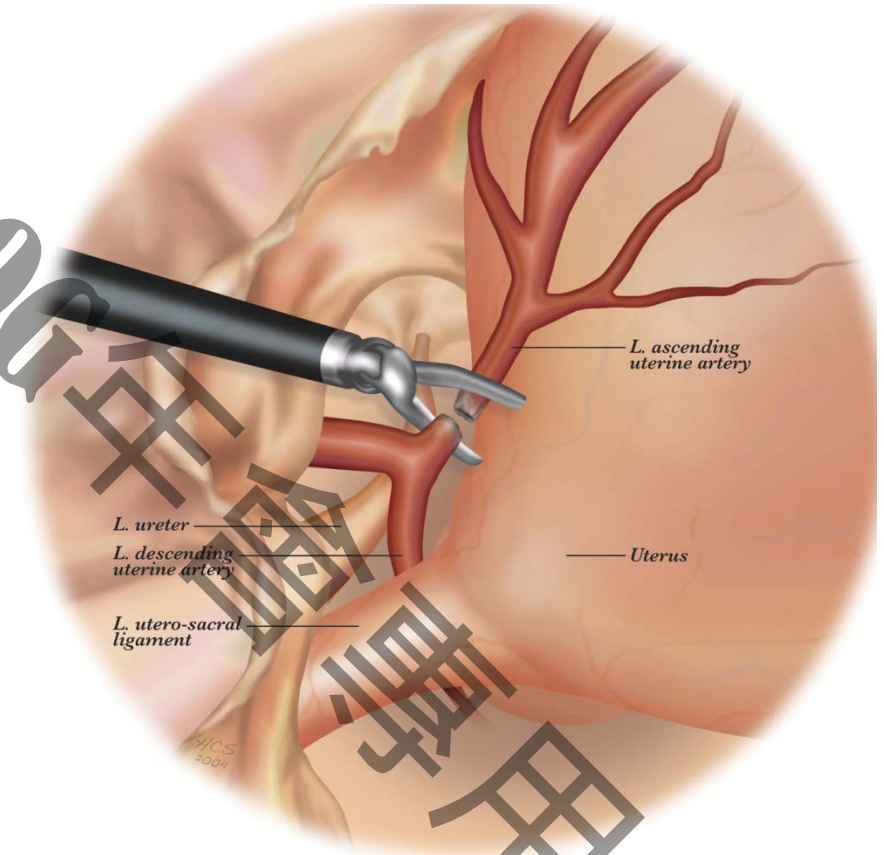
JMIG 2014;21:558-566

Marisa R. Adelman, MD*, Tyler R. Bardsley, MS, and Howard T. Sharp, MD



Overall urinary tract injury rate for laparoscopic hysterectomy: 0.73%.

Knowing the anatomy and good operation technique



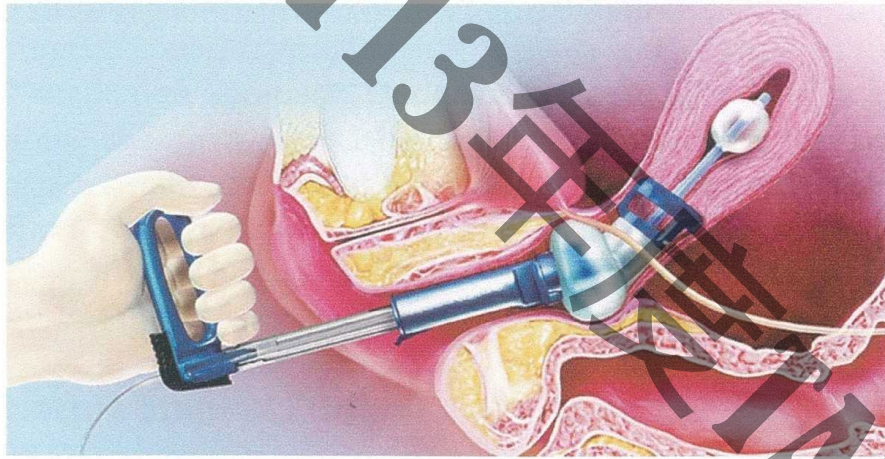
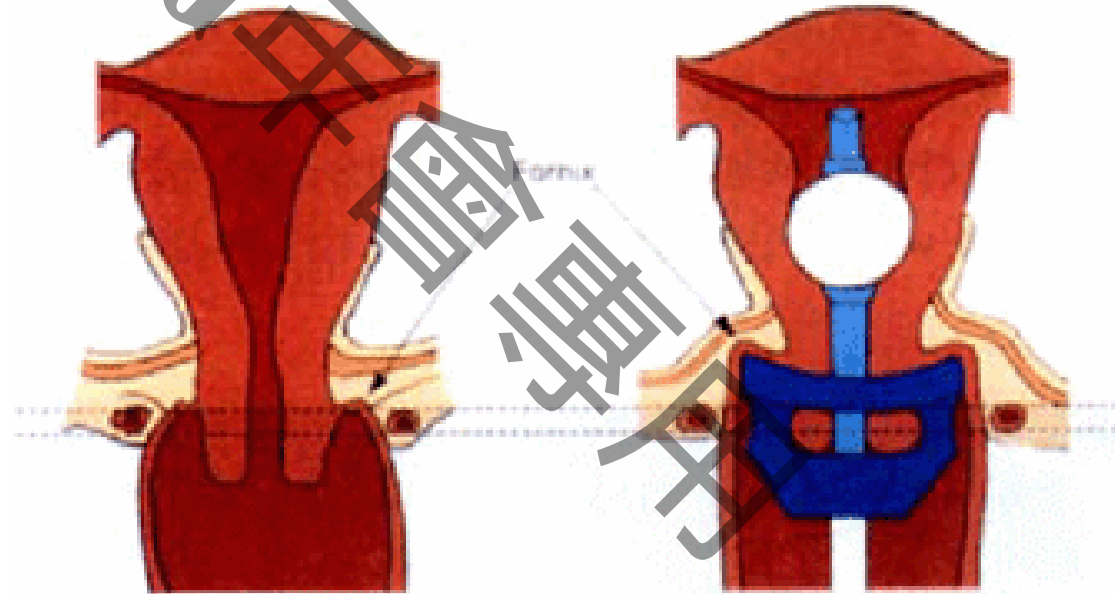


Fig. 58: RUMI uterine manipulator.

The RUMI manipulator and Koh colpotomiser system for total laparoscopic hysterectomy

Relationship of ureter and uterine artery.

Pushing up with cup after vesical peritoneum divided. Distance between fornix and ureter has increased



BJOG: An International Journal of Obstetrics & Gynaecology, 2005; 107(2): 274-277,

Total laparoscopic hysterectomy **without uterine manipulator.**

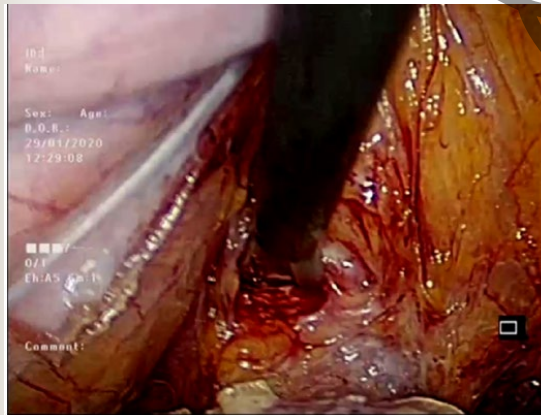
A retrospective study of 1023 cases

Dimitrios Zygouris^{a,*}, Nektarios Chalvatzas^a, Antonios Gkoutzioulis^a,
Georgios Anastasiou^b, Andreas Kavallaris^{a,b}

^a Department of Minimally Invasive Gynecology, St Luke's Hospital, Thessaloniki, Greece

^b Department of Gynecology and Obstetrics, Mother and Child Medical Center, Nikosia, Cyprus

2011.1 ~ 2020.1, 1023 cases



Opening of the anterior vaginal wall.

Indications for Hysterectomy.

	n = 1023
Fibroids / adenomyosis	603 (54 %)
Endometrial hyperplasia	133 (13 %)
Benign ovarian cyst	102 (10 %)
CIN	62 (6%)
Menorrhagia / DUB	123 (12 %)

CIN: Cervical Intraepithelial Neoplasia.

DUB: Dysfunctional Uterine Bleeding.

Intraoperative outcomes (N = 1023).

Operating time (all cases) (range)	78 (43–168) minutes
Operating time TLH (range)	75 (43–145) minutes
Operating time TLH + adnexectomy (range)	83 (45–168) minutes
Blood loss (range)	59 (20–260) ml
Uterine weight (range)	255 (40 – 1510) gr
Conversion to laparotomy	0
Women requiring blood transfusion	14 (1.4)
Ureteral injury	1
Bladder injury	3
Small bowel injury	5
Vaginal wall injury	18 (1.8 %)

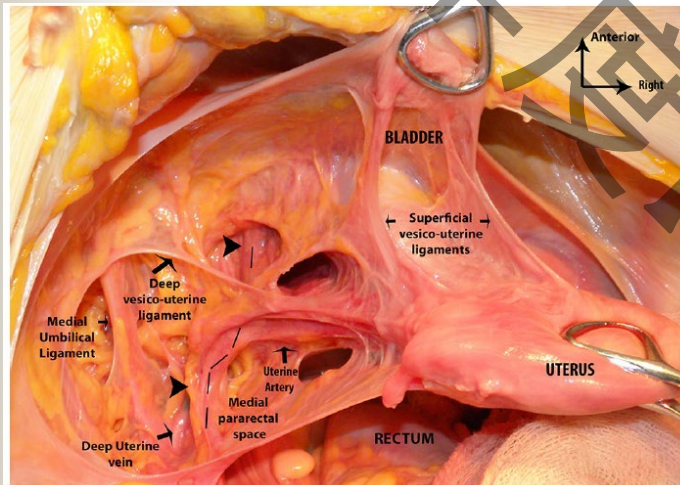
TLH: Total Laparoscopic Hysterectomy.

Postoperative complications (n = 1023).

Pyrexia, >37.5 °C	13 (1.3 %)
Urinary tract Infection	3 (0.3 %)
Deep vein thrombosis	0
Pulmonary embolism	0
Mean catheter duration (range)	1 (1–7) days
Patients with catheter ≥ 2 days	4 (0.4 %)
Hospital stay (range)	1.1 (1–8) days
Patients stayed ≥ 2 days	38
Wound infection	6 (0.6 %)
Vault hematoma	1 (0.1 %)
Vault dehiscence	5 (0.5 %)
Patients readmitted post – operatively	4 (0.4 %)

Uterine manipulator in total laparoscopic hysterectomy: safety and usefulness

Updates in Surgery (2020) 72:1247–1254



The position of the **ureter** can be seen before section of the uterosacral ligament and uterine artery with its curve or the knee of the ureter.

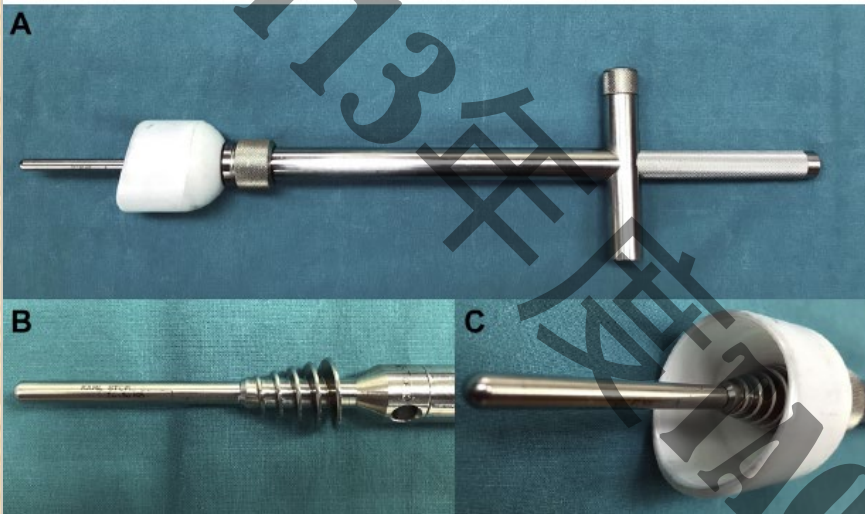
Surgical and Radiologic Anatomy (2019) 41:859–867

Table 2 Major complications caused by uterine manipulators

Manipulator	Major Complication
RUMI	Uterine rupture Disintegration inside the patient Vaginal wall laceration/excess hemorrhage
Hohl	Bowel perforation Uterine rupture
V-care	Cervical cup melting Disintegration inside the patient Uterine rupture
Clearview	Disintegration inside the patient Uterine perforation
Atom Medical, Tokyo, Japan	Uterine pseudoaneurysm

Table 3 Disadvantages of uterine manipulators

Manipulator	Disadvantages
Clermont Ferrand	Difficult to assemble Requires cervical dilatation
RUMI	Difficult to assemble
Hohl	Restricted range of uterine motion
V-care	Too light/Unable to mobilize big uteri
Hourcabic	Difficulty to maintain pneumoperitoneum Do not delineate vaginal fornices
Endopath	Difficulty to maintain pneumoperitoneum Do not delineate vaginal fornices
Histerophore	Restricted range of uterine motion

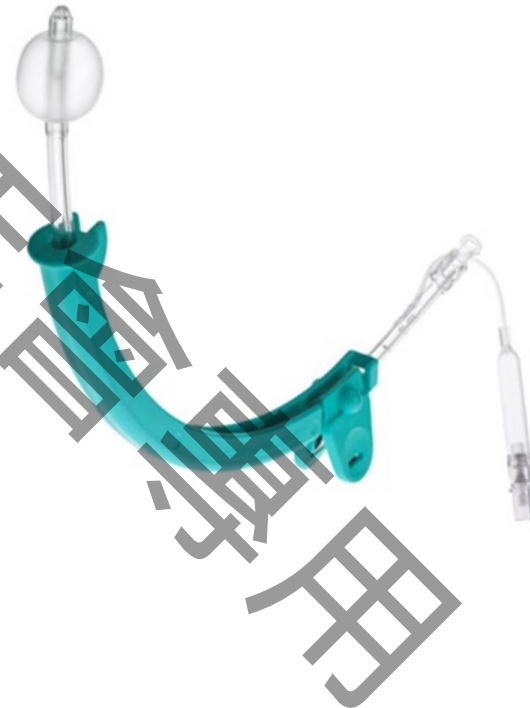


Kronner Manipulektor
Uterine
Manipulator/Injector

Hohl manipulator



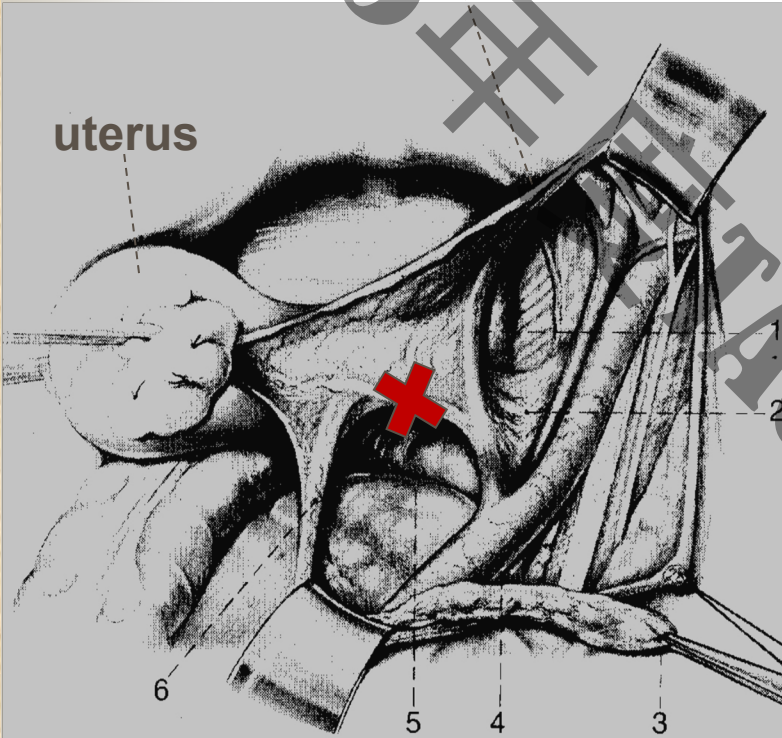
Colpo-Probe Vaginal Fornix Delineator



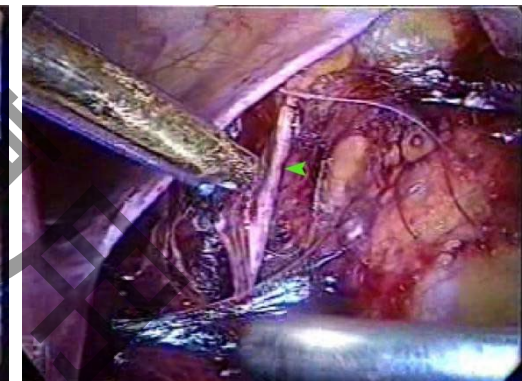
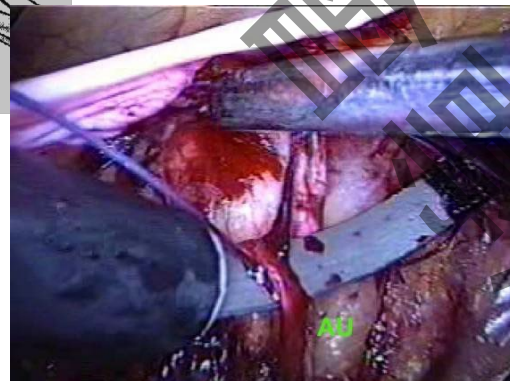
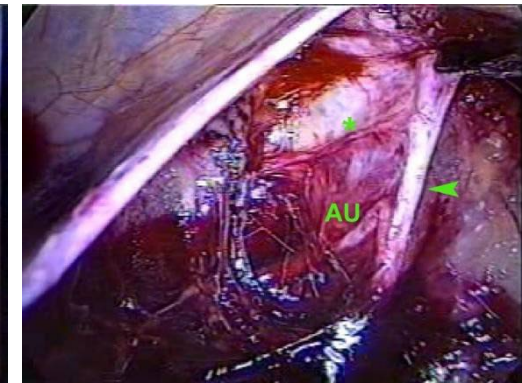
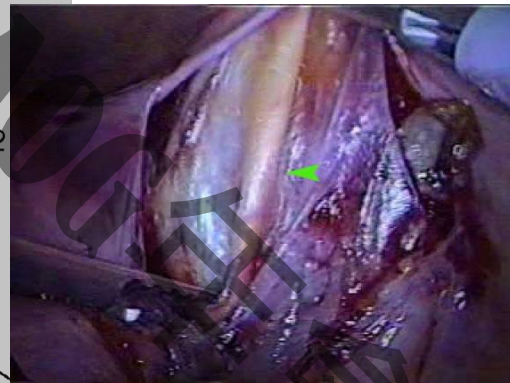
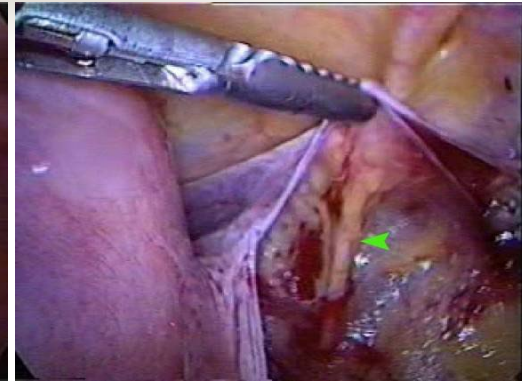
Uterine artery ligation Posterior approach

Round ligament

uterus



- 3: Infundibular pelvic ligament
- 4: common iliac artery
- 5: uterine artery
- 6: ureter

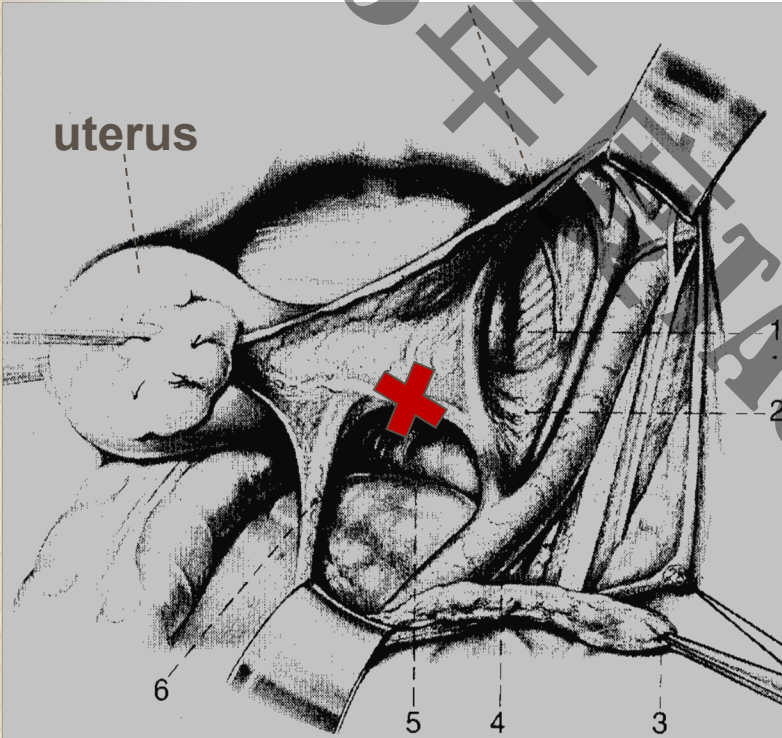


113年度TAOG年會

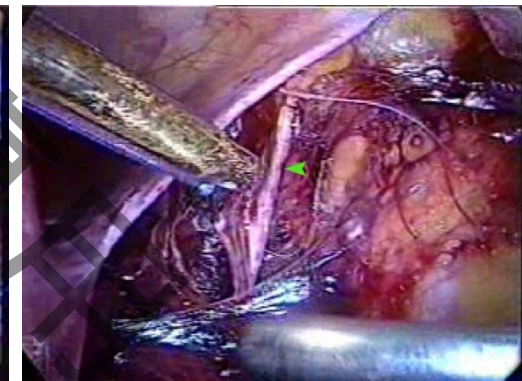
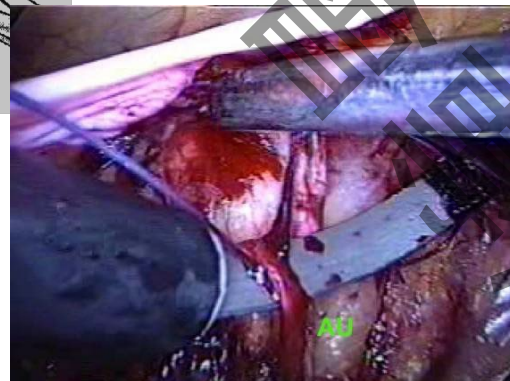
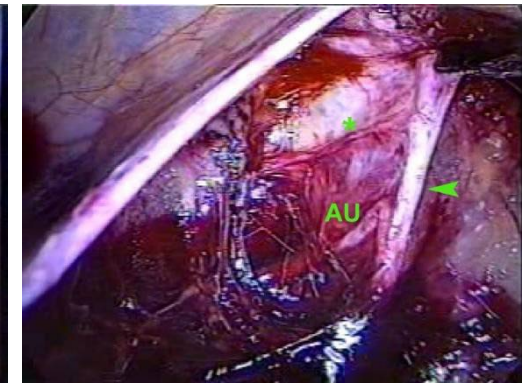
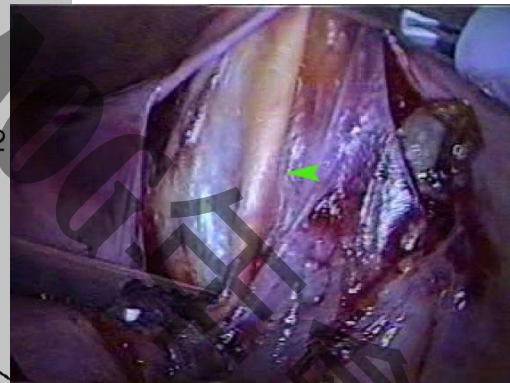
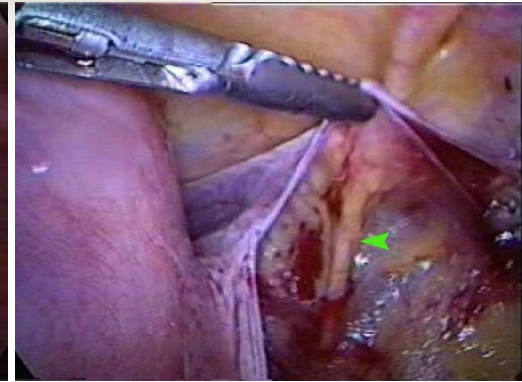
Uterine artery ligation Posterior approach

Round ligament

uterus

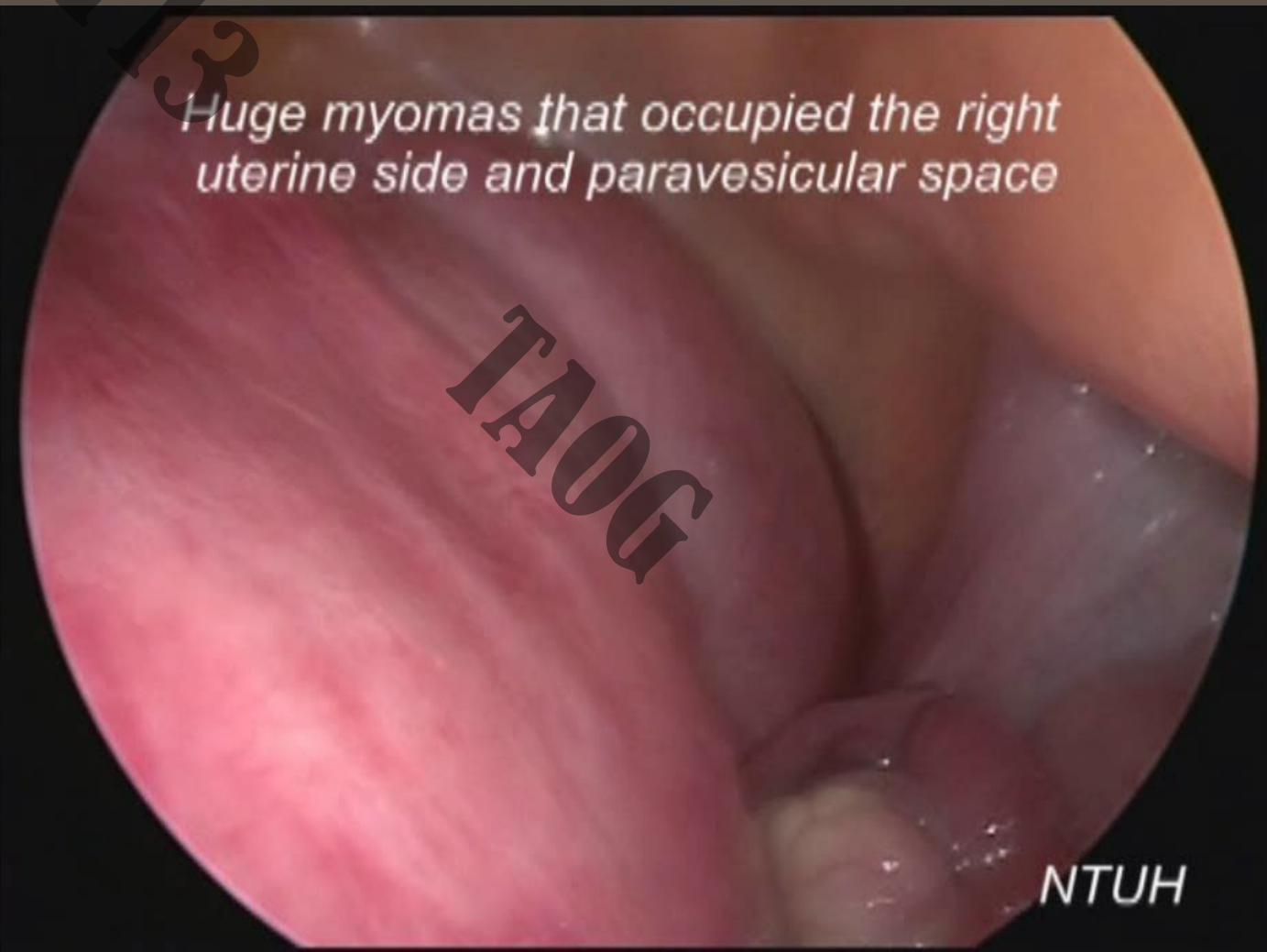


- 3: Infundibular pelvic ligament
- 4: common iliac artery
- 5: uterine artery
- 6: ureter



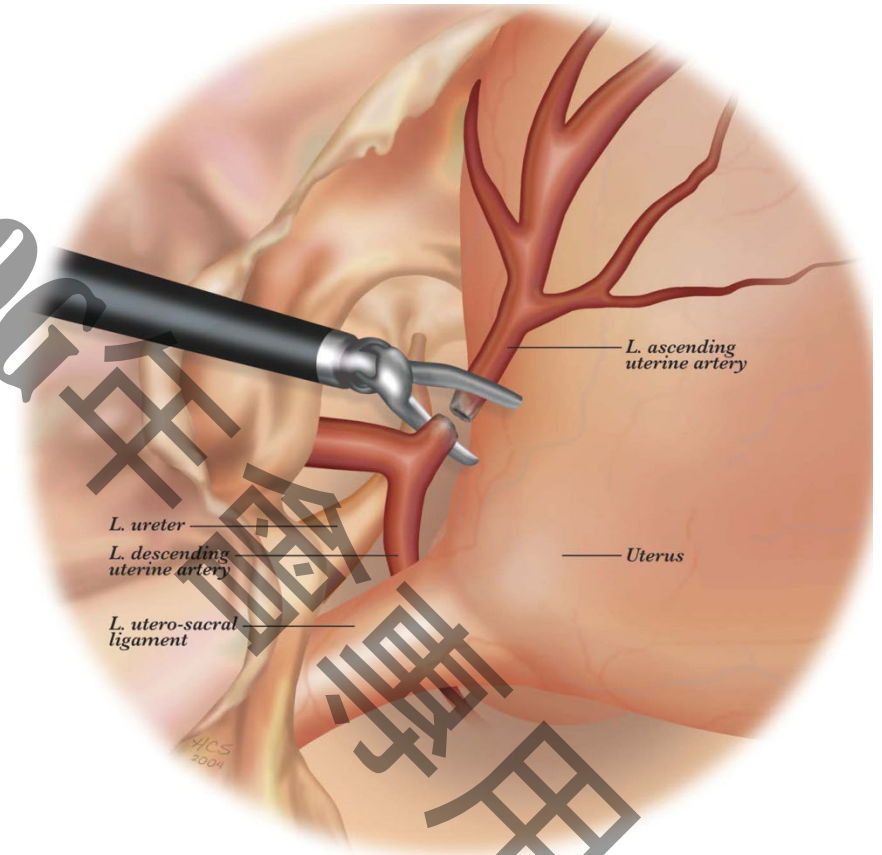
Single port LAVH

Huge myomas that occupied the right uterine side and paravesicular space

A laparoscopic view of the uterus. The uterus is the central, pinkish-red structure. Large, fleshy, reddish-brown masses (myomas) are visible on the right side of the uterus and in the paravesicular space. The surrounding peritoneum is visible, and the overall view is through a circular field of vision.

NTUH

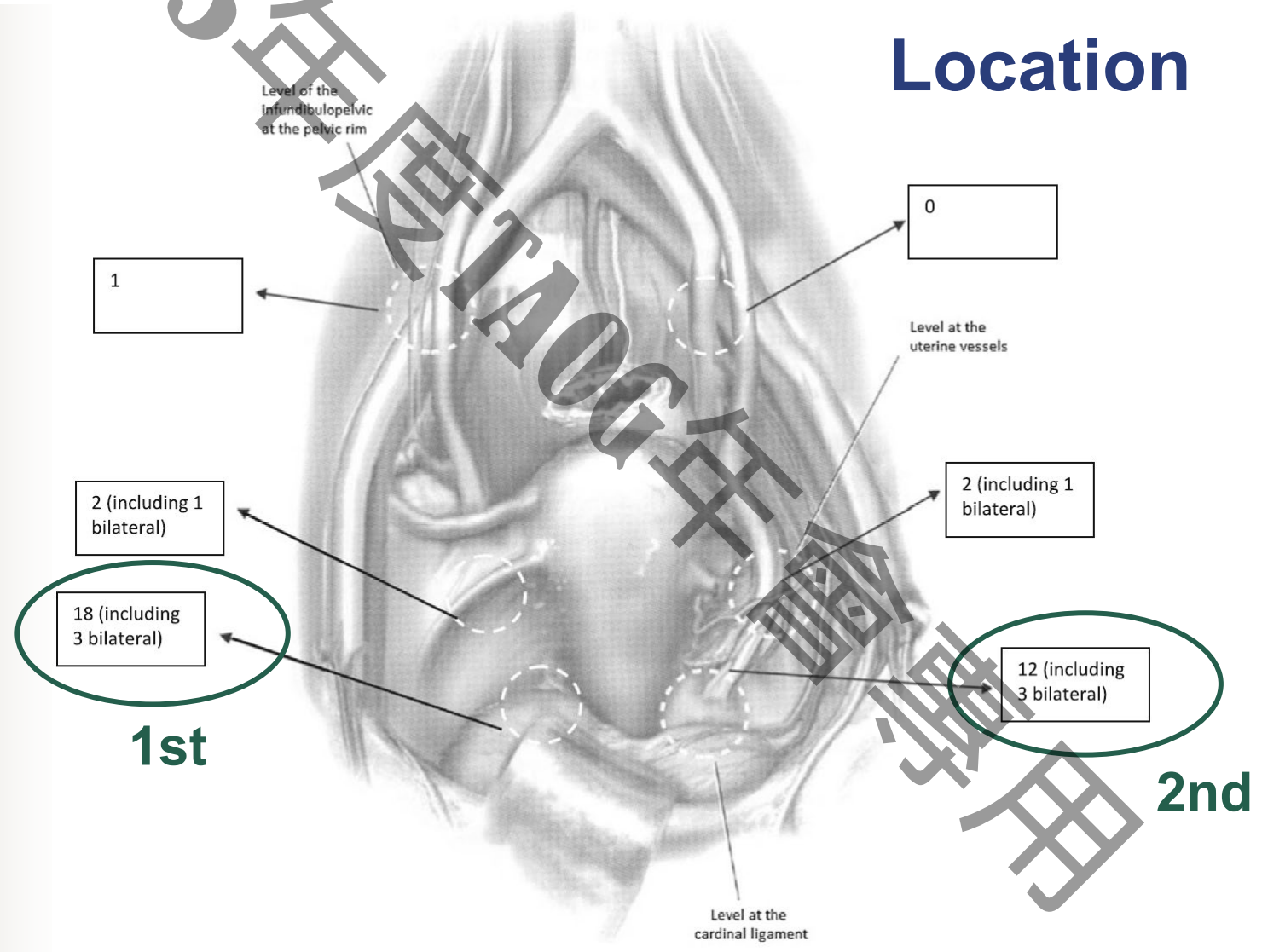
Knowing the anatomy: ureter



Causes and prevention of laparoscopic ureter injuries: an analysis of 31 cases during laparoscopic hysterectomy in the Netherlands

Petra F. Janssen · Hans A. M. Brölmann ·
Judith A. F. Huirne

Surg Endosc (2013) 27:946–956



Total laparoscopic hysterectomy in 1253 patients using an early ureteral identification technique

J. Obstet. Gynaecol. Res. Vol. 38, No. 9: 1194–1200,

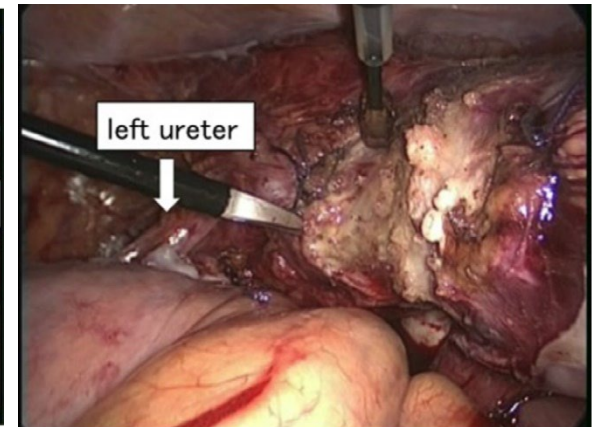
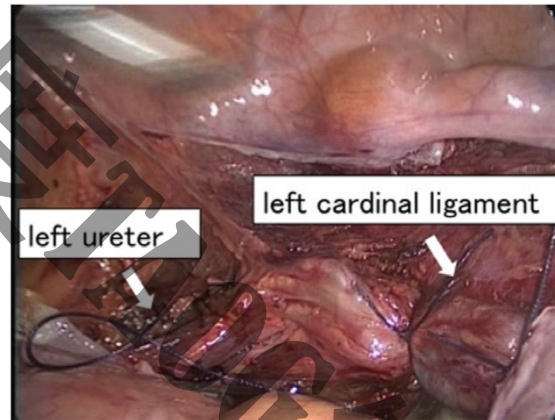
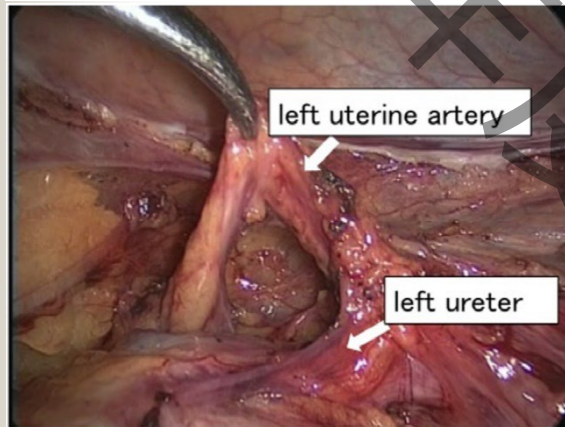


Table 1 Characteristics of all the patients ($n = 1253$)

Characteristics	n (%) or Mean (standard deviation)
Mean body mass index (kg/m^2)	23.0 ± 3.35
Mean age	46.3 ± 6.64
Nulliparous	187 (15.0)
No vaginal delivery	242 (19.3)
Parity (median)	2 (0–5)
History of abdominal surgery	316 (27.0)
History of cesarean	91 (7.0)

Table 2 Postoperative severe complications ($n = 24$)

Complication	No. patients
Bladder injury	6
Vaginal dehiscence	5
Postoperative hydronephrosis	5
Ureteral injury	4
Bowel injury	1
Postoperative hemorrhage	1
Bowel obstruction	1
Vesicoureteral fistula	1

Routine Cystoscopy After Robotic Gynecologic Oncology Surgery

JSLs July–Sept 2014 Volume 18 Issue 3 e2014.00261

Studies Examining Urinary Tract Injury in Gynecologic Surgery

Year	Author	Bladder Injury	Detection of Bladder Injury by Cystoscopy	Ureteral Injury	Detection of Ureteral Injury by Cystoscopy	Detection of LUT Injury by Cystoscopy	Indication for Surgery	Routine Cystoscopy
1999	Gilmour ¹²	20/1928 1.0%	17/20 (85%)	20/3235 (0.61%)	19/20 (95%)	36/40 (90%)	Benign	Yes
1999	Ribiero ¹³			4/118 (3.4%)	4/4 (100%)		Benign	Yes
2005	Vakili et al ²	17/471 (3.6%)	11/17 (65%)	8/471 (1.7%)	7/8 (87.5%)	18/25 (72%)	Benign	Yes
2006	Gilmour et al ³	62/3670 (1.7%)	59/62 (95%)	53/5755 (10.4%)	47/53 (88.6%)	106/115 (92.1%)	Benign	Yes
2009	Ibeanu et al ¹⁴	24/839 (2.9%)		15/839 (1.8%)		35/36 (97.2%)	Benign	Yes
2012	Sandberg et al ¹⁵	14/251 (5.5%)	0/14 (0%)	5/251 (2.0%)	0/5 (0%)	0/19 (0%)	Mixed	Yes

1.9%

78%

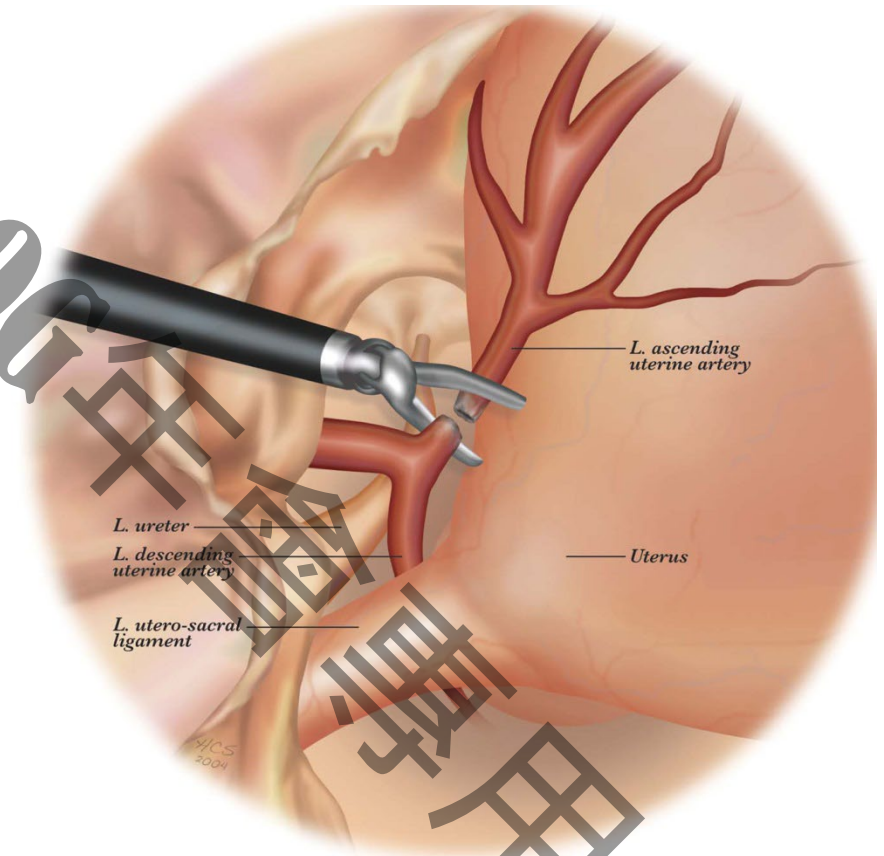
1.0%

86%

83%

Routine cystoscopy: did not appear to affect the detection rate of intraoperative lower urinary tract injury during robotic gynecologic surgery, but relatively simple to perform to avoid the severe morbidity and possible litigation surrounding a urinary tract injury.

Identification of risk factors

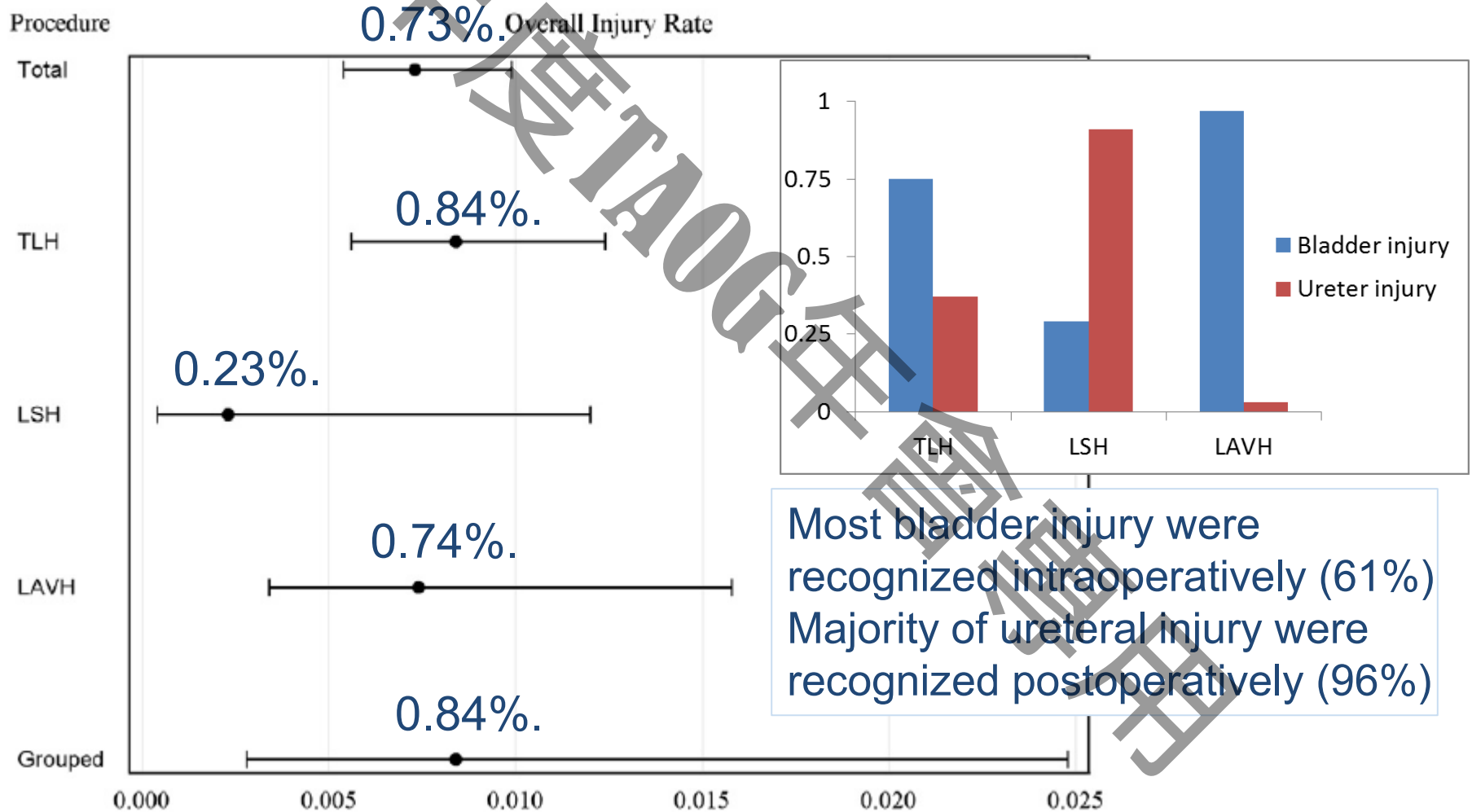


Urinary Tract Injuries in Laparoscopic Hysterectomy: A Systematic Review

Marisa R. Adelman, MD*, Tyler R. Bardsley, MS, and Howard T. Sharp, MD

Injury rate by procedure.

JMIG 2014;21:558-566

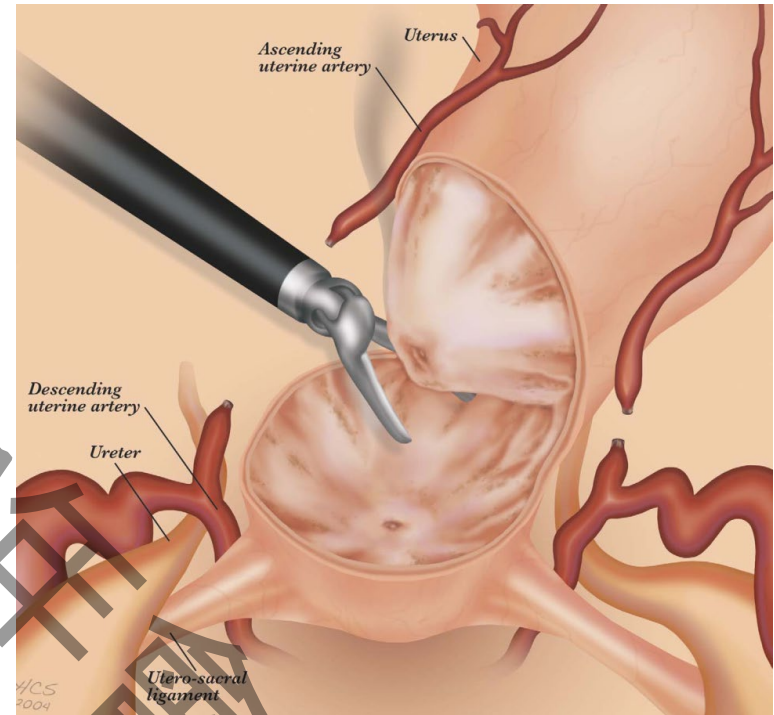


Supracervical Hysterectomy/Subtotal Hysterectomy

CLASSIFICATION

Garry and Reich Classification of Laparoscopic Hysterectomy

- *Type 1:* Diagnostic lap + VH
- *Type 2:* Lap vault suspension after VH
- *Type 3:* LAVH
- *Type 4:* LH (lap ligation of uterine artery)
- *Type 5:* TLH
- *Type 6:* LSH (lap supracervical hysterectomy)
- *Type 7:* LHL (lap hysterectomy with lymphadenectomy)
- *Type 8:* LHL + O (as above + omentectomy)
- *Type 9:* RLH (radical lap hysterectomy)



scalloped approach in order to limit the possibility of residual endometrium.

Gilman Kimball, USA

1st SCH/STH 1853

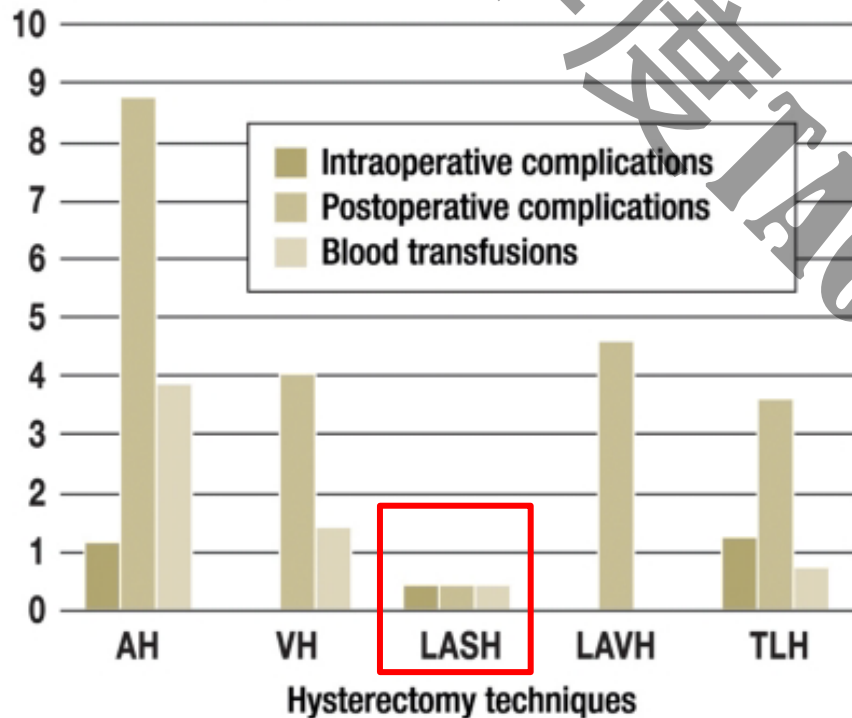
Am J Obs Gyn 2004:191, 1875–84

Advantages of supracervical hysterectomy

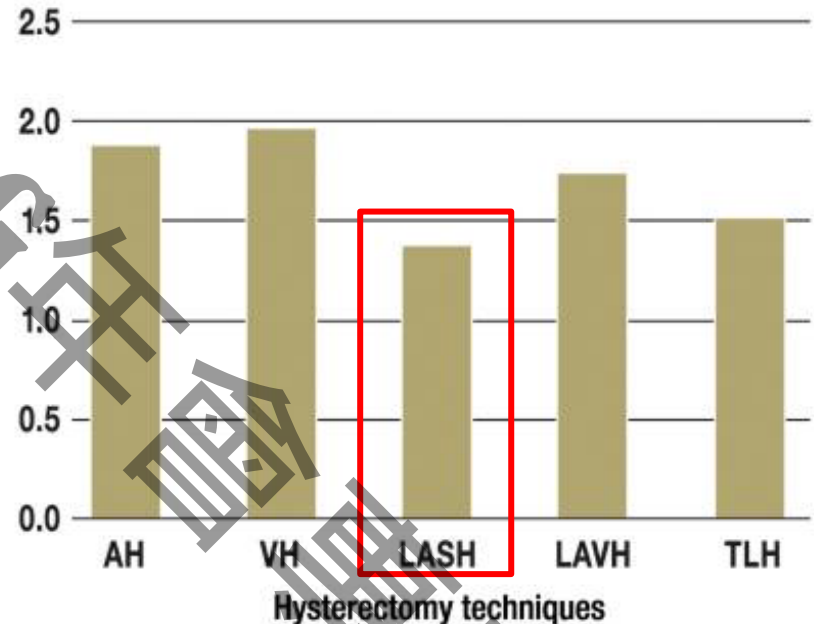
Erlangen University Hospital 2002 ~ 2008, 981 patients

Hysterectomy—A Comparison of Approaches

Complication rate (%)



Hb decrease (g/dL)



Dtsch Arztebl Int. 2010 May; 107(20): 353–359.

Disadvantages

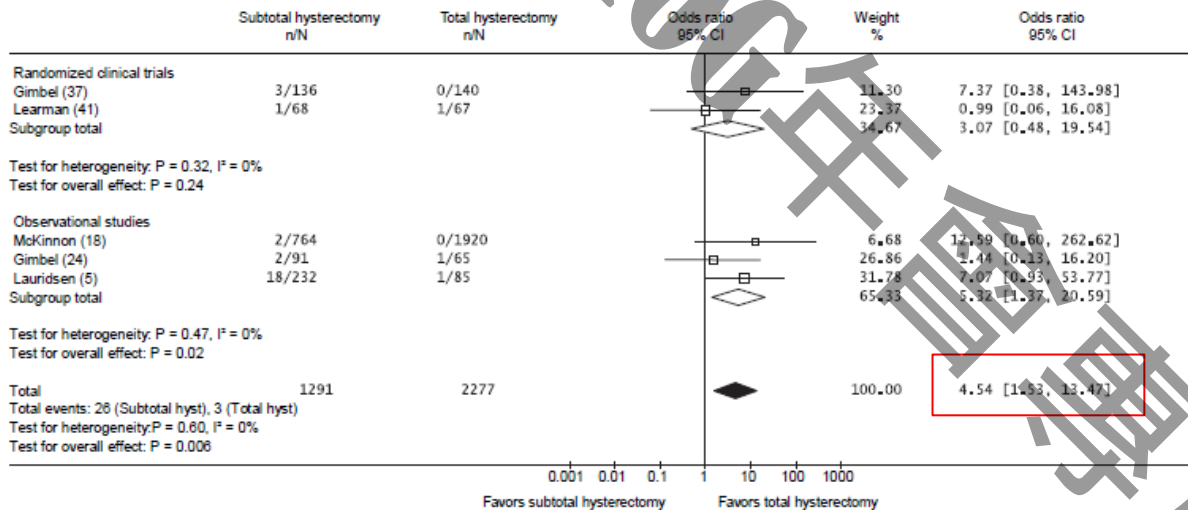
**14%
Cyclic Bleeding**

First author and country	Outcome measure	Outcome for TAH (n/total)	Outcome for SAH (n/total)	Odds ratio (95%CI)
Acken, USA (21)	Cyclic bleeding	2/174	2/39	0.215 (0.029–1.577)
Lauridsen, Denmark (5)	Cervical stump problems	0/100	15/323	–
Cahen, Finland/Switzerland (22)	Cervical stump problems	0/100	3/100	–
Ruoss, UK (34)	Cervical stump problems	–	4/50	–
Thakar, UK (44)	Cervical stump bleeding	–	9/133	–
Gimbel, Denmark (37)	Cervical stump bleeding	–	30/137	–
Gimbel, Denmark (24)	Cervical stump bleeding	–	15/91	–

4.7%

Cervical stump problem

STH



**more
prolapse**

Causes and prevention of laparoscopic **ureter injuries**: an analysis of 31 cases during laparoscopic hysterectomy in the Netherlands

Petra F. Janssen · Hans A. M. Brölmann ·
Judith A. F. Huirne

Surg Endosc (2013) 27:946–956

1991 ~ 2011 all recalled ureter injuries occurred in the Netherlands during a LH of all types

	TLH (N = 22)	LAVH (N = 6)	LSH (N = 3)	Total (N = 31)
Equipment				
<u>Uterine manipulator [n (%)]</u>				
Clermont Ferrand	12	2	3	17 (54.8)
McCartney tube	2	0	0	2 (6.5)
Other with vaginal shield ^a	3	0	0	3 (9.7)
Other without vaginal shield ^b	1	3	0	4 (12.9)
Unknown	2	1	0	3 (9.7)
None	2	0	0	2 (6.5)
<u>Hemostatic instrument [n (%)]</u>				
Vessel sealing	13	2	0	15 (48.4)
Ultrasonic	1	2	0	3 (9.7)
Conventional bipolar	6	1	3	10 (38.7)
Unknown	2	1	0	3 (9.7)
Procedure				
Concomitant salpingo-oophorectomy [n (%)]				
	7	1	0	8 (25.8)
<u>Ureter handling</u>				
Visualization ureter [n (%)]	6	1	2	9 (29.0)
Window in broad ligament [n (%)]	7	0	0	7 (22.6)
Lateralizing ureter [n (%)]	6	1	0	7 (22.6)
Dissection ureter [n (%)]	1	0	0	1 (3.2)
Vaginal closure vaginal cuff [n (%)]	6	5	—	11 (35.5)
Outcome				
Blood loss (mean ± SD) (mL)	184.3	425.0	316.7	245.7 ± 288.4
Operating time (mean ± SD) (min)	137.0	149.8	174.3	143.5 ± 53.8

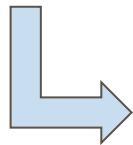
Causes and prevention of laparoscopic **ureter injuries**: an analysis of 31 cases during laparoscopic hysterectomy in the Netherlands

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1991 ~ 2011 all recalled ureter injuries occurred in the Netherlands during a LH of all types

	TLH (N = 22)	LAVH (N = 6)	LSH (N = 3)	Total (N = 31)
Age (mean ± SD) (years)	45.3	46.0	43.7	45.3 ± 7.1
BMI (mean ± SD) (kg/m ²)	27.0	27.8	–	27.1 ± 4.4
Parity (mean)	2.0	1.6	2.7	2.0 ± 1.17
≥ 1 caesarean section [n (%)]	4	0	1	5 (16)
Prior abdominal surgery ^a [n (%)]	9	2	0	11 (35.5)
Indication for hysterectomy [n (%)]				
Abnormal bleeding	13	3	3	19 (61.3)
Pelvic pain	4	2	0	6 (19.4)
Other	5	1	0	6 (19.4)
Fibroids [n (%)]	14	3	3	20 (64.5)



Difficult cases !

Adenomyosis is an independent risk factor for complications in deep endometriosis laparoscopic

Endometriosis Unit, ICGON, Hospital Clinic of Barcelona, University of Barcelona, Villarroel 170, 08036 Barcelona, Spain. ✉email: fcarmona@clinic.cat

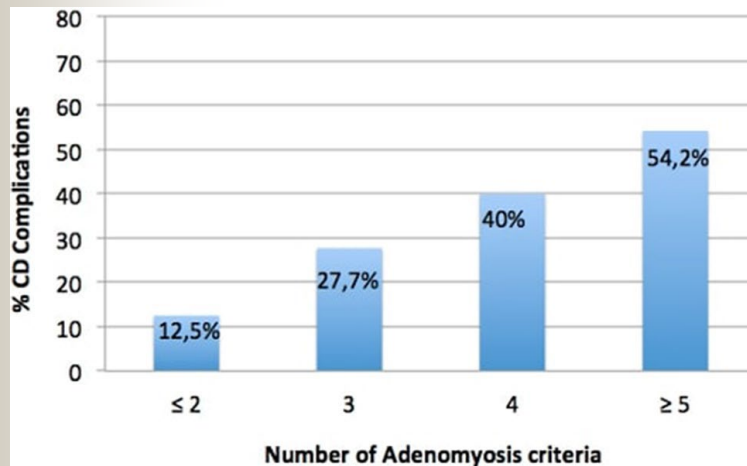
157 patients undergoing DE surgery

	Adenomyosis (A) N=77	No adenomyosis (noA) N=80	p value
Surgical time minutes (mean ± SD)	231 ± 101	181.08 ± 91.61	0.011
Difference pre-post Hemoglobin levels g/dl (mean ± SD)	2.17 ± 1.89	2.05 ± 1.22	0.049
Hospital stay days (mean ± SD)	3.32 ± 3.70	2.75 ± 1.85	0.09
CD complications			
n (%)	26 (33.76)	10 (12.5)	0.001
I	12 (15.58)	4 (5)	
II	10 (12.98)	6 (7.5)	
III	4 (5.19)	0 (0)	
IV	0 (0)	0 (0)	

Longer OP time

Higher complications

Adenomyosis ultrasound features according to the criteria of the Morphological Uterus Sonographic Assessment (MUSA) group, were: asymmetrical thickening, cysts, hyperechoic islands, fan-shaped shadowing, echogenic subendometrial lines and buds, translesional vascularity, irregular junctional zone and interrupted junctional zone. Adenomyosis was diagnosed when at least 3 of the above-mentioned ultrasound features were present according to our hospital protocol.



	Odds ratio	95% CI	p value
Adenomyosis	4.558	1.845–11.26	0.001
Surgical time	1.010	1.004–1.016	0.002
Bowel resection	2.558	0.843–7.761	0.097
Hysterectomy	3.110	1.293–7.478	0.011

Impact of endometriosis on surgical outcomes and complications of total laparoscopic hysterectomy

Stefano Uccella¹ · Nicola Marconi¹ · Jvan Casarin¹ · Marcello Ceccaroni² ·
Luigi Boni³ · Davide Sturla¹ · Maurizio Serati¹ · Simona Carollo¹ ·
Carolina Podesta' Alluvion¹ · Fabio Ghezzi¹

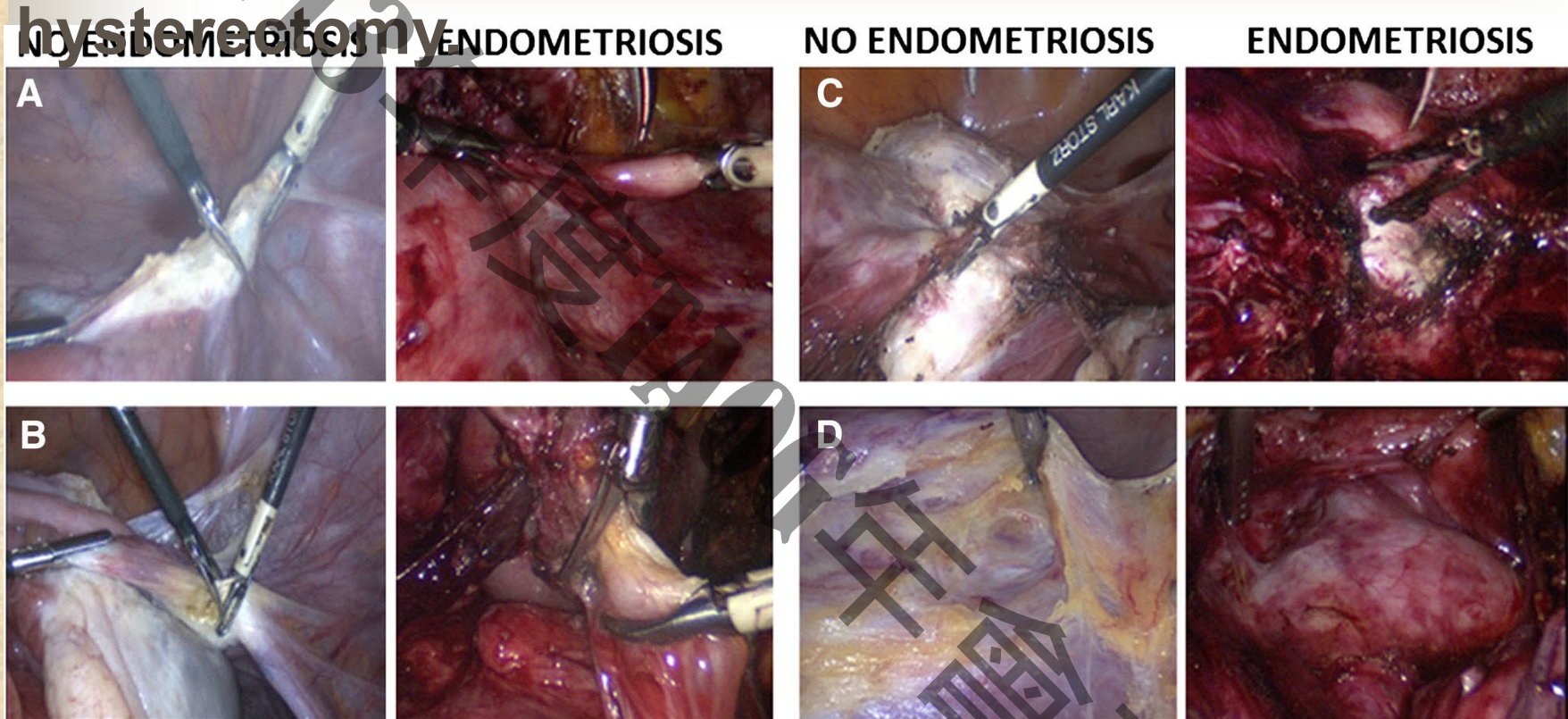
Department of Obstetrics and Gynecology, F. Del Ponte
Hospital, University of Insubria, Piazza Biroldi, 1,
21100 Varese, Italy

2000.1~ 2013.12, 102 women in the endometriosis group,
29 (25.9 %) with minimal–mild, and 83 (74.1 %) with
moderate–severe stage disease (rAFS score)

Table 3 Analysis of complications, dividing women with endometriosis in two subgroups: women with minimal–mild vs. moderate–severe endometriosis

Parameters	Minimal–mild endometriosis (stage I–II), N: 21	Moderate–severe endometriosis (stage III–IV), N: 60	Control group (361 women)	P value Stage I–II vs. III–IV	P value Stage III–IV vs. controls	P value Stage I–II vs. controls
Intraoperative complications	0 (0 %)	1 (1.7 %)	3 (0.8 %)	1.00	0.46	1.00
Organ lesions	0	3 (5 %)	0	0.56	0.003	>0.99
Urinary lesions	0	2 (3.3 %)	0	1.00	0.02	>0.99
Bowel lesions	0	1 (1.7 %)	0	1.00	0.14	>0.99
Conversion to open surgery	0	1 (1.7 %)	3 (0.8 %)	1.00	0.46	1.00
Post operative complications	1 (4.8 %)	9 (15 %)	12 (4.7 %)	0.44	0.001	0.18
Clavien–Dindo score >2	0 (100 %)	6 (66.7 %)	7 (23.5 %)	0.33	0.005	1.00

Impact of endometriosis on surgical outcomes and complications of total laparoscopic hysterectomy

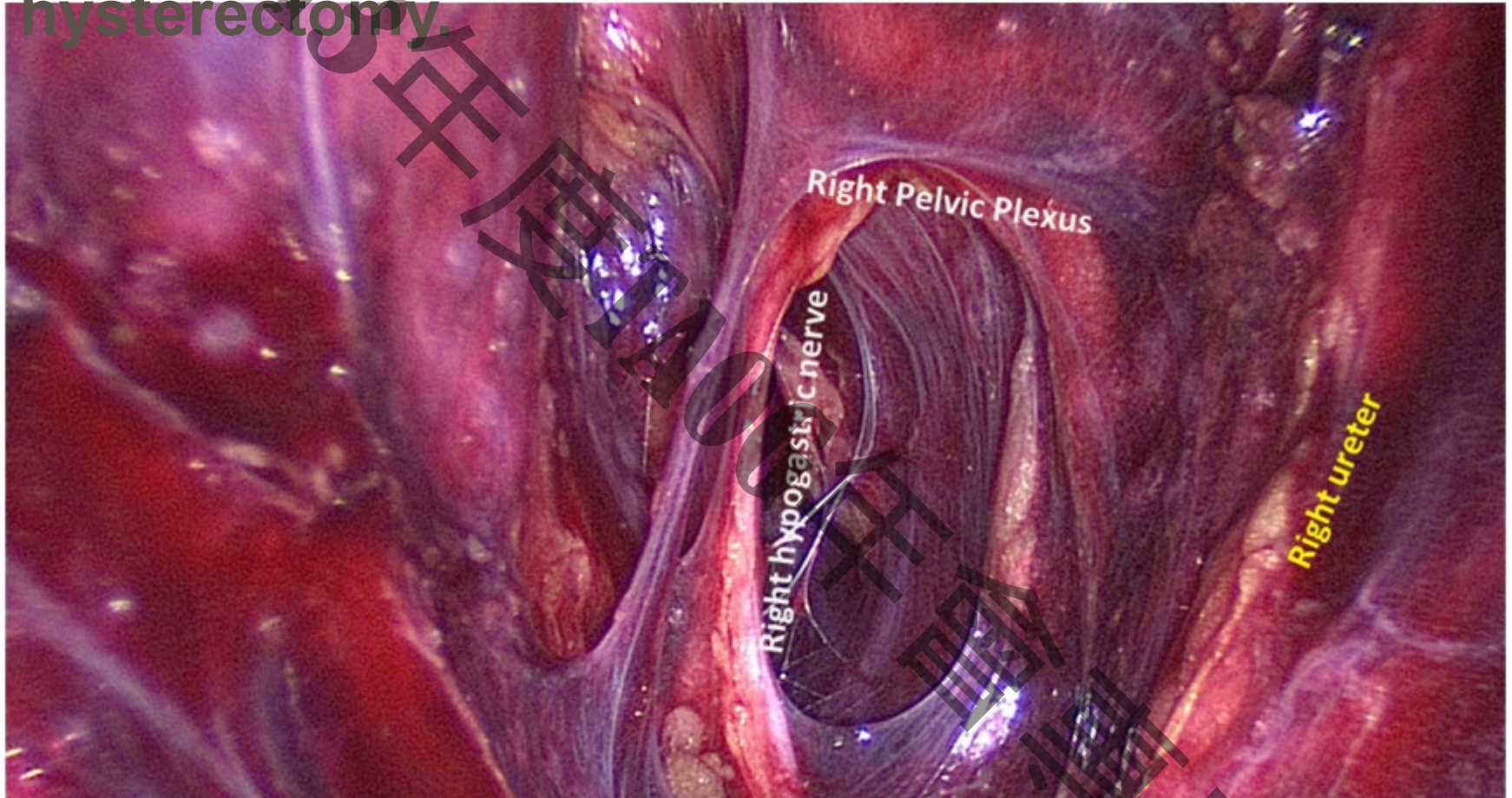


- A. Coagulation and section of the round ligament.
- B. Coagulation and section of the infundibulopelvic ligament.
- C. Coagulation and section of the uterine artery.
- D. Circular colpotomy at the vaginal fornices

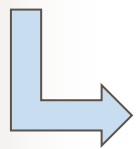
Arch Gynecol Obstet (2016) 294:771–778

Endometriosis is associated with longer operative time and an almost fourfold increase in the risk and severity of complications compared with controls.

Impact of endometriosis on surgical outcomes and complications of total laparoscopic hysterectomy.



Arch Gynecol Obstet (2016) 294:771–778



拜師、參加學會、轉給高手！

Recommendations for performing laparoscopic hysterectomy with respect to preventing ureter injuries

Preoperatively

Completion of **learning curve** (i.e., at least 30) with tutor
Careful case selection

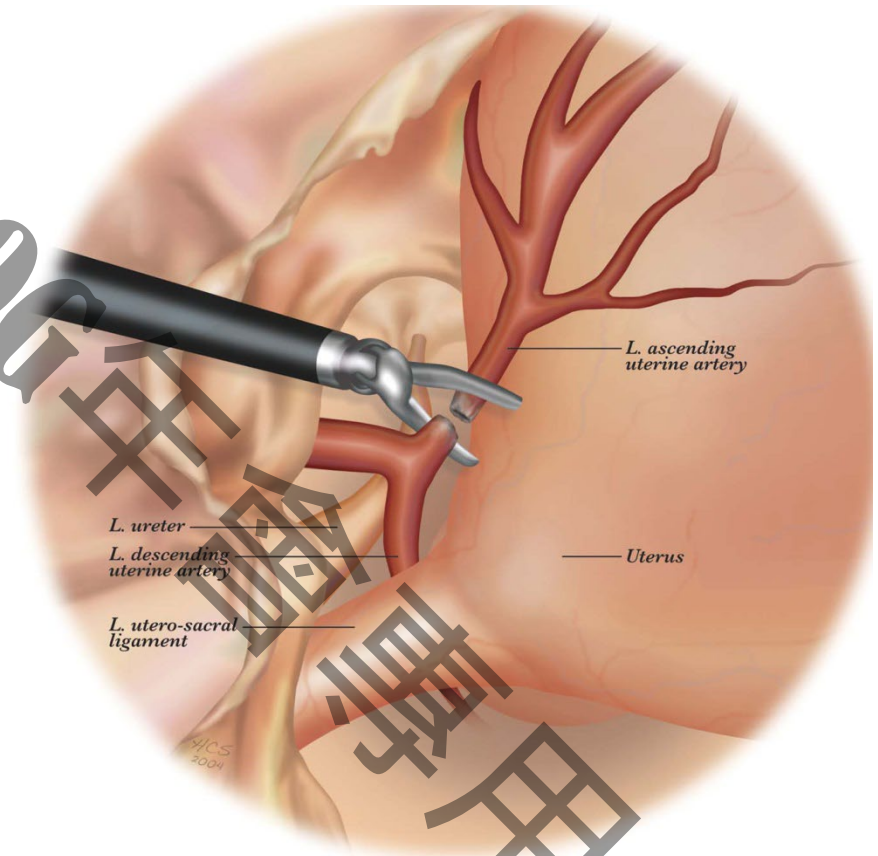
Intraoperatively

1. Use appropriate instruments, e.g., **uterus manipulator**
- 2 Coagulate uterine vessels close to the uterus from ipsilateral side with a **perpendicular approach** i.e., minimizing risk on bleeding and enlarge distance between uterine artery and ureter
- 3 Complete a **ureter visualization** in case of distorted anatomy before coagulation can take place

Postoperatively

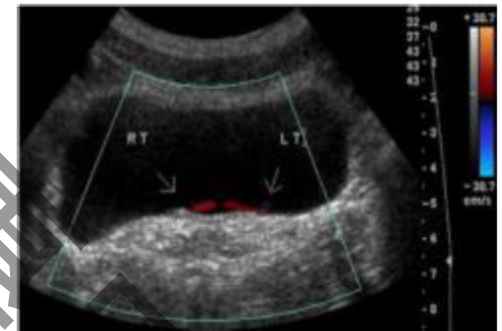
- 1 In case of distortion of anatomy and/or bleeding, performing **cystoscopy** during surgery or **Doppler ultrasound ureteral flow** on first postoperative day
- 2 Before completion of the learning curve, perform recommendation no.1 in all cases, also in case of normal anatomy

Detection and management of urinary tract injury



Postoperative Methods for detecting urinary tract injury

- Lab (Serum electrolytes, BUN/Cr, U/A & U/C, ascites study)
- Imaging studies
 - Suspect bladder injury:
 - Cystoscopy
 - Cystogram
 - Suspect ureteral injury:
 - Ultrasonography
 - hydronephrosis, Ureteral jets, retroperitoneal collection
 - A+P CT with contrast
 - Intravenous pyelography



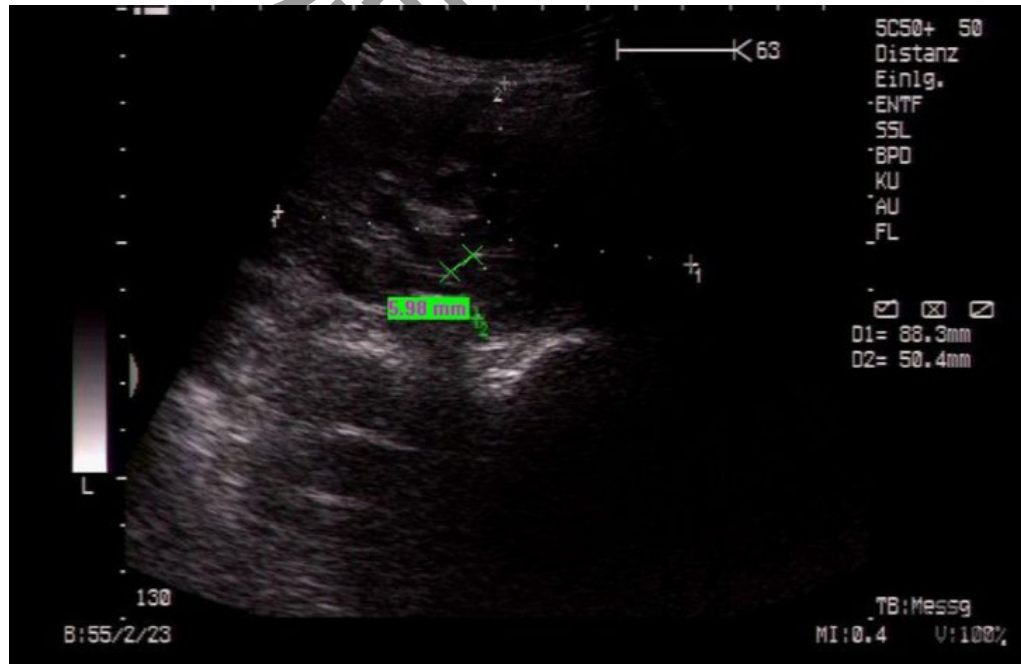
Mild hydronephrosis after uncomplicated hysterectomy

T. Hildebrandt*, A. Mueller, F.C. Thiel, L. Häberle, S. Cupisti, M.W. Beckmann, S.P. Renner

Department of Obstetrics and Gynecology, Erlangen University Hospital, University of Erlangen-Nuremberg, Erlangen, Germany

European Journal of Obstetrics & Gynecology and Reproductive Biology 168 (2013) 102–106

2004 ~ 2008: Retrospective 379 chart review of ultrasound findings



dilatation of the pelvicalyceal system of 5–15 mm was regarded as mild hydronephrosis.

Mild hydronephrosis after uncomplicated hysterectomy

T. Hildebrandt*, A. Mueller, F.C. Thiel, L. Häberle, S. Cupisti, M.W. Beckmann, S.P. Renner

Department of Obstetrics and Gynecology, Erlangen University Hospital, University of Erlangen-Nuremberg, Erlangen, Germany

European Journal of Obstetrics & Gynecology and Reproductive Biology 168 (2013) 102–106

Operation method	Number of patients	Mild hydronephrosis (n)		Unilateral hydronephrosis (n)	
			%		%
TLH	78	45	57.7	34	75.6
LAVH	58	32	55.2	25	78.1
LASH	73	34	46.6	27	79.4
VH	45	29	64.4	17	58.6
AH	125	75	60.0	45	60.0
Total	379	215	56.7	148	68.8

Mild hydronephrosis is a frequent finding after uncomplicated hysterectomy for benign pathology in otherwise asymptomatic patients.

Detection of Bladder injury

Intra-operative

Visible haematuria

Gaseous distention catheter bag

Urinary catheter visible

Hole visible in the bladder

Copious fluid in the operative field

Post-operative

Pyrexia

Copious clear fluid from drains/vagina/incisions/extravasation into the local tissue

Abdominal distention (after catheter removal)

Visible haematuria

Inability to void or low urine output (after catheter removal)

Renal dysfunction

Peritonitis/abdominal pain

Ileus

Causes and prevention of laparoscopic ureter injuries: an analysis of 31 cases during laparoscopic hysterectomy in the Netherlands

Petra F. Janssen · Hans A. M. Brölmann ·
Judith A. F. Huirne

Surg Endosc (2013) 27:946–956

Table 3 Time of recognition of ureter injuries

	TLH (N = 22)	LAVH (N = 6)	LSH (N = 3)	Total (N = 31)
Moment of diagnosis [n (%)]				
During primary operation	0	1	0	1 (3.2 %)
During postoperative admission	0	0	0	0
During readmission	19	5	3	27 (87.1 %)
Postoperative pain	11	4	3	18 (58.1 %)
Postoperative fever	4	1	0	5 (16.1 %)
Postoperative vaginal leakage of urine	4	0	0	4 (12.9 %)
Unknown	3	0	0	3 (9.7 %)
Time until identification (mean ± SD) (days)	37.4 ± 63.7	10.2 ± 5.8	8.7 ± 4.0	29.0 ± 54.0

TLH total laparoscopic hysterectomy, LAVH laparoscopy-assisted vaginal hysterectomy, LSH laparoscopic supracervical hysterectomy

Postoperative
recognition of
ureter injury

1 mo

1.5 wk

1 wk

Urinary Tract Injuries in Laparoscopic Hysterectomy: A Systematic Review

JMIG 2014;21:558-566

Marisa R. Adelman, MD*, Tyler R. Bardsley, MS, and Howard T. Sharp, MD

Sequelae of urinary tract injury [5]

- **Bladder Injuries:** total 252 injuries

Detection time	No.	Management
Intra-OP	203 (80.6%)	28 (13.8%): conversion to laparotomy 175 (86.2%): conservative/ repair by laparoscopic or vaginal approach
Post-OP	19 (7.5%)	10 (52.6%): laparotomy 6 (31.6%): laparoscopic or vaginal repair 3 (15.8%): nil
Not categorized	30 (11.9%)	

→ 84.2% of those with delayed recognition required a 2nd operative procedure.

Urinary Tract Injuries in Laparoscopic Hysterectomy: A Systematic Review

JMIG 2014;21:558-566

Marisa R. Adelman, MD*, Tyler R. Bardsley, MS, and Howard T. Sharp, MD

Sequelae of urinary tract injury [5]

- **Ureteral Injuries:** total 157 injuries

Detection time	Case no.	management
Intra-OP	22(14%)	12: stenting 3: ureteral reanastomoses 4: ureteral reimplantations 3: reparative surgeries
Post-OP	56(35.4%)	22: stents 4: percutaneous nephrostomy tubes 4: ureteral reanastomoses 27: ureteral reimplantations 2: uncategorized reparative surgeries 1: nephrectomy
Not categorized	79(50.6%)	43:ureteral reimplantations

34 (60.7%)
repeat OP

Urinary Tract Injuries in Laparoscopic Hysterectomy: A Systematic Review

JMIG 2014;21:558-566

Marisa R. Adelman, MD*, Tyler R. Bardsley, MS, and Howard T. Sharp, MD

Sequelae of urinary tract injury [5]

- **Fistulas:**

Complication	Total N (number of injuries)	Estimate (%)	95% CI
Vesicovaginal fistulas	392	3.44	1.62–7.12
Ureterovaginal fistulas	392	2.35	1.01–5.40
Stents required	326	11.83	5.96–22.13
Repeat surgery required	348	19.74	12.91–28.99

When bladder injuries present, genitourinary fistulas appear to be the most common complication. (74/76 in one series)

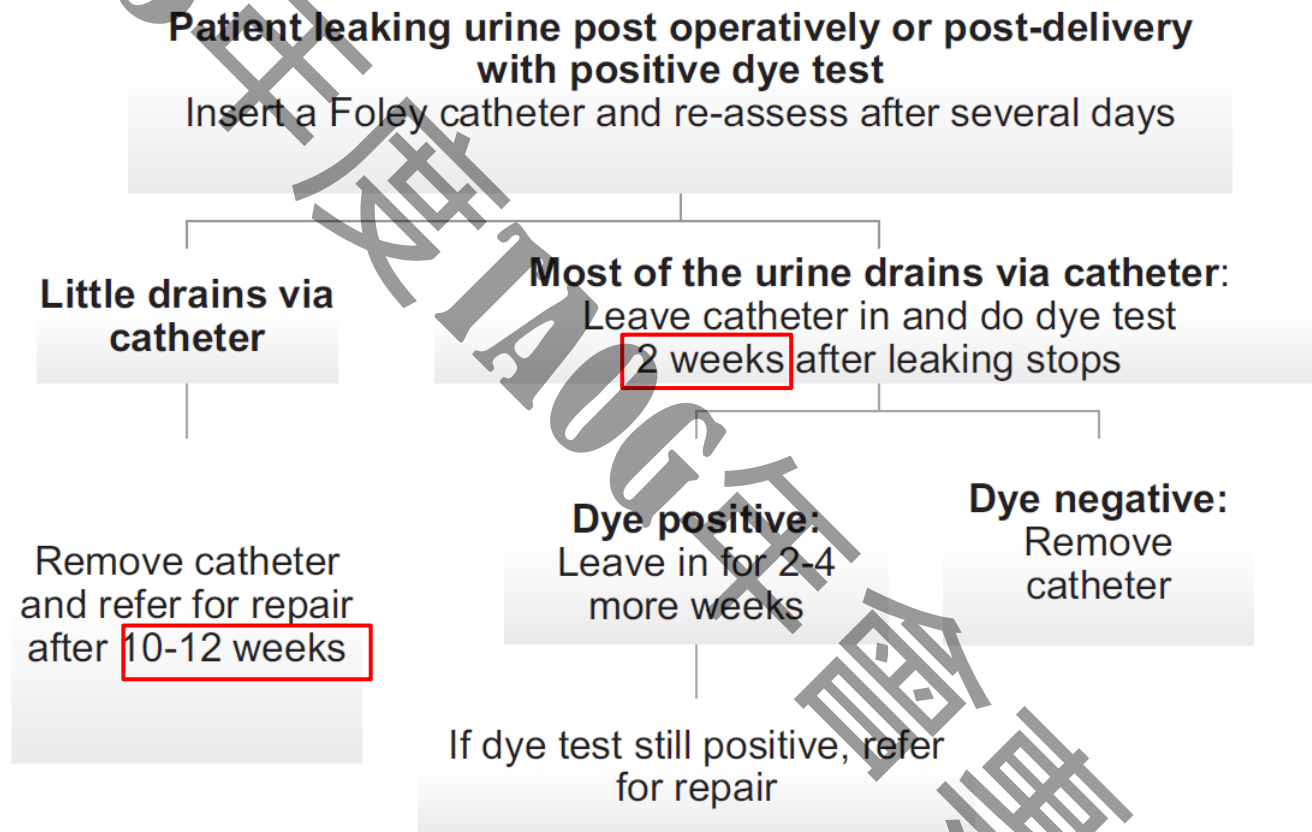
89.5% of recognized fistula required surgical correction.

Controversies in the management of vesicovaginal fistula

Michael Breen, FRCOG ^{a,*}, Michael Ingber, MD ^b

^a Centre de Soins des Fistules, Centre Hospitalier Universitaire Toamasina, Hospital Be Toamasina, Boite Postale, 501 Toamasina, Madagascar

^b The Center for Specialized Women's Health, Garden State Urology, Atlantic Health System, 3155 State Route 10E, Suite 100, Denville, NJ, 07834, USA



FlowChart. Flowchart for managing vesicovaginal fistula with catheter drainage.

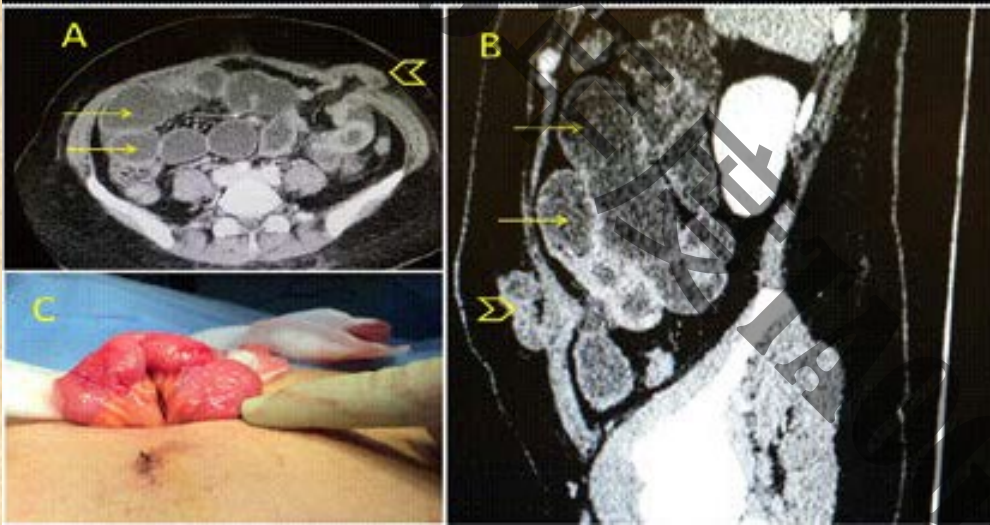
Best Practice & Research Clinical Obstetrics and Gynaecology 54 (2019) 61–72

more likely to be successful if the fistula is less than 1 cm in size

Trocar site hernia

Table II. Observations of six cases of incisional hernia amongst 3560 operative laparoscopies (from Kadar *et al.*, 1993)

Trocar size	Trocar site	
	Umbilical	Extraumbilical
5 mm		0/8771
10 mm	0/2560	open 1/254
		closed 0/175
		total 1/429 (0.2%)
12 mm	0/1000	open 2/25
		closed 3/136
		total 5/161 (3.1%)

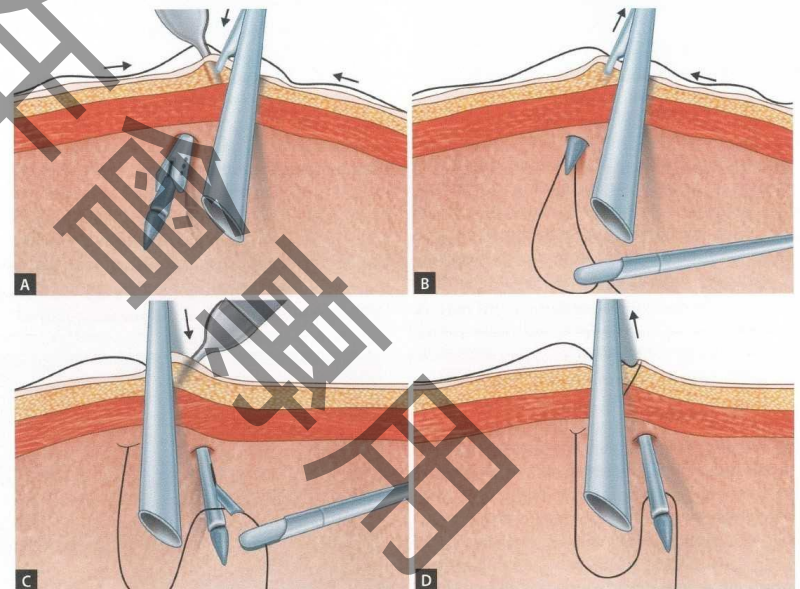


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Trocar site hernia occurs rarely in 5- and 7- mm ports

More commonly in ports >10 mm

increased risk with 12-mm ports (3.1%)



Figs. 55A to D: Port closure with the help of suture passer.

Take Home Message

1. Obtain skill through learning
2. Case selection
3. Careful trocar entrance and instrument application to avoid injury
4. Uterine manipulator could reduce urinary tract injury
5. Anatomy recognition is a key way to success
6. Management of post-operative complication requires collaborative team work

