

# Utility of an Internal Retractor (EndoGrab) for the Management of the Vesicouterine Ligament during Laparoscopic Radical Hysterectomy

Eiji Kobayashi Mamoru Kakuda Yusuke Tanaka Akiko Morimoto  
Tomomi Egawa-Takata Shinya Matsuzaki Yutaka Ueda Kiyoshi Yoshino  
Tadashi Kimura

Department of Obstetrics and Gynecology, Osaka University Graduate School of Medicine, Osaka, Japan

## Key Words

Laparoscopic radical hysterectomy · Urologic injury ·  
Vesicouterine ligament · Internal retractor · EndoGrab

## Abstract

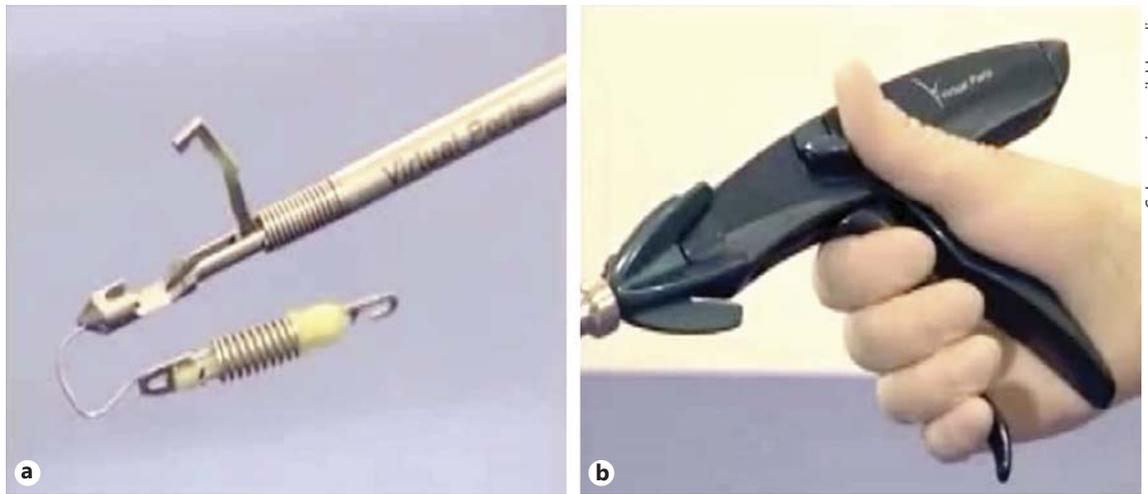
**Background/Aims:** The study aims to prevent serious urologic injury during a radical hysterectomy; we propose that one of the most important procedural steps is the careful management of the vesicouterine ligament (VUL). **Patients and Methods:** Between January 2013 and October 2014, we used a novel internal retractor in 17 patients undergoing a laparoscopic radical hysterectomy (LRH) for early-stage cervical cancer to obtain and secure a better surgical view. For management of the VUL during the laparoscopic procedure, we routinely used an internal retractor (EndoGrab; Virtual Ports, Misgav, Israel) and vessel tape to reposition the ureter in a safe lateral-caudal direction. **Results:** Using an EndoGrab, we were easily able to reproduce a suitable surgical view that simulated the one obtained by an abdominal route for radical hysterectomy. Using this improved laparoscopic procedure, we completed radical hysterectomies in all 17 cases without a ureteral injury complication. **Conclusion:** Our modified method using an EndoGrab is effective for the prevention of ureteral injury during a LRH, and its ease of use makes it suitable even for those surgeons early in their laparoscopic learning curve.

© 2016 S. Karger AG, Basel

## Introduction

A laparoscopic radical hysterectomy (LRH) with pelvic and aortic lymph node dissection was first reported in 1992 [1]. Since that initial report, several other groups have published their experiences supporting the feasibility and safety of the procedure. Minimally invasive surgery is a good alternative option for doing radical surgery and is highly feasible in early-stage cervical cancer [2, 3]. Laparoscopic surgery, performed under specific situations, is susceptible to complications, especially for surgeons in the early stages of their learning curve [4, 5]. One such complication, a urinary tract injury, can have major personal, financial and social costs. Johnson et al. [6] have reported a significant increase in ureteral injuries during total laparoscopic hysterectomy, when compared with the traditional abdominal hysterectomy (OR 2.61, 95% CI 1.22–5.60).

Hwang [7] reported their results from a meta-analysis of 20 LRH studies. They concluded that LRH is associated with a significantly increased risk of intraoperative urologic complications (OR 1.97, 95% CI 1.23–3.13). Although there have been several reports regarding an effective method for avoiding ureteral injury during an abdominal radical hysterectomy (ARH) [8–10], there have been no similar reports for LRH. Herein, we report our experience with cervical cancer patients using the



**Fig. 1. a** The opening of one of the grasping ends of an EndoGrab. **b** Handle of the forceps.

EndoGrab, which is an internally anchored retracting device. This instrument secures a sufficient surgical field, keeps the ureter displaced in a downward position and enables safer, more accurate surgical procedures.

### Patients, Methods and Materials

This study was reviewed and approved by the Osaka University Ethical Committee for Human Subjects. The study included 17 patients treated for early-stage cervical cancer at the Osaka University hospital between January 2013 and October 2014, on whom the EndoGrab was used during their LRH. Written informed consent was obtained from all patients. All patients were operated on by the same surgeon (E.K.). In the vesicouterine ligament (VUL) phase, we used the EndoGrab to dislocate the ureter. We retrospectively evaluated the operative time, blood loss, length of postoperative hospital stay, and intra- and post-operative complications in these patients.

The EndoGrab is an internally anchored retracting device that can be introduced into the abdomen through a 5-mm laparoscopic port (fig. 1). Once deployed, one of the 2 grasping ends is attached to the target organ while the other is anchored to the abdominal wall. In this study, we used only one grasping end to dislocate the ureter. This device can be adjusted repeatedly throughout the operation to allow for more optimal retraction and is removed at the end of surgery.

#### Operative Technique

All laparoscopic procedures were performed in the dorsal lithotomy position, under general anesthesia. A transvaginally inserted uterine manipulator was used to help maneuver the uterus during the surgery. A 12-mm port was inserted through a transumbilical incision for placement of the operative laparoscope. Four ancillary ports were positioned, 2 in each lower quadrant, 1 in the left upper quadrant and 1 in the suprapubic region. We rou-

tinely used a suction irrigator probe with a built-in integrated monopolar electrode (ENDOPATH® Probe Plus II, Ethicon Endo-Surgery, Puerto Rico, USA).

The uterovesical peritoneum was opened from the cervix to the round ligament. After dissection of the round ligament, a pararectal and paravesical space was created and the pelvic lymphadenectomy was initiated. At the end of the lymphadenectomy, the external iliac artery and vein, the internal iliac artery, the iliac bifurcation, the deep uterine vein and the obturator nerve were each completely exposed. After clipping and dissecting the uterine artery at its origin, we dissected the connective tissue between the ureter and the uterine artery. The course of the ureter was then usually clearly exposed, up to the entrance of the ureteral tunnel. We wrapped the ureter in vessel tape, which was cut at 5 cm in diameter, and we clipped the vessel tape. We then pulled up the vessel tape with the EndoGrab. If we wanted to modify the position of EndoGrab, we reconnected the grasping end with forceps. Then we could reposition the vessel tape anywhere desired. After sufficient dissection of the bladder, we transected the anterior VUL. We then transected the cardinal ligament and posterior VUL. Except for the vaginal cuff incision and closure, we performed all procedures laparoscopically. At the end of the procedure, we routinely confirmed that there were no urological complication using an injection of indigo carmine and cystoscopy.

### Result

#### *Improved Surgical View and Displacement of the Ureter in a Downward Position*

An EndoGrab device was used for retraction in all cases in this study. We used one grasping end of the EndoGrab to relocate the ureter under the pubic bone (fig. 2). After sufficient dissection of the bladder, we transected the anterior VUL (online suppl. video, see [www.](http://www.)

**Table 1.** Characteristics and outcomes of patients who underwent LRH

Age, years, median (range)	41 (30–67)
Body mass index, kg/m <sup>2</sup> , median (range)	21.7 (17.4–25.9)
Stage (number of patients)	
IA2	2
IB1	15
Histological type	
Squamous cell carcinoma	11
Adenocarcinoma	6
Number of harvested pelvic nodes, median (range)	28 (18–39)
Pelvic lymph node metastases	
Present	2
Absent	15
Duration of operation, min, median (range)	434 (282–513)
Blood loss, ml, median (range)	270 (80–560)
Duration of hospital stay after the surgery, days, median (range)	12 (9–16)

karger.com/doi/10.1159/000443392). The ureter was satisfactorily dislocated in the caudal-lateral direction with the EndoGrab, which quite improved the surgical view. With the caudal-lateral dislocation of the ureter by the EndoGrab, the VUL could be safely dissected in all 17 cases.

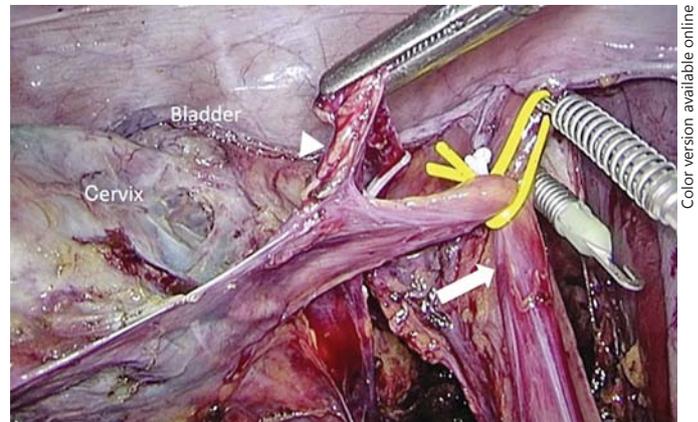
#### Clinical Results and Complications

The median operative time was 434 min. The median estimated blood loss was 270 ml. The median postoperative hospital stay was 12 days (table 1). Injury to the ureter was not observed in any of the 17 cases. Massive bleeding from the vessels of the VULs was also not observed. There were no other intra- or postoperative complications.

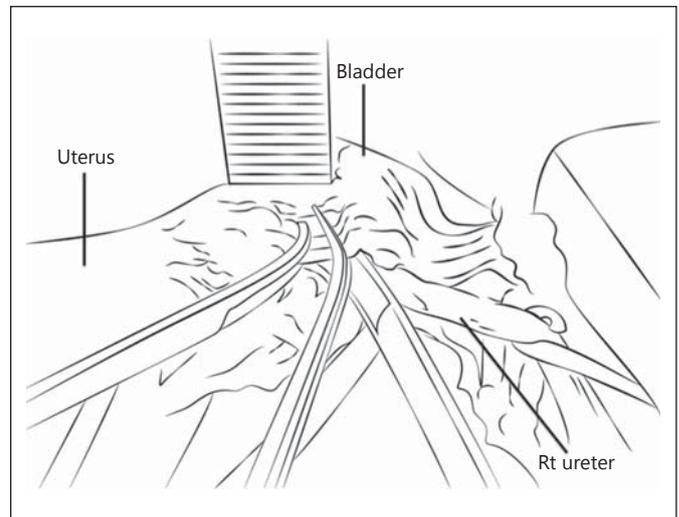
#### Discussion

When conducting the ARH, the VUL is opened by simultaneous clamping and incision, after a ureteric tunnel is created using Metzenbaum scissors. During this procedure, the ureter is dislocated in a caudal-lateral direction with a retractor (fig. 3).

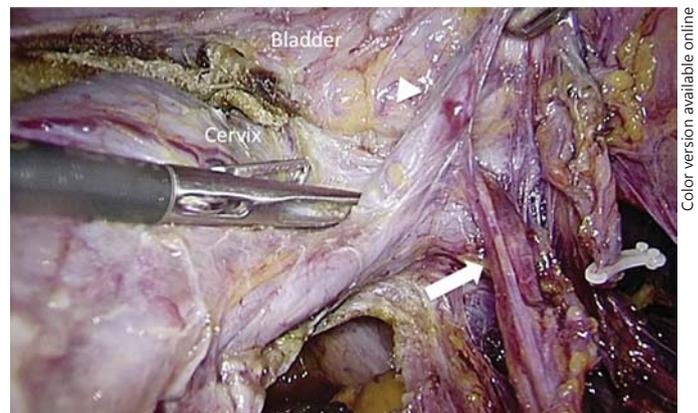
In a typical laparoscopic surgery (that does not employ an EndoGrab), the ureter usually falls down, and a surgical field cannot be maintained as good as with ARH (fig. 4). The assistant sometimes needs to grasp and dislocate the ureter in the caudal-lateral direction. The problems associated with this typical procedure are an inadvertent ureteral injury and loss of the use of the assistant's forceps [11]. There have been creative alternative retrac-



**Fig. 2.** Vessel tape and EndoGrab are used to dislocate the right ureter in the caudal lateral direction. Arrowhead shows the right uterine artery. Arrow shows the right ureter.



**Fig. 3.** The surgical view in typical ARH. Two retractors and 1 scissors are used to dislocate the ureter and uterine artery.



**Fig. 4.** Typical surgical view without use of EndoGrab. Arrowhead shows the right uterine artery. Arrow shows the right ureter.

tion methods described in the literature. Previously reported methods of retraction in laparoscopic surgery used transabdominal stay-sutures [12], T-Lift [13] and a magnetic anchoring guidance system [14]. These devices enable the assistant to maintain one free hand, but their shortcoming is that they are limited to lifting intra-abdominal tissue toward the abdominal wall; they cannot be used to pull tissues away, in a caudal direction.

In our revised procedure, the ureter was wrapped in vessel tape, which was pulled upward with the EndoGrab and fixed to the peritoneum beneath the pubic bone. We could then dislocate the ureter in the caudal-lateral direction with the EndoGrab, just as we would have done in a laparotomy. During the procedure, the surgeon maintained a good surgical view and visually monitored whether the ureter was forcibly stretched. We believe this improved procedural change reduced or prevented ureteral injury.

The 2 primary strengths of using the EndoGrab in this manner are that the ureter can be dislocated in the caudal-lateral direction, as in a laparotomy, and the device can be adjusted repeatedly throughout the operation to allow for optimal retraction. We were able to use the EndoGrab to retract the ureter indirectly, via a vessel tape looped around the ureter, which reduced potential damage to it. Use of the EndoGrab in this novel way has not been previously reported.

Recently, in Japan, there has been widespread use of LRH for cervical cancer. When we began conducting LRHs in January 2013, our average operating times were

longer than in previous reports because we were in the early phases of introducing a new surgical procedure. Because we had to observe the patients longer for possible complications of this new procedure, the average length of the hospital stay in our series was also longer than that in Western countries.

The limitations of this study were that this procedure was used on only a small number of the patients and the absence of a control group of similar size operated on by the same surgeon in the same time period but without the use of the EndoGrab device and, finally, the short follow-up period. However, we did complete all 17 procedures without any complications, including ureteral injury, which is common in typical LRH. We therefore believe that this improved technique might be useful, especially during the early phase of surgeons learning to conduct LRH.

In conclusion, our improved LRH technique, involving the use of an EndoGrab internal retractor, has proven to be safe and simple to apply in the management of the VUL. This technique has potential applications in reduced port and robotic radical hysterectomy in the deep pelvis, without crowding the surgical field with additional forceps, to simulate the surgical field of a more open surgery.

## Disclosure Statement

The authors have no conflict of interest to disclose.

## References

- 1 Nezhat CR, Burrell MO, Nezhat FR, et al: Laparoscopic radical hysterectomy with paraaortic and pelvic node dissection. *Am J Obstet Gynecol* 1992;166:864–865.
- 2 Kanao H, Fujiwara K, Ebisawa K, Hada T, Ota Y, Andou M: Total laparoscopic nerve-sparing radical parametrectomy for occult early-stage cervical cancer: surgical technique and postoperative bladder function. *Gynecol Obstet Invest* 2015;80:128–133.
- 3 Zapardiel I, Zanagnolo V, Magrina JF, Magtibay PM: Robotic radical parametrectomy in cervical cancer. *Gynecol Obstet Invest* 2011;72:179–182.
- 4 Dargent DF: Laparoscopic surgery in gynecologic oncology. *Surg Clin North Am* 2001;81:949–964.
- 5 Xu H, Chen Y, Li Y, Zhang Q, Wang D, Liang Z: Complications of laparoscopic radical hysterectomy and lymphadenectomy for invasive cervical cancer: experience based on 317 procedures. *Surg Endosc* 2007;21:960–964.
- 6 Johnson N, Barlow D, Lethaby A, Tavender E, Curr L, Garry R: Methods of hysterectomy: systematic review and meta-analysis of randomised controlled trials. *BMJ* 2005;330:1478.
- 7 Hwang JH: Urologic complication in laparoscopic radical hysterectomy: meta-analysis of 20 studies. *Eur J Cancer* 2012;48:3177–3185.
- 8 Kobayashi E, Iwamiya T, Isobe M, Miyake T, Shiki Y, Yamasaki M: A novel technique for the management of the vesicouterine ligament during radical hysterectomy. *Gynecol Oncol* 2009;115:56–59.
- 9 Fujii S, Takakura K, Matsumura N, Higuchi T, Yura S, Mandai M, Baba T: Precise anatomy of the vesico-uterine ligament for radical hysterectomy. *Gynecol Oncol* 2007;104:186–191.
- 10 Yoo S, Terai Y, Tanaka T, Tanaka Y, Tsunetoh S, Kanemura M, Ohmichi M: Role of the two-point pull-up technique for treating the uterine arteries during radical hysterectomy and trachelectomy. *Eur J Obstet Gynecol Reprod Biol* 2013;170:544–549.
- 11 Ostrzenski A, Radolinski B, Ostrzenska KM: A review of laparoscopic ureteral injury in pelvic surgery. *Obstet Gynecol Surv* 2003;58:794–799.
- 12 Navarra G, Rando L, La Malfa G, Bartolotta G, Pracanica G: Hybrid transvaginal cholecystectomy: a novel approach. *Am J Surg* 2009;197:e69–e72.
- 13 Albornoz J, Messori P, Wattiez A: How to improve exposure in laparoscopy: organ suspension with the T-lift device. Las Vegas, Presented at 41st Annual Meeting of American Association Gynecologic Laparoscopist, 2012.
- 14 Park S, Bergs RA, Eberhart R, Baker L, Fernandez R, Cadeddu JA: Trocar-less instrumentation for laparoscopy: magnetic positioning of intra-abdominal camera and retractor. *Ann Surg* 2007;245:379–384.