

Variations in Procedures for Ureterolysis with Sharp Dissection in Minimally Invasive Hysterectomy

Yasuhiro Tanase*, Mayumi Kobayashi Kato, Masaya Uno, Mitsuya Ishikawa, Tomoyasu Kato

Department of Gynecology, National Cancer Center Hospital, Tokyo, Chuo-Ku, Japan

Abstract

To safely perform minimally invasive hysterectomy (MIH), including laparoscopic hysterectomy and robot-assisted hysterectomy, partial ureterolysis, or visualizing only the ureter without dissection is often inadequate. Moreover, careless blunt dissection could injure the blood vessels. We present our surgical method for ureterolysis using sharp dissection during MIH. First, the outer portion of the ureter is dissected. Dissecting between the pelvic sidewall and the posterior leaf of the broad ligament creates a pararectal space outside the ureter, enabling the easy identification of the ureter running on the posterior leaf. Second, the inner portion of the ureter is dissected. After determining the location of the ureter, a better partial dissection of the ureter can be performed from the posterior leaf, instead of dissecting along the entire circumference. If fine surgery has to be performed, the ureter can be dissected by enclosing it within its sheath. We primarily perform dissections using a monopolar device, which allows a sharp dissection. Furthermore, in our method, we often include the dissection of the ureteral tunnel. It is important to understand the anatomy and membrane structure of the ureter in each patient and adjust the extent of ureterolysis based on individual differences.

Keywords: Dissection, hysterectomy, minimally invasive surgical procedure

INTRODUCTION

In gynecologic surgery, blunt dissection is mainly used. However, careless blunt dissection could injure the blood vessels. In general, sharp dissection is the most basic technique in the field of surgery. Especially for colorectal surgeons, sharp dissection along the embryological plane and high vascular ligation at the vessel origin are essential. In our institute, gynecologic surgeons have been performing sharp dissection as well. Especially, considering the detachment around the ureter, we believe that sharp dissection is safer and preferable to avoid inadvertent bleeding caused by blunt dissection.

Furthermore, surgical techniques for the identification and dissection of the ureter should be mastered by all gynecologic surgeons to reduce the risks of ureteral injury during a minimally

invasive hysterectomy (MIH). However, partial ureterolysis is inadequate for safely performing MIH, and the extent of ureterolysis depends on the surgeon's technique and skills. Here, we discuss procedural variations for ureterolysis with sharp dissection in MIH including laparoscopic hysterectomy and robot-assisted hysterectomy, and demonstrate our surgical method, including the tips and disadvantages.

SUBJECTS AND METHODS

We mainly perform dissections using a monopolar device, which enables sharp dissection. The sheath around the ureter is delicate, and careless blunt dissection could injure the blood vessels. Furthermore, care must be taken to prevent damage to the adventitia and muscular wall of the ureter.

Article History:

Submitted: 23-Nov-2021

Revised: 03-Jan-2022

Accepted: 17-Mar-2022

Published: 05-Aug-2022

Access this article online

Quick Response Code:



Website:
www.e-gmit.com

DOI:
10.4103/gmit.gmit_129_21

Address for correspondence: Dr. Yasuhiro Tanase,
5-1-1, Tsukiji, Tokyo, Chuo-Ku 104-0045, Japan.
E-mail: yatanase@ncc.go.jp

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Tanase Y, Kato MK, Uno M, Ishikawa M, Kato T. Variations in procedures for ureterolysis with sharp dissection in minimally invasive hysterectomy. *Gynecol Minim Invasive Ther* 2022;11:171-3.

We usually dissect the areolar connective tissue that is exposed using moderate tissue traction. Regarding the use of the monopolar device, the low-voltage mode (“Cut” or “Blend”) with a lower thermal effect may be important, particularly when dissecting the ureter. Anatomical knowledge and dissection skills are vital for safe ureterolysis. Surgeons should adjust the extent of ureterolysis as per each patient. We demonstrate our surgical method for ureterolysis in [Video 1]. This retrospective study was approved by the Institutional Review Board of our institution (approval no. 2018-120). Owing to the retrospective nature of the study, the ethics committee waived the requirement of informed consent from the patients.

Surgical technique

Dissection of the pelvic sidewall and identification of the ureter

The peritoneum lateral to the ovarian vessels is incised toward the pelvic brim to further expose the retroperitoneum. Full medial traction of the peritoneum around the ovarian vessels at the pelvic brim exposes the ureter more clearly over the iliac vessels at their bifurcation. This traction is important to expose the ureter. The ureter running on the posterior leaf of the broad ligament can then be identified. If the ureter cannot be identified on the pelvic sidewall, examining the pelvic brim, where the ureter traverses the bifurcation of the common iliac artery, can be helpful. The path of the ureter can then be traced more distally. These surgical principles of identifying the ureter are the same as those employed for an open, laparoscopic, or even robotic approach.

Dissecting the outer portion of the ureter

After the ureter is exposed, a safe dissection space outside the ureter till the uterine artery is created, which is known as the pararectal space of Latzko. This space can be developed by dissecting between the pelvic sidewall and the posterior leaf of the broad ligament. Dissection can be continued along the medial side of the internal iliac artery and ventral to the curve of the sacrum. The pararectal space can be exposed without the risk of major bleeding and is developed caudally to the uterine artery traversing the ureter [Figure 1a].

Dissecting the inner portion of the ureter

The development of the outer portion of the ureter alone would often be insufficient for performing MIH safely because the ureter runs nearer than expected via the uterine cervix. Thus, dissecting the inner side of the ureter could be important. The ureter naturally goes with its sheath and adheres to the posterior leaf of the broad ligament. Thus, the ureter with its sheath should be separated from the posterior leaf of the broad ligament to the parametrial opening, thereby keeping the ureter safely isolated. Careful

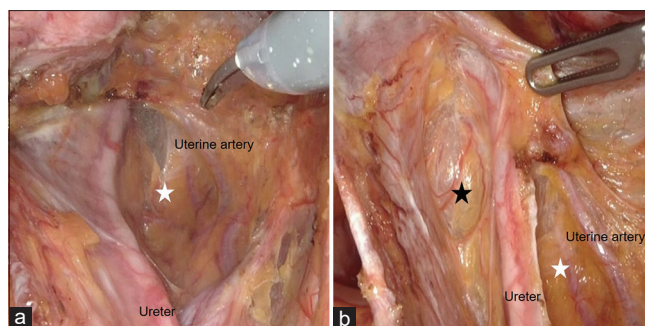


Figure 1: The right retroperitoneal space. (a) The outer portion of the ureter, so-called pararectal space of Latzko, is opened (white star). (b) The inner portion of the ureter is opened (black star). This space is known as the pararectal space of Okabayashi. The ureter with its sheath should be dissected from the posterior leaf of the broad ligament <http://www.apagemit.com/page/video/show.aspx?num=293>

dissection with medial traction can be employed to free the ureter safely [Figure 1b]. This inner portion of the ureter is known as the pararectal space of Okabayashi.

Dissection of the ureteral canal opening

In our method, we often include the dissection of the ureteral tunnel. Loose connective tissues that bridge the ureteric sheath to the parametrium, which often include blood vessels, are observed [Figure 2]. These connective tissues are dissected to clarify the opening of the ureteral canal and prevent unnecessary bleeding. After dissecting the ureter at the opening of the ureteral canal, the parametrium can be dissected safely.

DISCUSSION

The incidence of ureteral injuries during laparoscopic hysterectomy has been estimated to be 0.48%, which is higher than that during laparotomy (0.18%).^[1] In a recent Cochrane review, MIH had a higher risk of genitourinary injury (bladder injury and ureteric injury combined) than abdominal hysterectomy (odds ratio 2.44, 95% confidence interval 1.24–4.80).^[2] In an effort to achieve hemostasis, inadvertent clamping, suture ligation, or excessive electrocautery may obstruct or injure the ureter. Therefore, meticulous attention to prevent bleeding is vital for maintaining proper visualization during surgery. For bleeding around the ureter, excessive coagulation should be avoided and gauze compression is recommended. A ureteral injury often occurs at one of the following four common sites during laparoscopic surgery: (1) at the pelvic brim where the ureter traverses the hypogastric vessels and under the infundibulopelvic ligament, (2) along the pelvic sidewall under the ovarian fossa, (3) lateral to the cervix where the ureter passes under the uterine arteries, and (4) lateral to the vaginal fornix.^[3] Gynecologic surgeons should be aware of the pathogenesis and most frequent sites of ureteral injury and acquire surgical safety skills in ureterolysis.

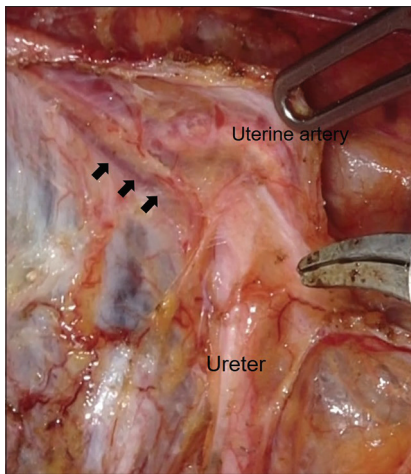


Figure 2: The right crossing of the ureter and uterine artery. Black arrows indicate the connective tissue between the ureter and the parametrium, which often includes small blood vessels. By dissecting this loose connective tissue, the ureteral canal can be clarified without unnecessary bleeding

MIH can be performed safely using transvaginal devices, such as the Koh Colpotomizer System or VCare® (ConMed, Utica, NY, USA) without dissecting the ureter.^[4] However, in surgeries for gynecologic malignancy, caution should be observed in the use of transvaginal devices, including a uterine manipulator, because of the possibility of tumor spillage. In addition, visualizing only the ureter at the pelvic brim or pelvic side wall without retroperitoneal dissection might be inadequate because the section lateral to the vaginal cuff is a common site of ureteral injury. Moreover, as the segment of the ureter between the intersection of the uterine artery and urinary bladder is not visible, ureterolysis to the ureteric tunnel might occur.

Few studies have been conducted on ureterolysis in MIH,^[5] thus, our method has many practical applications. The necessity of ureterolysis in MIH might be controversial, especially for benign indications. However, as the incidence of ureteral injuries in MIH is higher than that in laparotomy, ureterolysis in MIH could be acceptable. Moreover, gynecologic surgeons should be familiar with different ureteral injuries and recognize variations in pelvic anatomy to ensure surgical safety in ureterolysis. Above all, learning safe surgical techniques and variations in approaches toward ureterolysis may be useful in performing advanced minimally invasive surgeries, especially surgeries for gynecologic malignancies.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Packiam VT, Cohen AJ, Pariser JJ, Nottingham CU, Faris SF, Bales GT. The impact of minimally invasive surgery on major iatrogenic ureteral injury and subsequent ureteral repair during hysterectomy: A national analysis of risk factors and outcomes. *Urology* 2016;98:183-8.
2. Aarts JW, Neiboer TE, Johnson N, Tavender E, Garry R, Mol BW, *et al.* Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev* 2015;12:1-132.
3. Rosenblatt PL, Stanford E. Urologic injuries in laparoscopic surgery. In: Isaacson K, editor. *Complications of Gynecologic Endoscopic Surgery*. Philadelphia, USA: Saunders; 2006. p. 95-104.
4. Koh LW, Koh PH, Lin LC, Ng WJ, Wong E, Huang MH. A simple procedure for the prevention of ureteral injury in laparoscopic-assisted vaginal hysterectomy. *J Am Assoc Gynecol Laparosc* 2004;11:167-9.
5. Gabriele C, Luca L, Karolina A, Istvan A, Rodrigo F, Nassir H, *et al.* Laparoscopic dissection of the pelvic ureter: Rules of engagement. *J Minim Invasive Gynecol* 2019;26:604.