International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Sarwar S et al. Int J Reprod Contracept Obstet Gynecol. 2025 Jul;14(7):2411-2415
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20252003

Review Article

Preventing ureteric injury in total laparoscopic hysterectomy: a focus on surgical technique

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Received: 15 May 2025
Accepted: 12 June 2025

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ABSTRACT

Hysterectomy is a frequently performed procedure in gynaecology. Laparoscopic hysterectomy offers the added advantages of reduced postoperative pain, minimal blood loss, shorter hospital stays, and lower incidence of surgical site infections. However, it does carry an elevated risk of injury to the urinary bladder and ureters. Recent technological advancements can help identify the ureters during laparoscopic hysterectomy, thereby decreasing the occurrence of lower urinary tract injuries. However, these advanced techniques are often not easily accessible in developing countries and can be expensive. We described a step-by-step approach to total laparoscopic hysterectomy that aims at minimising the risk of lower urinary tract injuries, and recent advances along with other methods to avoid urinary tract injuries are also discussed.

Keywords: Gynaecological surgery safety, Total laparoscopic hysterectomy, Ureteric injury

INTRODUCTION

Hysterectomy is a common gynaecological procedure performed.[1] Indications of hysterectomy include leiomyomas, dysfunctional uterine bleeding unresponsive to medical treatment, chronic pelvic pain, pelvic organ prolapses, and malignant diseases.[2-4] Due to the benefits of shorter hospital stay, less postoperative pain, less blood loss, and faster overall recovery, hysterectomy is increasingly being performed laparoscopically or using the robot.[5,6]

Previous pelvic and abdominal surgeries, endometriosis, and increased BMI may make the laparoscopic approach difficult, with increased complications.[7] Other factors influencing the choice of approach are the surgeon's experience and patient preferences.

The urinary bladder and lower ureter lie in close proximity to the uterus and cervix and are susceptible to injury during pelvic surgeries. Lower urinary tract injuries are one of the potential complications of hysterectomy, with increased risk using the laparoscopic approach.[8] The lower urinary tract injury rate is estimated to be 1.3 % in laparoscopic hysterectomy.[9] Lower urinary tract injuries increase patients' morbidity significantly and may lead to renal failure.

This study aims to describe our technique of total laparoscopic hysterectomy, which focuses on minimising the chances of lower urinary tract injuries and safely conducting the procedure.

TECHNICAL CONSIDERATIONS

Patient selection

For TLH (total laparoscopic hysterectomy), we select patients whose uterine size is not large, and who have no history of endometriosis or dense abdominal adhesions.

Patients who had previous cesarean sections can be safely operated on as the adhesions can be taken down under vision. Previous abdominal surgeries makes TLH hazardous. High BMI patients pose great difficulty as the mesentery is heavy due to high visceral fat, and retracting the bowel becomes difficult.

Patient positioning and ports placement

The patient was catheterised with a Foley catheter. Patient was positioned in the modified Llyod Davis position. We routinely used ipsilateral ports. A 10 mm supra-umbilical port is passed for the camera. Another 10 mm port is passed 5 cm lateral from the camera port in the left iliac fossa. A 5 mm port is passed near ASIS. An additional 5 mm port can be passed in the right iliac fossa for an assistant. A uterine manipulator is inserted per vaginally.

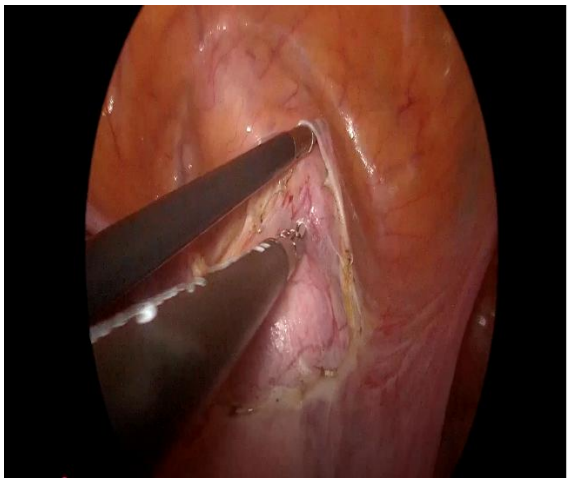

Figure 1: Raising vesicouterine flap.

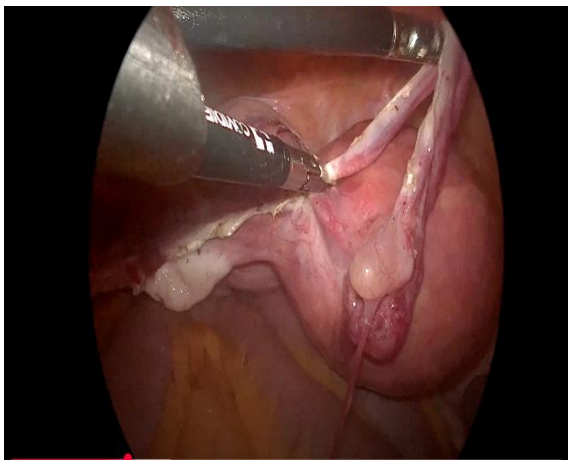

Figure 2: Left salphingectomy.

STEPS OF TLH

Ten steps of TLH are described here that we routinely follow.

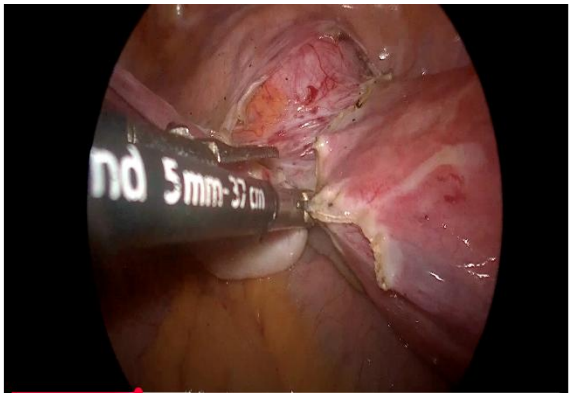

Figure 3: Coagulation of proper ovarian ligament.

Figure 4: Raising of posterior flap.

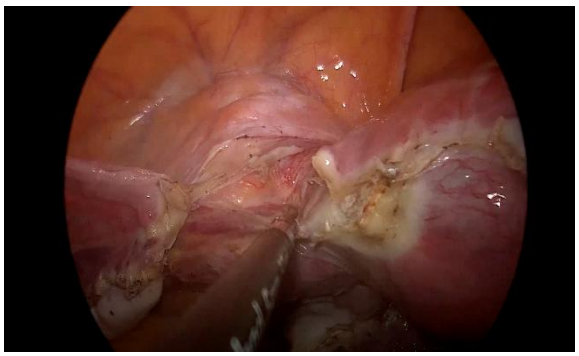

Figure 5: Coagulation of left uterine vessels.

Figure 6: Colpotomy.

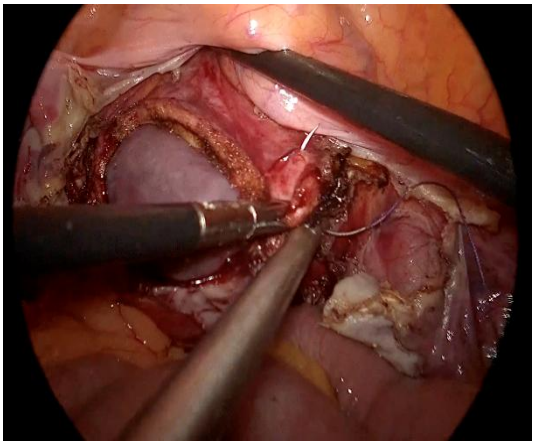

Figure 7: Vault closure.

Raising vesicouterine flap

The two leafs of broad ligament are incised and anterior layer is dissected downwards. The urinary bladder is dissected off the anterior surface of the uterus and cervix. A bipolar energy device (Ligasure) is used for most of the steps mentioned.

Right salphingectomy

The right fallopian tube is coagulated, and its attachment with the uterus is left intact to be removed with it.

Left salpingectomy

The left fallopian tube is coagulated similarly to the right side.

Coagulation of the left proper ovarian ligament

The left ovarian ligament was coagulated, and ovary was detached from the uterus. In cases where ovaries has to be removed, the infundibulopelvic ligament was coagulated.

Coagulation of right proper ovarian ligament

The right proper ovarian ligament was coagulated in a similar manner to the left.

Raising the posterior flap

The posterior leaf of broad ligament in dissected posteriorly till the uterosacral ligament, which was divided.

Coagulating left uterine vessels

The left uterine vessels are coagulated using the Ligasure device. The uterine vessels are coagulated and divided near the cervix. Titanium clips can be applied for additional security.

Coagulating the right uterine vessels

The right uterine vessels were coagulated in a similar manner to the left one.

Colpotomy

The vaginal vault was incised using a monopolar electrocautery hook. Bleeding was secured with the same electrocautery.

Vault closure

The vaginal vault was closed in a continuous manner using Vicryl 1 suture. This step can be performed using endosuturing or alternatively it can be done through vagina.

Specimen is retrieved through vagina. A drain can be left in the pouch of Douglas, but this is not done in routine.

DISCUSSION

Minimal incisions, shorter recovery time, less intraoperative blood loss, and less postoperative pain make total laparoscopic hysterectomy a preferred approach over open hysterectomy through a laparotomy. However, laparoscopic hysterectomy is associated with a significantly increased risk of injury to the lower urinary tract as compared to open hysterectomy.

The rate of vesicouretric injuries in laparoscopic hysterectomy its reported to range from 0.7 % to 2.01 % in different studies and is significantly greater than open approach.[8-10]

Most of the injuries to urinary bladder are recognised intraoperatively while ureteric injuries are recognised postoperatively in majority of the cases.[11,12]

Injuries to the urinary bladder and ureter can result in significant morbidity to the patient's postoperative recovery and can be a cause of legal liability to the surgeon.

The steps of TLH described above minimise the risk of ureteric and bladder injury.

Raising of the vesicoureteric flap separates bladder from the cervix and uterus, thereby prevents injury to bladder and ureter as these structures are pushed down. The use of a uterine manipulator and cephalic retraction further adds to the separation of ureter and bladder from the uterus.

Dissection and coagulation of uterine vessels should be performed close to the uterus and cervix in order to minimise the risk of injury to the ureters. The bipolar device helps to minimize the risk of thermal injury to the surrounding structures.

In difficult spaces with adhesions or endometriosis, it is advocated to dissect the space of Okabayashi in order to identify the ureter and repeatedly identify ureteric peristalsis.[13]

Tanaka et al have described a five-step approach for safe hysterectomy in patients with obliterated *cul-de-sac*.[14] This approach was based on sound anatomical knowledge to develop the avascular retroperitoneal plane and minimise the risk of injury to the rectum ureter and hypogastric nerves. Such a dissection is helpful in cases of dense adhesions due to endometriosis. However, our ten-step approach can be used in routine cases.

One way of minimising the risk of ureteral injury is the use of temporary ureteric catheters or stents. A systematic review by Feng et al and Han et al showed the benefit of routine catheter placement prior to pelvic surgery which helps in identifying of ureter and any potential injury during surgery.[15,16] However this may increases cost of surgery and is not routinely performed in low resource settings and developing countries.

Recent advances in visualising ureters during hysterectomy include the use of near-infrared ray catheters (NIRC). Kisu et al and Hiroaki Fujita et al have demonstrated the use of NIRC during hysterectomies, and it appears to help in identifying ureters during hysterectomy.[17,18] Such advances can help reduce the risk of injuries to the lower urinary tract; however, in developing countries, the use of such technologies is limited. Precautionary measures and safe dissection, as described in our study, can be helpful in resource-limited settings.

CONCLUSION

While recent technological advances can help reduce the rate of injuries to the lower urinary tract during total laparoscopic hysterectomy, our ten-step approach can be used routinely for a safe hysterectomy, especially in resource-limited settings.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Sarwar S, Khattak A, Saeed R, Khattak N, Islam M, Zarin M. Preventing ureteric injury in total laparoscopic hysterectomy: a focus on surgical technique. Int J Reprod Contracept Obstet Gynecol 2025;14:2411-5.