

# Ureteral Injury in Gynecologic Laparoscopy

Gina Sternschuss

## ABSTRACT

**Purpose:** To review incidence, presentation, diagnostic methods, management, significance and avoidance of ureteral injuries in gynecologic laparoscopy.

**Materials and methods:** PubMed, National Center for Biotechnology Information Database, Journal of the Society of Laparoendoscopic Surgeons, obstetrics and gynecology journal, google images were reviewed to gather information regarding ureteral injuries in gynecologic laparoscopy.

**Results:** Ureteral injury is one of the serious complications of laparoscopic surgery, in particular, gynecologic laparoscopy. It is very important to be familiar with presentation, diagnostic methods and management as well as prevention of ureteral injury at the time of gynecologic laparoscopy.

**Conclusion:** Every gynecologic surgeon has to be familiar with signs and symptoms as well as management of ureteral injury at the time of gynecologic laparoscopy.

**Keywords:** Gynecologic laparoscopy, Ureteral injury, Ureteral stenting.

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## INTRODUCTION

Laparoscopic gynecologic surgeries have a clear advantage over open surgeries and considered to be more beneficial for the patients since patients undergoing laparoscopic gynecologic surgeries return to normal activities quicker, have shorter hospitalizations, fewer infections, lower overall blood loss and less postoperative pain.<sup>1</sup> Laparoscopic procedures are generally safe, effective and well tolerated by the patients.<sup>2</sup> But, e.g. laparoscopic-assisted vaginal hysterectomy from lap hyst paper has higher risk of bladder and ureter injury than abdominal hysterectomy.<sup>3</sup> Overall rate of lower urinary tract injury during gynecologic laparoscopy is 3 to 4%.<sup>4</sup> Injury to the lower urinary tract leads to increase in patient's morbidity and mortality as well as decrease in quality of life.

Urological injury is a very serious complication in gynecological laparoscopic operations. It is associated with the morbidity of vesicovaginal fistula, ureteric stenosis as well as hydronephrosis with variable degrees of renal impairment and failure may occur.

Urological injury can also be the basis of medicolegal suits.

It is an important concern for gynecologists, and can happen to inexperienced as well as to experienced gynecologic surgeons. Awareness, as well as early recognition and detection of the possibility of urologic injury is paramount of safe gynecologic laparoscopic surgery.<sup>5</sup>

Most common sites of ureteric injury during gynecologic laparoscopy are at the level of pelvic brim, near the infundibulopelvic ligament, and at the level where the ureter passes beneath uterine artery.

Factors associated with increased incidence of ureteric injury are the conditions leading to the distortion of the pelvic anatomy, such as extensive endometriosis, pelvic adhesions, presence of large pelvic mass.<sup>5</sup>

Noteworthy that almost half of ureteric injuries occurring during laparoscopic hysterectomy, occur during simple, uncomplicated hysterectomy.<sup>6</sup> Some investigators found that ureteral injury during laparoscopy most commonly occurs near the uterosacral ligaments.<sup>7</sup>

Some surgeons routinely dissect the ureter, exposing its course retroperitoneally, although it is also not without drawbacks, such as risk of injury to the major vessels on the pelvic sidewall. Some surgeons routinely stent the ureters, but stenting the ureters has not been shown to decrease the risk of ureteral injury (Fig. 1). In fact, presence

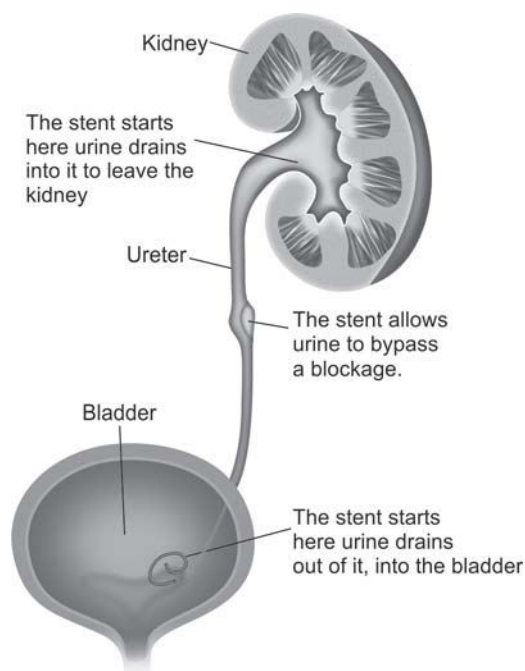


Fig. 1: Ureteral stenting<sup>14</sup>

of ureteric stent may increase the injury to the ureter during laparoscopic dissection.<sup>8</sup>

Ureteral damage is usually caused by one of the three ways-either by direct injury from clamping, cutting, ligating or kinking in an attempt to stop the hemorrhage deep in the pelvis, by stripping ureter of its periurethral sheath devoiding it from its blood supply thereby creating postoperative damage, or by use of electrocautery.<sup>9</sup>

One of the issues in laparoscopic surgery is a widespread use of electrocautery during dissection, during development of tissue planes, during exposure of the pedicles and such. Good understanding of principles of electrocautery is imperative for the safe laparoscopic surgeon (Fig. 2).

Issues such as difference between monopolar and bipolar energy, direct coupling, and lateral thermal spread have to be kept in mind. Blind use of electrocautery without first identifying exact source of bleeding near uterine artery, for example, can lead to ureteral injury and create other complications.

Routine cystoscopy during laparoscopic gynecologic surgery allows for detection of more urinary tract injuries than without use of routine cystoscopy. The rate of injury to the ureter increases from 7.3 per 1,000 surgeries to 14.5 per 1,000 surgeries when routine intraoperative cystoscopy is employed.<sup>10</sup> Intraoperative cystoscopy with intravenous indigo carmine is a simple way to detect lower urinary tract injury, such as injury to the ureter and the bladder. It is highly recommended to ensure absence of injury to the lower urinary tract.<sup>11</sup> Early recognition and repair is the key to successful recovery.<sup>5</sup>

Manifestations of ureteral injury usually seen early after the surgery (48-72 hours postoperatively). Patients present with signs and symptoms of peritonitis that is accompanied by nausea, vomiting, abdominal pain, fever and leukocytosis. Sometimes flank tenderness and hematuria are also observed. IVP is a diagnostic method of choice in patients where ureteral injury is suspected.

There are several methods to deal with ureteral injury after laparoscopic surgery. A small laceration, not leading to the transaction of the ureter, can be managed with an insertion of ureteric stent and 1 suture closing the defect may be placed, if an injury has been recognized intraoperatively.<sup>12</sup> Most commonly, if ureteral damage is minimal, ureteral stenting is sufficient. Sometimes exploratory laparotomy with reimplantation of the ureter into the bladder, anastomosis of the damaged ureter, transureteral ureterostomy, interposition of the loop of ileum between the ureter and the bladder may be required (Figs 3 and 4).<sup>13</sup>

Occasionally, ureteral injury after laparoscopy presents late in patient's postoperative course (3-33 days postoperatively). The presenting symptoms are similar to early recognized ureteral injuries, such as nausea, vomiting, fever, flank pain and peritoneal signs-abdominal distension, abdominal pain, ileus as well as diffuse urinary peritonitis due to urinary ascites. Blood test shows an increase in creatinine level. If ureteral injury remains undetected until late in postoperative course, obstruction and fistula may occur. Ureteral stricture may also develop that makes ureteral stenting very difficult. So, delayed recognition of ureteral injury in gynecologic laparoscopy associated with serious complications and treatment with ureteral stenting is not useful. Exploratory laparotomy with one of the methods of repair mentioned above, usually indicated.<sup>7</sup>

Prevention of lower urinary tract injury and particularly ureteral injury, during gynecologic laparoscopy can be minimized by thorough knowledge of pelvic anatomy, identification of the course of the ureter intraoperatively (Fig. 5), and knowledge of its location at all times during the dissection, keeping in mind most common sites of ureteral injury, understanding principles of electrocautery as well as use of correct and safe operative techniques (Fig. 6).



Fig. 2: Electrosurgical generator used in gynecologic laparoscopy<sup>14</sup>



Fig. 3: Ureteral reimplantation<sup>14</sup>

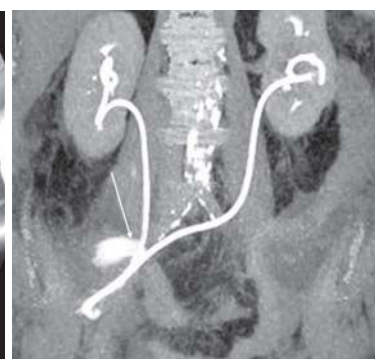


Fig. 4: Ureteral anastomosis<sup>14</sup>

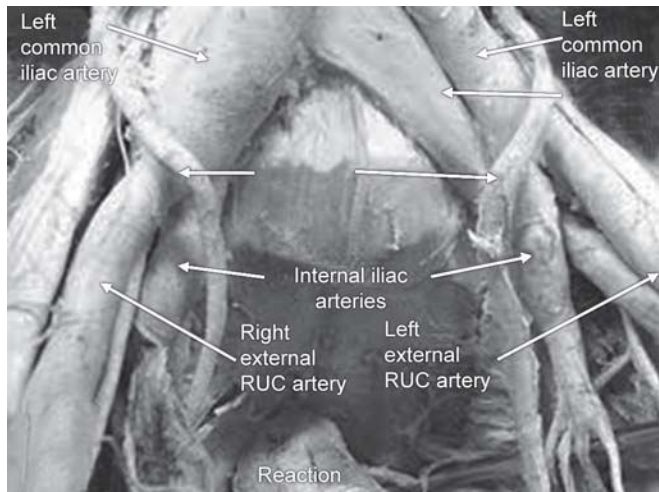


Fig. 5: Course of the ureter in the pelvis<sup>14</sup>

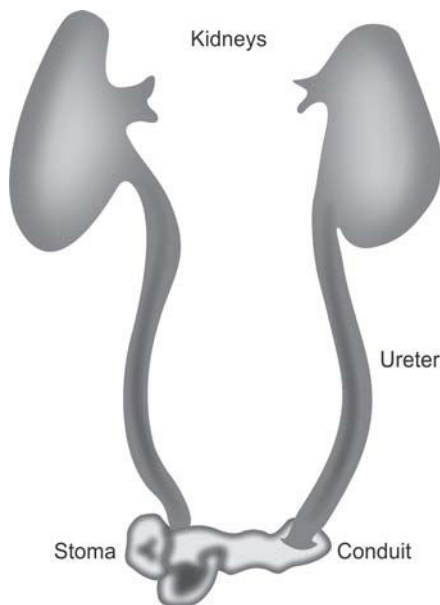


Fig. 6: Ureteral ileal conduit<sup>14</sup>

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