

Ureteric Injuries during Laparoscopic Gynecological Operations

Evin Nil Uğurlu

Department of Obstetrics and Gynecology, Memorial Hospital, Istanbul, Turkey

Abstract

Objective: To review the literature regarding ureteral injuries that occurred during laparoscopic gynecological operations and determine preventive methods.

Material and methods: We have evaluated all the articles related with ureteral injuries of laparoscopic operations between the years 2000 and 2010, and selected 14 of them.

Results: The rate of injury is 0.093 to 1.1%. Most of the injuries occurred at distal third of ureter due to close proximity to uterine artery. Unfortunately, most of the injuries were diagnosed postoperatively. The most common injury type was thermal injury, and the treatment of choice was often by laparotomy, particularly ureteroneocystostomy. The best way to prevent injury is a through knowledge of pelvic anatomy and principles of electrosurgery together with enough expertise.

Conclusion: Ureteric injury prevention and if occurred, timely diagnosis is prudent to prevent serious morbidities.

Keywords: Ureteral injury, Laparoscopic gynecologic operation, Prevention.

INTRODUCTION

Nowadays, as the laparoscopic gynecological surgeries have become more popular, concerns about safety and complications aroused as well. Although, the complications of gynecological laparoscopic surgeries are supposed to be low occurring in 3-6/1000¹ till date, there has not been any agreement about whether laparoscopy increases the rate of ureteral complications or not.

Overall, the incidence of ureteral injury is estimated to be 0.03 to 2.0% for abdominal hysterectomy, 0.02 to 0.5% for vaginal hysterectomy and 0.2 to 6.0% for laparoscopic hysterectomy.²

Pappala et al³ evaluated 72 ureteral injuries over 21 years and reported that 64% of ureteral injuries were caused by gynecological operations. And the most common operation responsible for this complication was hysterectomy (49%).

The most common injury type was thermal injury in most of the articles where injury types were mentioned.⁴⁻⁹

The other injury types include:^{3,8,10}

- Ligation or kinking by suture
- Stapling devices
- Lacerations
- Complete or partial transections.

Most of the ureteral injuries occurred at distal third portion where it is close to uterine artery and uterosacral ligaments due to close proximity.^{3,4,6}

The other places of injury are pelvic brim and infundibulopelvic ligaments.⁶

Leonard et al after 13 years of experience have suggested that as long as the surgeons are experienced enough at laparoscopic surgeries, the ureteric injury rate may be comparable with open hysterectomies, i.e. 0.2 to 0.4%. They reported in their own studies this rate to be 0.3%. In other words, they concluded that laparoscopic hysterectomy does not increase the risks of ureteral complications.⁴

They drew attention to predisposing risk factors, now that all of the injuries happened to patients with predisposing factors. These were previous abdominal surgery, endometriosis and big myoma in broad ligament, all of which may distort the normal anatomic pathway of ureter rendering it to injury.

The risk of ureteral injuries elevate in the presence of predisposing factors, such as endometriosis, pelvic adhesions or large pelvic masses where the anatomy as well as the course of ureter have distorted. But it is imperative to note that half of the injuries in laparoscopic hysterectomy happen during simple cases.^{4,6}

One of the most important points regarding ureteral injuries is that they are often diagnosed postoperatively. Particularly thermal injuries are more difficult to detect, now that heat-induced necrosis takes time to develop.^{1,3,4}

Riberio et al¹¹ evaluated 278 patients who underwent hysterectomies. They performed perioperative cystoscopy to determine its use in order to detect ureteral injuries intraoperatively.

They conclude that intraoperative cystoscopy allows early recognition and treatment of all obstructive ureteral injuries and may reduce the postoperative rate of complications during advanced laparoscopic procedures.

But Elvis et al⁷ state that although screening with cystoscopy confirms bladder integrity and can exclude ureteric occlusive lesions, one of the main drawbacks is that it may miss ischemic injury or tear at ureter. That is why, they suggest this procedure for complicated cases only, not routinely.

Leonard et al also recommended cystoscopy after injection of indigo carmine to check for bladder and ureter integrity for difficult cases. They consider the value of this procedure to be much higher at surgeries in which suture rather than bipolar coagulation is used for uterine artery hemostasis. The major drawback of cystoscopy is that it may not detect some other injuries especially the ones caused by electrosurgical instruments.^{1,4,6}

If diagnosed intraoperatively, these injuries should immediately be repaired with experienced surgeon accompany. Minor injuries, such as small hole caused by a sharp instrument or just a blanched area of thermal damage may be treated conservatively with stenting and continuous bladder drainage only while major cases should be managed according to extent, type and location of injuries.^{1,3}

The mode of injury for most of the repairs was surgery with laparotomy.^{3,4,6,8,9,11-13} In only two articles, the operations were done by laparoscopic route and were uneventful.^{10,13} Historically, these repairs have been performed by laparotomy like resection, reanastomosis, and reimplantation to urinary bladder. But nowadays, these procedures have begun to be done by laparoscopic approach and yield good results.¹ Ricco et al¹⁰ reported four patients with ureter injury who were treated laparoscopically and all of them had good outcomes. Then they stated that laparoscopic management of ureteral injuries should be the first method of choice and reported that removal of a suture or stricture, stent insertion, suturing for laceration, reanastomosis over a stent, and even reimplantation have become feasible with laparoscopic approach.

Now that most of the lesions are recognized postoperatively, the surgeon should have high degree of suspicion whenever the patient has signs and symptoms of

abdominal and flank pain, abdominal tenderness, abdominal distension, fever, watery discharge from vagina, nausea and vomiting, and request blood tests and radiological investigations in the form of intravenous pyelogram or contrast-enhanced computed tomography.^{1,4,6,8}

Pappala et al³ evaluated 72 ureteric injuries during 21 years of time period and stated that the predominating factor determining the prognosis regarding ureteric injuries was the time of diagnosis. Whenever surgeon suspects any injury during operation, he or she should explore the ureter immediately.

PREVENTIVE MEASURES^{4,6-8}

- Appropriate patient selection preoperatively, determining risk factors if possible.
- Knowledge of pelvic anatomy, especially the entire course of ureter.
- Knowledge of electrosurgical principles and using them appropriately (depth, penetration, spread).
- Adequate visualization.
- Ureteral identification at all times during surgery.
- For high-risk patients, adhesiolysis, ureterolysis and retroperitoneal approach.
- For difficult and suspicious cases, perioperative cystoscopy with intravenous injection of indigo carmine dye to look for spillage from ureteral orifice, ensure bladder integrity and rule out ureteral obstruction.
- Bipolar coagulation of uterine arteries should be performed only at the level of ascending branch to remain as far from ureter as possible.
- Surgeon's experience is an important factor that determine the complication rate.
- Collaboration with urological surgeon.
- Leonard et al have not been in favor of ureteral stent placement because they thought that this procedure may cause some complications. They suggested that every surgeon should have the ability to gain access to retroperitoneal space and perform ureterolysis in difficult cases. If bleeding occurs during this process, hemostasis should be performed by endoscopic clips rather than bipolar coagulation to avoid thermal injuries.
- Monash et al¹⁴ evaluated complications of laparoscopic injuries, and as a preventive measure, suggested uterine morcellation for large fibroid before taken out from vagina, not to tear the walls. This avoids potential excessive bleeding and its complications like ureter injury due to suturing for hemostasis adjacent to the ureter.

CONCLUSION

Although laparoscopic pelvic surgery gained a lot of acceptance and popularity; actually it is still a relatively new way of approach. The most important factor related with its success is experience. Whether laparoscopic approach increases ureteric complications or not, is not very clear. The most important point we want to emphasize is prevention. A good knowledge of pelvic anatomy, the entire course of ureter during operation, and basic principles of electrosurgery are mandatory. Now that recognition mostly is possible some time after operation, we should be very cautious when the consequences of these injuries are concerned, such as impairment of renal function and even loss of entire kidney. Finally, we want to draw attention to the mode of injury repair. Many of the articles favor laparoscopic route as the mode of treatment and we think that this approach will gain popularity in a short time period.

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