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Original Research Article

## Intraoperative cystoscopy in major gynaecological surgeries: necessary skill for a gynecologist

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### ABSTRACT

**Background:** The goal of this study is to find out: how important it is to utilize intraoperative cystoscopy liberally in normal gynaecological procedures to detect urinary tract injuries, how long it takes to do intraoperative cystoscopy and what problems are linked with cystoscopy.

**Materials:** The study is from the year 2016 to 2022 involving around 1221 patients. In a tertiary care facility, retrospective observational research was conducted. The study comprised patients receiving all gynaecological and urogynaecological operations. Malignancy was ruled out. Following gynaecological surgery, a 20-F-30-degree telescope was used to perform a cystourethroscopy. To record case information, a study proforma was created.

**Results:** Intraoperative cystoscopy detected four bladder injuries during anti-incontinence surgery (TVT) and hysterectomy. After a thorough laparoscopic hysterectomy with normal cystoscopy, one patient returned one month later with right ureteric injury. A urinary tract infection struck fifteen people shortly after surgery. After surgery, one patient suffered flank pain and a fever for 48 hours. There was no sign of urinary tract injury on a CT-IVP scan. She was handled with care.

**Conclusions:** For early diagnosis of urinary tract injuries, gynaecologists should have a low threshold for performing intraoperative cystoscopy during gynaecological procedures. Early detection and treatment of urinary tract injuries reduces the patient's morbidity, with a successful repair outcome at the time of detection. Performing an intraoperative cystoscopy during gynaecological procedures allows for this.

**Keywords:** Urinary tract injuries, Intraoperative cystoscopy, Gynaecological operations

### INTRODUCTION

The urinary tract system is vulnerable to harm during obstetric and gynaecological surgery due to its near proximity to the female reproductive organ. The real rate of urinary tract injury from gynaecological surgery is unknown, however reported rates for bladder injury range from 0.2 to 1.8 percent, and 0.003 to 1.5 percent for ureteric injury.<sup>1-3</sup> The rate of urinary tract injuries associated with all types of gynaecological surgery is

estimated to be between 0.2 and 15 per 1000 patients.<sup>4</sup> Each year, roughly 600,000 hysterectomies are performed in the United States of America.<sup>5</sup> In India, there are no national statistics on hysterectomy. Only limited data is available from Haryana (7%) and Gujarat (5%), where 7-8% of rural women and 5% of urban women had already had a hysterectomy at an average age of 37 years.<sup>6,7</sup>

The risk of urinary tract injury is increased by distorted pelvic anatomy caused by severe endometriosis,

adhesions, previous surgeries, pelvic organ prolapse, and obesity. The most common site of ureteric damage is where the uterine artery crosses the ureter. Good and standard surgical procedure is the first line of defence. Secondary prophylaxis involves a cystoscopy to check for proper ureteric jets and a thorough examination of the bladder wall. The patient will have a better prognosis and have less morbidity if the injury is recognized and corrected during initial surgery. Although the value of intraoperative cystoscopy in urogynecological procedures has been proven, there is still no consensus on its utility in normal gynaecological surgery. The goal of this study is to investigate the importance of using intraoperative cystoscopy frequently in normal gynaecological procedures to detect urinary tract injuries, the time required for intraoperative cystoscopy, and cystoscopy problems.

## METHODS

A retrospective observational study was carried out in a tertiary care academic centre. The trial began in 2016 and will continue until May 2022, with a total of 1221 individuals enrolled. Prior to inclusion, all patients provided written informed consent. Patients receiving abdominal, vaginal, or laparoscopic gynaecological and urogynaecological operations were included. Malignancy was a criterion for exclusion. All procedures were conducted by obstetrics and gynaecology trainees under the supervision of an attending gynaecologist or urogynecologist. 4 hours before surgery, a single dose of oral pyridium 100 mg was given. A 20-F-30-degree telescope was used to perform a cystourethroscopy after gynaecological surgery. As a distention media, normal saline was utilised and held 60 cm above the patient's perineum. The urethra, urethrovesical junction, and bladder were all thoroughly examined. In four cases, a biopsy of the bladder was collected from aberrant locations. A rapid outflow of orange-colored urine from bilateral ureteric apertures was used to determine ureteral patency.

Case information such as the patient's demographics, any co-morbidities, primary surgery, the indication for surgery, previous surgeries, general and pelvic examination, any injury, total blood loss, operating time, and cystourethroscopic results were recorded on a research proforma. The average time of follow-up was 12 months. The history of any voiding issues, incontinence, fever, or flank pain was taken from all patients. As a distention media, normal saline was utilised and held 60 cm above the patient's perineum. The urethra, urethrovesical junction, and bladder were all thoroughly examined. In four cases, a biopsy of the bladder was collected from aberrant locations. A rapid outflow of orange-colored urine from bilateral ureteric apertures was used to determine ureteral patency.

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## RESULTS

A total of 1221 participants were enrolled in this prospective study. (Table 1) shows the patients' demographic and clinical information.

**Table 1: Clinical and demographic data of the patients.**

Demographic and clinical data	N
<b>Age (years)</b>	
Mean (range)	50 (25-66)
<b>Parity index</b>	
Nulligravida	8
1-3	45
3-5	41
>5	7
<b>BMI</b>	
Mean (range)	24.3 (16-35)
<b>Mean operative time (minutes)</b>	150
<b>Mean blood loss (ml)</b>	140
<b>Mean time to perform cystoscopy (minutes)</b>	4

The type of surgery performed is detailed in (Table 2). The injury is detailed in (Table 3). Three bladder injuries occurred, and intraoperative cystoscopy was used to diagnose them.

**Table 2: Type of surgery performed.**

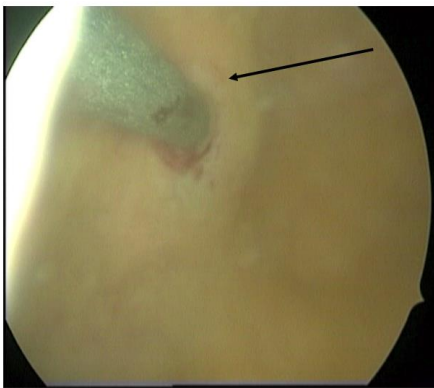
Total procedures performed (with cystoscopy)	N
<b>TAH + BL</b>	46
<b>TLH + BL</b>	673
<b>VH</b>	190
<b>TVT</b>	3
<b>TOT</b>	102
<b>Anterior mesh repair</b>	16
<b>Open myomectomy</b>	119
<b>Lap ovarian cystectomy with salpingectomy</b>	16
<b>Anterior posterior compartment repair</b>	8
<b>Perigee</b>	1
<b>LAVH</b>	6
<b>VH+TOT</b>	12
<b>NDVH</b>	29

One of the three bladder injuries happened when a needle pierced through the right side of the bladder during anti-incontinence surgery (tension free vaginal tape) (Figure 1).

**Table 3: Site and type of injury.**

Site of injury	Type of injury	Procedure	Detection on cystoscopy	Peristalsis	Treatment
<b>Bladder</b>	Needle puncture	TVT	Yes	Yes	Removal
<b>Bladder</b>	Suture	TLH	Yes	Yes	Removal
<b>Right ureter lower one third</b>	UVF	TLH	No	Yes	Ureteric reimplantation
<b>Bladder</b>	Suture	TAH	Yes	Yes	Removal
<b>Bladder</b>	Rent noted in anterior wall of bladder	TLH	Yes	Yes	suturing

The problem was solved by withdrawing the needle and repositioning it properly. To ensure mucosal integrity, a second cystoscopy was performed.

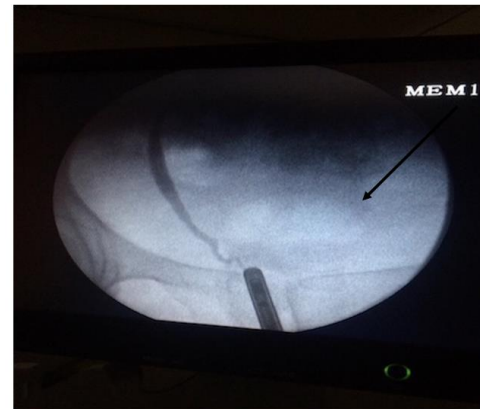


**Figure 1: TVT needle visualised during intraoperative cystoscopy in right lateral wall of bladder during TVT procedure.**

The other two bladder injuries occurred after total abdominal hysterectomy and total laparoscopic hysterectomy. Both bladder injuries happened after a suture was used to close the vault, and the suture was located at the base of the bladder in both cases. The suture in between was removed, and cystoscopy was performed again to check mucosal integrity. One ureteral damage was missed after total laparoscopic hysterectomy, and intraoperative cystoscopy revealed a normal ureteric opening with a vigorous bilateral jet of urine. She went to the gynaecological outpatient department after a month with complaints of profuse watery vaginal discharge. Watery discharge was confirmed by speculum inspection. A C-arm guided ureteropyelogram revealed right lower ureteral constriction, indicating a distal damage to the right ureter (Figure 2). This was consistent with a thermal damage that resulted in ischemia and a ureteric fistula. It was necessary to re-implant the right ureter. Four aberrant cystoscopic findings that were not related to damage were identified intraoperatively and did not require treatment.

Glomerulations, trabeculations, and Hunner's lesion were among them. Urine microscopy and culture sensitivity revealed 15 individuals had an acute postoperative urinary tract infection. Antibiotics were given to them,

and after 3 to 5 days, they were symptom-free. One patient experienced flank pain and a fever 48 hours after surgery. Her urine microscopy came out negative. A CT-IVP examination revealed no evidence of urinary tract damage. She was treated with caution. The pain and fever disappeared within a week, and the patient has had no problems since then.



**Figure 2: Kinking of right lower end of ureter following total laparoscopic hysterectomy.**

## DISCUSSION

This is a non-randomized retrospective study that assesses the value of intraoperative cystoscopy during gynaecological procedures. A prospective study can help us figure out how often urinary tract injuries occur. The primary goal of this study was to see if there was any damage to the urinary system that could be observed by intraoperative cystoscopy. The time it took to perform intraoperative cystoscopy and any complications that occurred as a result of the surgery were the secondary outcomes. We discovered a higher rate of urinary tract damage after hysterectomy in this group. During cystoscopy in two patients, one after abdominal and laparoscopic hysterectomy, an intervening suture was discovered at the base of the bladder and was freed intraoperatively. Following the TVT surgery, a needle was discovered and removed intraoperatively. In any other gynaecological procedure, no intraoperative damage was discovered. Even so, not all urinary tract injuries are recognised during surgery, and peristalsis is a poor diagnostic of ureteral integrity.<sup>8</sup> In our investigation,

the bladder injury rate was 0.3 percent (N=4), which is comparable to the bladder injury rate described in the literature. During intraoperative cystoscopy, one ureteric damage was overlooked. A big anterior wall fibroid had caused abnormal uterine haemorrhage, thus the patient had a total laparoscopic hysterectomy. The use of a harmonic ultrasonic energy source at the level of the uterine arteries caused thermal injury that resulted in ischemia of the bottom one-third of the right ureter. Cystoscopy revealed the presence of vigorous ureteric jets from the ureteral apertures on both sides. To accurately determine the sensitivity and specificity of cystoscopy, a reassessment of the urinary system would be required.<sup>9</sup> Kumar et al discovered that 65 percent of urinary tract fistulas reported at a tertiary care facility happened as a result of gynaecological procedures, with abdominal hysterectomy being the most common indication.

Laparoscopic hysterectomy (10%), vaginal hysterectomy (5%), and vaginoplasty were the other aetiologies (5 percent).<sup>10</sup> The aetiology of urogenital fistula was attributed to hysterectomy (44), laparoscopic oophorectomy (one), and caesarean section (the rest) in a retrospective assessment of 50 patients who underwent laparoscopic repair of urogenital fistula at our institute over a 10-year period. A retrospective meta-analysis found a 0.8 percent bladder injury rate and a 0.3 percent ureteral injury rate. When cystoscopy is used intraoperatively, the rate of damage diagnosis increases fivefold, according to this study. Based on their findings, surgeons should have a low threshold for performing cystoscopy.<sup>12,13</sup> According to Ibeanu's prospective study, the bladder injury rate is 2.9 percent and the ureteral injury rate is 1.8 percent. As a result, this prospective study's suggestion is for universal cystoscopy after laparoscopic hysterectomy.<sup>14</sup> Intraoperative identification of urinary tract injuries has the benefit of allowing for immediate treatment, which reduces postoperative morbidity and kidney function loss. Renal failure, fistula formation, postoperative peritonitis, and increased litigation risk are all implications of delayed diagnosis.<sup>15</sup> The trainees took an average of 4 minutes to execute a cystoscopy. Three patients developed postoperative urinary tract infections, which could have been caused by a preoperative urinary tract infection triggered by cystoscopy. As a result, a recent preoperative urine microscopy should be conducted on a regular basis. There were no additional major issues reported. Only one complication caused directly by cystoscopy has been recorded in the literature: a thermal damage to the bladder caused by an elevation in the temperature of the distension medium.<sup>16</sup> Only when the rate of ureteral injury exceeds 1.5 percent for abdominal hysterectomy and 2 percent for vaginal and laparoscopic hysterectomies has universal cystoscopy been proved to be cost-effective. This solely applied to ureteric injury. Ferro et al in cost analysis explains an additional cost of \$54.42 per case in America without anaesthesia. Due to increased expenses, greater surgical time, more

equipment required, and gynaecologists' lack of training, they favour selective use of cystoscopy.<sup>16</sup> Cystoscopy's capacity to discover damage that would otherwise go undetected by a simple visual check, allowing for rapid treatment and a reduction in morbidity and potential litigation, should stimulate more widespread use.<sup>17</sup> Cystoscopy of the lower urinary tract should be readily available to gynaecology surgeons doing a laparoscopic hysterectomy, according to the AAGL (advancing minimally invasive gynaecology worldwide). Cystoscopy should be used routinely during laparoscopic complete hysterectomy, according to surgeons and institutions. The American college of obstetrics and gynecology recommends that cystoscopy be performed by a general ob-gyn for procedures with a high risk of urologic injury (such as those for pelvic organ prolapse or incontinence), but concludes that routine cystoscopy at the time of hysterectomy needs more research.<sup>18</sup> Currently, gynaecologists do not perform intraoperative cystoscopy during laparoscopic hysterectomy as standard practise. An institutional strategy of doing routine intraoperative cystoscopy during benign hysterectomy led to early diagnosis of urinary tract damage, according to one retrospective analysis. The study's key strength is that it compared both the pre-policy and post-policy cystoscopy groups, with the pre-policy group having four cases of vesicovaginal fistula and the post-policy group having none. The other strength is the eight-year post-operative follow-up.<sup>19</sup> According to a 2005 survey, just 19% of Canadian surgeons used intraoperative cystoscopy during laparoscopic hysterectomy. The most common reason for not doing intraoperative cystoscopy during gynaecology surgery was a lack of training (59%). In 14% of cases, a lack of cystoscopy privileges was mentioned as the reason.<sup>20</sup> Most gynaecologists in our nation do not have access to the tool or the necessary skills. Our study's limitations include the fact that it is a single-center study. All of the procedures were carried out under the supervision by gynaecology trainees. When trainees perform cystoscopy, we might speculate that the injury rate will be higher and the detection rate will be lower. According to Mahmoudi et al there is no difference in injury rates in instances done by trainees versus senior surgeons.<sup>21</sup> We have a 12-month follow-up, which is in line with the majority of the published literature. This study does not include a cost analysis of cystoscopic procedures. The benefit of this study is that all of the participants were able to perform cystoscopy with ease. A diagnostic cystoscopy has a short learning curve and is a useful tool while doing gynaecological surgery. Large-scale surveys of health professionals, with a particular focus on the occurrence of urinary tract injuries and their detection timing, may help us understand the need for routine or selective cystoscopy in low-resource countries like ours.

## CONCLUSION

For early diagnosis of urinary tract injuries, obgyns should have a low threshold for doing intraoperative



cystoscopy during gynaecological procedures. Cystoscopy training, which should include education in instrumentation, technique, and evaluation of normal and abnormal cystoscopic findings, should be included in residency training in obstetrics and gynaecology. Although our findings do not support the routine use of intraoperative cystourethroscopy, we do recommend its widespread use during major gynaecological surgeries because it improves the surgeon's confidence by detecting problems early and thus reduces postoperative morbidity, litigation issues, emotional and financial strain on the patient due to urological injuries.

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