

# American Urogynecologic Society Consensus Statement: Cystoscopy at the Time of Prolapse Repair

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**Abstract:** Injury to the urinary tract is a known risk of surgical repair of anterior and apical pelvic organ prolapse. Cystoscopy at the time of surgical prolapse repair is a low-risk procedure that can identify genitourinary tract injury by inspecting the bladder and urethra as well as by visualizing the ureters and ureteral efflux. There are several techniques to assist with visualization of ureteral efflux. Identifying injury intraoperatively may allow for mitigation of the morbidity of the injury. Universal cystoscopy should be performed at the time of all pelvic reconstructive surgeries, with the exception of operations solely for posterior compartment defects.

**Key Words:** cystoscopy, prolapse repair

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Iatrogenic injury to the lower genitourinary tract is a risk of pelvic organ prolapse reconstructive surgery including anterior vaginal wall, vaginal vault (with or without concomitant hysterectomy), and obliterative repairs. Identifying lower genitourinary tract injuries intraoperatively decreases morbidity. Not identifying lower genitourinary tract injury at the time of surgery can lead to serious complications including peritonitis, fistula formation, and loss of renal function.<sup>1,2</sup> Cystoscopy is useful in assessing the integrity of the bladder and patency of the ureters. Surgeons should perform intraoperative cystoscopy during any pelvic organ prolapse reconstructive surgery with risk to the bladder or ureters, as cystoscopy provides a mechanism by which iatrogenic lower genitourinary tract injury can be recognized and, in most cases, immediately managed, thereby minimizing morbidity.

## DESCRIPTION OF TECHNIQUE

Cystoscopy incorporates visual inspection of the urethra and bladder, including the ureteral orifices. A rigid cystoscope with a 30-degree or a 70-degree angle lens or a flexible cystoscope can be used to circumferentially inspect the bladder and urethra for injury and assess for ureteral patency. A 70-degree angle lens may be helpful to visualize the ureteral orifices in patients with anterior vaginal wall prolapse. A 0-degree angle lens may be helpful for urethral visualization if urethral injury is suspected or a more detailed assessment of the urethra is desired. Cystoscopic distension media should provide adequate distension and clarity of the visual field. The bladder is examined systematically, evaluating for trauma to the urothelium. Although a video screen to project

images from the lens with a camera attachment can be helpful, the bladder can be viewed directly through the cystoscopic lens. Anomalies such as duplicated ureteral orifices should be noted in the operative report. Ureteral patency should be confirmed by visualization of efflux from the ureteral orifices. Not all lower genitourinary tract injuries will be detected by cystoscopy. For example, damage from thermal injury may not be apparent until necrosis occurs. Although cystoscopy adds some surgical time, the overall additional morbidity is low.<sup>3</sup>

If efflux of urine from the ureteral orifices is difficult to visualize, adjunctive agents can be helpful. Intravenous indigo carmine was once used for this purpose but has not been commercially available since 2014. Although intravenous methylene blue has been used to confirm ureteral patency, the efflux of blue-colored ureteral jets can be inconsistent or delayed. There is also a small risk of methemoglobinemia (in patients with glucose-6-phosphate dehydrogenase deficiency) and of serotonin syndrome in patients taking selective serotonin reuptake inhibitors or monoamine oxidase inhibitors.<sup>4,5</sup> Other agents can be helpful to confirm ureteral patency. A randomized trial comparing saline distention alone (control) with distention with 10% dextrose solution, oral phenazopyridine, and intravenous sodium fluorescein found improved visualization of ureteral jets with intravenous sodium fluorescein and distention with dextrose. The authors did not find differences in operative time or morbidity between techniques.<sup>6</sup> Previous retrospective research had found an increased rate of postoperative urinary tract infection in those receiving the dextrose solution.<sup>7</sup> Another recent randomized trial compared oral phenazopyridine with no medication and found no difference in time to visualize jets but decreased surgeon frustration with phenazopyridine.<sup>8</sup> The authors also found a lower rate of failed postoperative trial of void in the phenazopyridine group. Oral phenazopyridine is less costly than intravenous sodium fluorescein.<sup>4,5</sup> The use of mannitol bladder distension media has been reported to provide the most surgeon satisfaction, in comparison to phenazopyridine, sodium fluorescein, and normal saline distension.<sup>9</sup> Ultimately, the surgeon should make the final decision about which agent is used based on his/her preference and institutional availability.

## SUPPORTIVE DATA

In women undergoing anterior vaginal and/or vaginal vault prolapse surgery, with or without hysterectomy, there is risk of bladder injury and iatrogenic ureteral obstruction because it involves dissection, suturing, and possibly graft placement close to the bladder and ureters. Normal anatomic relationships are distorted by prolapse. In a study of 15 unembalmed cadavers, the distal uterosacral ligament suspension sutures were found on average to be 14 mm (0–33 mm) from the ipsilateral ureter.<sup>10</sup> Dain et al<sup>11</sup> investigated the position change of the distal ureters in the setting of anterior colporrhaphy, finding significant deviation of the ureteral orifices in the caudal ( $0.65 \pm 0.3$  cm) and lateral directions ( $0.32 \pm 0.5$  cm). Kwon et al<sup>12</sup> reviewed 526 major vaginal and urogynecologic surgeries, finding that anterior vaginal wall repair was the most common cause of unrecognized ureteral compromise. Among 15 cases of intraoperative cystoscopy that resulted in changes in intraoperative management, 7 were caused by

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anterior vaginal wall repair sutures, which represented 2.0% of all such repairs. A retrospective review of 700 consecutive patients who underwent surgery for anterior vaginal wall and/or vaginal vault prolapse with concomitant universal cystoscopy found an intraoperative ureteral obstruction rate of 5.1%, with a positive predictive value for intraoperative cystoscopy of 99.3%.<sup>13</sup> There were a sensitivity of 94.4% and a specificity of 99.5%.

Lower genitourinary tract injury is also a risk during obliterative repairs. One retrospective study evaluating 92 patients undergoing obliterative repairs and routine intraoperative cystoscopy found a 4.4% incidence of ureteral obstruction. All cases were reversed intraoperatively via removal of sutures.<sup>14</sup> Another study of 245 women undergoing vaginal obliterative procedures (LeFort colpocleisis, colpectomy, or vaginal hysterectomy and colpectomy) demonstrated, via cystoscopy, a genitourinary tract injury rate of 0.8% to 1.5%.<sup>15</sup>

Institutions that adopt a policy of routine cystoscopy after pelvic organ prolapse reconstructive surgery are likely to note a decrease in the rate of urologic injuries. A retrospective cohort study of 2822 women undergoing hysterectomy for benign indications looked at rates of urologic injury before and after instituting a universal cystoscopy policy. The study noted that urologic injury rates decreased from 2.6% to 1.8% and delayed urologic injury rates decreased from 0.7% to 0.1%, respectively, in the post-policy group vs the pre-policy group.<sup>16</sup>

A 2015 systematic review of urinary tract injuries during benign gynecologic surgery compared rates of injury in the settings of routine intraoperative cystoscopy and no routine cystoscopy.<sup>17</sup> For urogynecologic surgeries and benign gynecologic surgeries other than hysterectomy, significantly more intraoperative and fewer delayed postoperative lower urinary tract injuries were found when cystoscopy was used routinely. For ureteral injury, routine cystoscopy found 10.8/1000 injuries intraoperatively; without routine cystoscopy, 0.2/1000 were found. Delayed, postoperative diagnosis occurred in 0.7/1000 with routine cystoscopy vs 2.3/1000 without. Cystoscopy represents a low-risk tool that can be used to decrease the rate of delayed recognition of lower genitourinary tract injuries after pelvic organ prolapse surgery.<sup>3</sup>

A retrospective review of 224 cases of incontinence and pelvic organ prolapse reconstructive surgery found that in 5.3% of cases, findings on intraoperative cystoscopy prompted a change in management.<sup>18</sup> Importantly, the study notes that in 58% of those with abnormal cystoscopies, the surgeons had low suspicion for injury on the basis of the difficulty of the case. In other words, patients at risk for lower genitourinary tract injury were not always predicted by history or course of surgery.

## RECOMMENDATIONS

- Cystoscopy can identify lower genitourinary tract injury intraoperatively and prevent patient morbidity.
- Ureteral efflux should be confirmed when cystoscopy is performed during pelvic organ prolapse reconstructive surgery; multiple agents exist to aid with this if needed.
- Universal cystoscopy should be performed at the time of all pelvic organ prolapse reconstructive operations, with the exception of operations solely for posterior compartment defects.

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