Cystoscopy for the Gynecologist

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Disclosures

I have no conflicts of interest pertinent to this lecture.

Objectives

- Appreciate the history associated with the development of the cystoscope
- Review indications for diagnostic cystourethroscopy
- Become familiar with instrumentation for diagnostic and operative cystoscopy
- Become familiar with normal bladder/urethral anatomy and identify abnormal cystoscopic findings
Howard Kelly

- Bladder distension
- Scope introduced using an obturator, with pt in knee-chest position
- Negative intra-abdominal pressure allowed air to distend bladder
- Head mirror to reflect light
- Greatly improved visualization

20th Century and Today

- Hopkins/Kopany 1954
  - Fiber-optic scope
  - Rod lens system
- Angled scopes
- Complex instrumentation
- Flexible cystoscope
- General surgeons developed Urology subspecialty
- Ob/Gyn combined program decreased cystoscopy training by gynecologists

Granting Of Privileges For Cystourethroscopy

- "Should be based on training, experience and demonstrated competence"
- "Implies that the physician has knowledge and competency in the instrumentation and surgical technique; can recognize normal and abnormal bladder and urethral findings; and has knowledge of pathology, diagnosis and treatment of specific diseases of the lower urinary tract"

ACOG Committee Opinion Number 372
July 2007, Reaffirmed 2010
Indications for Diagnostic Cystoscopy

- Identify intraoperative urinary tract injury:
  - Bladder perforation during TVT
  - Ureteral patency after vault suspension
- Recurrent UTIs
- Irritative voiding symptoms in the absence of UTI, esp following prior mesh procedure:
  - Bladder stones
  - Foreign body in bladder and/or urethra
- Diagnosis and/or treatment of interstitial cystitis

Indications for Diagnostic Cystoscopy....

- Vesicovaginal fistula
- Bladder/urethral diverticulum
- Hematuria
- Evaluate for spread of gynecologic malignancy
- Operative cysto in Gyn:
  - Biopsy
  - Foreign body removal (stone, mesh)
  - Intradetrusor Botox injections
  - Urethral bulking agents

When to do cystoscopy?

- When the risk of lower urinary tract injury exceeds 1.5%, the routine use of diagnostic cystoscopy is warranted
- Procedures whose risk exceeds this rate include:
  - Laparoscopic and robotic hysterectomy
  - Anti-incontinence procedures
  - Majority of procedures for correcting pelvic organ prolapse
- The safety profile for intra-operative diagnostic cystoscopy is excellent
Intraoperative cystoscopy...
Who needs it?

- ACOG recommendation: all pt's undergoing prolapse and/or incontinence procedures
- Hysterectomy: depends on route
  - Rate of injury diagnosed with routine cystoscopy:

<table>
<thead>
<tr>
<th>Route</th>
<th>Bladder</th>
<th>Ureter</th>
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<tbody>
<tr>
<td>Abdominal</td>
<td>2.2-2.5%</td>
<td>1.7-2.2%</td>
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<tr>
<td>Vaginal</td>
<td>4-6%</td>
<td>1.4-2.6%</td>
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<tr>
<td>LSC</td>
<td>2-3%</td>
<td>0-1.5%</td>
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Gilmour, ObGyn '06
Ibeanu, ObGyn '09
Vakili, AJOG '05

Intraoperative cystoscopy...
Who needs it?

- Other surgical/patient factors that increase risk of urinary tract injury
  - Prior C/S or laparotomy
  - Endometriosis
  - Obesity
  - Large pelvic mass
  - History of pelvic radiation

Instrumentation: Rigid Cystoscopy

- Telescope
  - 0, 12, 30 or 70°
- Bridge
  - Connector for scope and sheath
  - Operative ports
- Sheath (17-28 French)
  - Vehicle for introducing scope, distending media and instruments into bladder
- Obturator
  - Allows for atraumatic placement of larger caliber sheaths
Rigid Cystoscope

Components of a rigid cystoscope
- A: Telescopes. 70-degree lateral angled-view telescope (above) and a 30-degree forward-oblique telescope (below).
- B: Bridges. Single-port bridge (below) and dual-port deflecting bridge (above).
- C: Sheath, 22-French operating.
- D: Assembled cystoscope with a diagnostic 17-French sheath.

<table>
<thead>
<tr>
<th>Degree of scope</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>70</td>
<td>- Good visualization of entire bladder wall (esp for TVT trocar placement)</td>
<td>- Urethroscopy difficult</td>
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<tr>
<td>30</td>
<td>- Visualize all quadrants Operative cysto</td>
<td>- None (pt discomfort if awake)</td>
</tr>
<tr>
<td>0, 12</td>
<td>- Urethroscopy - Operative cysto (biopsy, stents, bulking)</td>
<td>- Poor visualization of dome, anterolateral walls</td>
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Flexible Cystoscopy
- Useful for office diagnostic cystoscopy
- All 3 parts (scope, bridge, sheath) in one
- 15-French
- Learning curve
## Cystourethroscopy Setup

- Lithotomy position (high or low)
- Must have:
  - Cystoscope
  - Light source
  - Can fill bladder through catheter and look through eyepiece on scope
- Helpful, but not necessary:
  - Bag of cysto fluid/tubing (80cm above bladder)
  - Camera

## Distension medium
- Normal saline
- Sterile water – safe for electrocautery

## Antibiotic prophylaxis
- Not indicated for diagnostic cysto unless urine dip/culture are positive (ACOG, AUA)
- No endocarditis prophylaxis (AHA)
- Indicated for operative cysto (biopsy, etc)
  - Single dose of Cipro 500mg or Bactrim DS

## Operative Cystoscopy

- Numerous instruments available
- Most pertinent to Gynecologic procedures
  - Grasping forceps
  - Biopsy forceps
  - Scissors
  - Needle/syringe for Botox/bulking agents
  - Bugbee monopolar ball electrode
Diagnostic Cystoscopy Technique

- 30°/70° scope w/ 17-French sheath
- 2% lidocaine jelly
- Identify air bubble for orientation
- In-and-out technique for 12 sweeps, corresponding to numbers on a clock
- If pt has cystocele, vaginal finger can aid in visualization of trigone/UOs
- Key point: be systematic and thorough, same way every time, documentation

Normal Cystoscopic Findings

Normal Bladder Mucosa

- Smooth surface
- Pale pink/glistening white
- Fine vasculature
Trigone

- Formed by ureteral orifices and UVJ
- Thicker, more granular texture than dome
- Interureteric ridge
- UO's usually circular/slitlike openings

Trigonal Metaplasia

- Squamous metaplasia on histology
- Thickened white membrane with villous contour
- Common finding at trigone (>50% reproductive age women)
- Response to irritative or infectious process (chronic UTI, catheter, etc)
- AKA trigonitis

Urethrovesical Junction

- Usually round or inverted horseshoe in shape
- Should be closed at rest until cysto fluid opens the lumen
- Should close with hold/stress maneuvers
Normal Urethra

- Pink, lush epithelium in folds (estrogen-dependent)
- Urethral crest may be seen as a posterior longitudinal ridge
- Walls of UVJ and urethra may not coapt in pt's with intrinsic sphincter deficiency

Ureteral Patency

- Free flow of urine from ureteral orifice confirms patency
- Cystoscopy cannot diagnose ureteral injury just its absence
Abnormal Cystoscopic Findings

Acute Cystitis

- Reddened and edematous mucosa obscures vasculature
- May have hemorrhages
- Known bacterial cystitis contraindication to cystoscopy
- Non-infectious causes:
  - Radiation
  - Hemorrhagic
  - Catheter reaction
  - Interstitial cystitis

Trabeculation

- Hypertrophied detrusor musculature
- Associated with detrusor overactivity and obstruction
- Enlargement of intervening saccules can lead to diverticula
Chronic inflammation leads to fibrosis in bladder wall
- Present with pain, urgency, frequency
- Hydrodistension to max capacity under general anesthesia
- Punctate hemorrhages (A) and glomerulations (B) are pathognomonic

Interstitial Cystitis

- Hunner’s ulcer
- Uncommon finding seen in severe, long-standing IC
- Surface epithelium destroyed by inflammation
- Appear as velvety red patches or linear cracks
- May crack and bleed with hydrodistension

Cystitis Cystica

- Benign 1- to 2-mm clear mucosal cysts at the bladder base
- Formed by single layers of subepithelial transitional cells
- Associated with chronic irritation and commonly surrounded by inflammation
Bladder Polyp

- Benign growth covered by epithelium
- Variable in appearance
- Usually asymptomatic
- 5 – 10% may progress to cancer, so should be biopsied

Bladder Cancer

- Transitional cell carcinoma
- Most common followed by adeno- and squamous cell
- Typical raised lesion with villous or papillary appearance and surrounding inflammation
- May be associated with CIS, which can mimic the appearance of infectious cystitis

Vesicovaginal Fistula

- Vast majority are post-hysterectomy
- Usual location is bladder base, superior to interureteric ridge in area of vaginal cuff
- Fistula may be large with obvious opening into vagina or small with scarring being the only mucosal abnormality
Acute Urethritis

Reddened, edematous mucosa along the length of the urethra

Urethral Polyps

- Inflammatory polyps and fronds found at or near the UVJ
- Response to chronic inflammation
- Usually translucent with villous appearance
- Can become large enough to fill the proximal urethral lumen

Urethrovaginal Fistula

- Opening seen along lateral or posterior surface of urethra
- Urethral diverticulum has similar appearance, but may express an exudate with palpation
Mesh Erosion

- **A:** vaginal mesh erosion viewed with a cystoscope
- **B:** mesh within the urethral lumen during urethroscopy
- High index of suspicion in anyone with LUTS and h/o sling or other mesh procedure

Surgical introduction of foreign bodies into the bladder

- This is the metallic tip of a tack used in sacrocolpopexy protruding into the bladder dome.
- **A** Loop of Prolene suture in the bladder.
- Sling arm noted in the lateral bladder wall

Complications Associated with Cystoscopy

- **Infection**
  - Asymptomatic Bacteriuria 5-8%
  - Symptomatic UTI 2-5%
- **Send urine cx on anyone with symptoms pre- or post-op**
- Cystoscopic findings consistent with acute cystitis should be treated
Cystoscopy Complications

- Traumatic injury to bladder/urethra
  - Incidence unknown
- Scope trauma to bladder wall
  - Usually at bladder base above trigone
  - Observe for bleeding; electrocautery if needed
- Bladder perforation
  - Control bleeding
  - Foley catheter drainage
  - LSC/laparotomy only if concern for abdominal bleeding or extremely large defect

Case

- At the end of a TVH, uterosacral suspension and cystocele repair for stage 2 prolapse, you perform cystoscopy and ~2 minutes after indigo carmine is given, there is flow only from the right side. Management options.....
  - Give it time... +/- IV Lasix 10-20mg
- Still no flow...
  - Confirm surgical history (nephrectomy, etc)
  - Cut uterosacral stitch on that side and look again
  - Attempt to pass stent/Urology consult
  - Intraop or post-op renal ultrasound/retrograde

Summary

- Knowledge of the components of a cystoscope and how to use an angled lens are imperative before attempting cystoscopy.
- Ability recognize bladder injury and document ureteral patency during pelvic surgery will aid in prompt recognition and allow for early correction of injuries common to gynecologic surgery.
- Knowledge of typical lesions is important for recognition of pathology and appropriate therapy.