The Lower Urinary Tract – Are You Aware of These Minimally Invasive Approaches?
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Overview

Minimally invasive procedures have significantly improved outcomes for lower urinary tract diseases in small animals. These approaches offer diagnostic precision, reduced morbidity, shorter recovery times, and improved client satisfaction. This lecture highlights several clinical applications, including **percutaneous cystolithotomy (PCCL)**, **ectopic ureter laser ablation**, **perineal approach cystoscopy**, and **urethral stenting**. Each case demonstrates how these techniques can replace or complement traditional surgical interventions.

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1. Percutaneous Cystolithotomy (PCCL)

Background

Calcium oxalate urolithiasis remains a common cause of recurrent lower urinary tract disease in dogs. Approximately 50% of affected dogs experience recurrence within 2–3 years. Traditional cystotomy carries a 20% risk of leaving residual calculi and may contribute to suture-induced urolith formation.

Procedure Summary

PCCL involves a **small (6 mm) bladder incision** through a mini-laparotomy. A cystoscope is introduced directly into the bladder for magnified visualization and stone removal. This technique ensures near-complete stone clearance while minimizing tissue trauma and the likelihood of postoperative complications.

Key Prevention Tools

- Encourage dilute urine (USG < 1.020; ideally < 1.008)
- Evaluate ionized calcium and PTH for hypercalcemia
- Consider CaOx1/CaOx2 gene testing in predisposed breeds
- Maintain urine pH between 7.0–7.5 with potassium citrate (avoid cranberry formulations)

- Monitor calciuria (Ca:Cr ratio) and adjust thiazide diuretics as indicated
- Recheck radiographs every 3 months post stone removal

Takeaway

- **Minimally invasive** and **highly effective**; <4% chance of residual stones
- **Outpatient procedure** with minimal discomfort
- **Eliminates suture-related recurrence** and provides full cystoscopic visualization
- Applicable to **any patient size**, can be **combined with laser lithotripsy**

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2. Ectopic Ureter Laser Ablation

Background

Ectopic ureters are a common cause of congenital urinary incontinence in young female dogs. Intramural ectopic ureters can now be corrected cystoscopically using laser ablation, offering a safe and effective alternative to invasive surgery.

Procedure Summary

Using cystoscopy, the intramural portion of the ureter is identified and ablated with a diode or Holmium:YAG laser to create a direct opening into the bladder. This restores normal urine flow and reduces infection risk.

Outcomes

- ~50% of dogs achieve continence post-procedure without additional treatment
- Up to 75% achieve continence with adjunctive therapy (medical or collagen/occluder support)
- Low complication rate; rare risk of ureteral stricture or hydronephrosis

Takeaway

- **Diagnosis and treatment in one procedure**—no exploratory surgery needed
- **Less invasive, faster recovery**, and **lower infection risk**
- Serves as the **treatment of choice** for intramural ectopic ureters

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3. Perineal Approach Rigid Cystoscopy

Background

Male dogs present unique anatomical challenges for cystoscopy due to the pelvic urethra's curvature. The perineal approach provides a minimally invasive alternative that allows direct visualization and intervention in the prostatic and post-prostatic urethra.

Procedure Summary

A small perineal stab incision allows access for an introducer sheath and guidewire-assisted dilation. A 2.7 mm, 30° rigid cystoscope is then inserted for urethral and bladder evaluation. This technique also enables interventions such as **ureteral catheterization**, **laser ablation**, or **urethral stenting**.

Takeaway

- Enables **rigid cystoscopic access in male dogs**
- Permits **laser and stent procedures** otherwise limited to females
- Minimally invasive, avoiding pelvic osteotomy or open surgery

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4. Urethral Stenting

Background

Urethral obstruction may arise from **granulomatous urethritis**, **transitional cell carcinoma (TCC)**, or **severe inflammatory disease**. When obstruction prevents urination, a urethral stent provides immediate palliation and restores function.

Procedure Summary

Under fluoroscopic and cystoscopic guidance, a self-expanding metallic stent is deployed to restore urethral patency. This allows concurrent biopsy collection and contrast assessment.

Complications and Prognosis

- Incontinence: ~47% of females, ~78% of males (severe in ~50% and 33%, respectively)
- Tumor regrowth around stent: 22% of cases; through stent: 2%
- Improved survival when combined with **NSAIDs and chemotherapy** post-placement

Differential Note

Granulomatous urethritis may mimic TCC but often responds well to immunosuppressive therapy once the obstruction is relieved.

Takeaway

- **Minimally invasive palliation** with **immediate return to urination**
- Dramatically improves quality of life
- Essential for differentiating **TCC vs. granulomatous urethritis**
- Survival improved with **multimodal therapy**

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5. Urethral Obstruction from Calculi

Background

When retrograde flushing fails, traditional urethrotomy carries a high risk of postoperative **urethral stricture**. Laser lithotripsy offers a precise, minimally invasive alternative.

Takeaway

- **Avoids urethrotomy** and stricture formation
- **Rapid, targeted fragmentation** of urethral stones
- Can be combined with PCCL for complete stone removal

Key Clinical Takeaways

Condition	Minimally Invasive Option	Main Advantage	Key Benefit
Bladder stones	PCCL	Minimizes incision & residual calculi	Outpatient, less trauma
Ectopic ureter	Laser ablation	One-step diagnosis & correction	Avoids open surgery
Male cystoscopy	Perineal approach	Enables rigid cystoscopy access	Allows advanced interventions
Urethral obstruction	Stent placement	Immediate relief	Quality of life improvement

Condition	Minimally Invasive Option	Main Advantage	Key Benefit
Urethral calculi	Laser lithotripsy	Avoids urethrotomy	Prevents strictures

Summary

Minimally invasive urinary procedures have redefined the standard of care for lower urinary tract disease. Techniques such as PCCL, cystoscopic laser ablation, and stenting reduce morbidity, hospitalization, and recurrence rates while improving diagnostic precision and patient outcomes. These procedures are accessible, reproducible, and suitable for a wide range of general practice cases through appropriate referral collaboration.