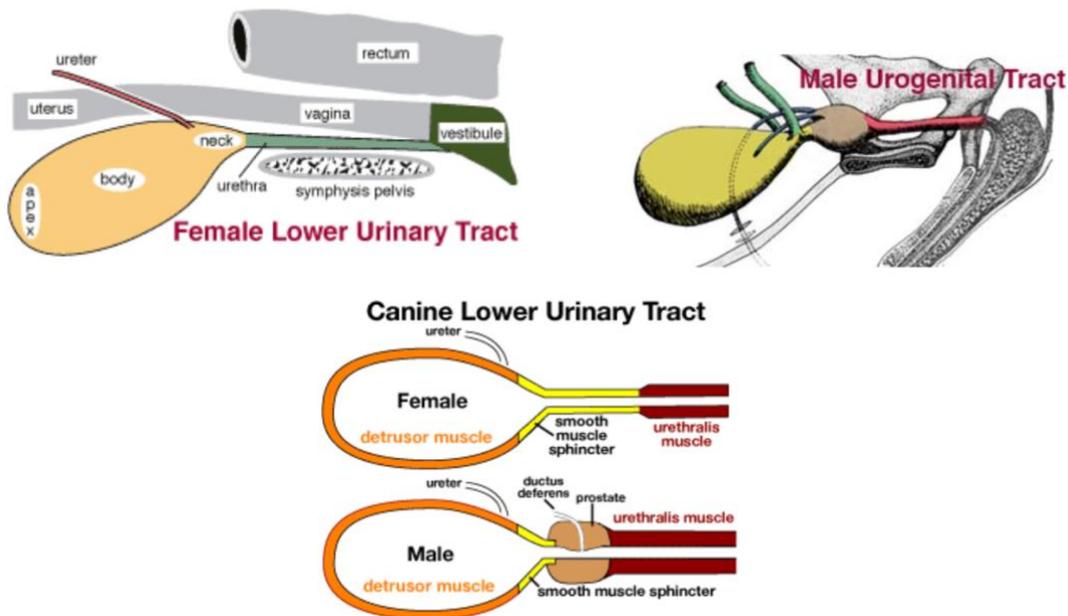




## Urethral Sphincter Mechanism Incompetence (USMI) in Dogs and Cats

### Quick take



USMI is the most common cause of **leaking urine at rest** in spayed female dogs (and occurs less often in males and cats). The urethral “valve” (sphincter) doesn’t stay tightly closed between bathroom breaks, so urine dribbles—especially during sleep or relaxation. First-line medicines help most dogs; for tough cases, minimally invasive urethral bulking injections, suspension surgeries (urethropexy/colposuspension), or a hydraulic/artificial urethral sphincter can restore continence for many patients.

### 1) Pathophysiology: What’s going on inside?

Think of the urethra as a short tube with smooth-muscle “drawstrings” (the internal sphincter) and supportive pelvic tissues that help keep it closed. In USMI, closure pressure is too low.

#### Why?

Hormone and tissue changes after spay: Oestrogens normally helps maintain urethral mucosal thickness and blood flow; after spay, some bitches lose that support, decreasing closure pressure. (Not every spayed dog is affected, but it raises risk.)

**Anatomy & size:** Medium-to-large dogs are over-represented; body weight, urethral length/position, and breed all play a role.

**Nerve & muscle tone:** The alpha-adrenergic nerve signals that keep the sphincter snug can be insufficient; this is why alpha-agonist medications often work.



**In cats:** True USMI is uncommon. When it occurs, it may be idiopathic (unknown cause), post-spay, or associated with other illnesses; many incontinent cats have other causes (e.g., neurologic disease, bladder issues), so careful diagnosis matters.

**What owners see:** puddles where the pet slept, damp fur around the vulva or prepuce, urine scald or recurrent UTIs. Pets otherwise urinate normally when awake.

## 2) How it's diagnosed

Your vet will rule out urinary tract infection, bladder stones, ectopic ureters, neurologic disease, and other causes, then consider USMI based on history, exam, possibly imaging, and response to therapy. A 2024 ACVIM consensus statement outlines a thorough approach and notes breed/size patterns and treatment tiers. Congenital conditions that can cause urinary incontinence in puppies will typically cause a constant incontinence (constant dripping, not only at rest) and develop before the spay, usually present at the time of adoption, even though the signs can remain discrete.

## 3) Treatment overview

### A. Lifestyle & basics (good for everyone)

- Keep pets lean (extra weight worsens leaks).
- Frequent potty breaks, last one just before bedtime.
- Manage skin care (clip/clean, barrier creams) to prevent urine scald.
- For cats, extra/larger litter boxes and absorbent bedding can help while you and your vet work up the cause.

### B. Medical therapy (first-line in dogs; often the whole solution)

- **Phenylpropanolamine (PPA)** – boosts urethral tone via alpha-adrenergic receptors. Across multiple studies and reviews, about 75–95% of dogs improve or become continent; some series report 85–97% continence with proper dosing and long-term adjustment.
- **Estriol (short-acting oestrogen)** – improves urethral mucosa/closure pressure; used alone or with PPA. Controlled and observational work supports benefit in many spayed bitches.
- **Other/adjuncts (case-by-case):** combination PPA+estriol, addressing concurrent UTIs, and—in selected cases being researched—alternative agents (e.g., amitriptyline in a small pilot vs estriol). Your vet will tailor choices to your dog's health and response.
- **Cats:** PPA is sometimes used off-label and may help selected cats; evidence is slimmer than in dogs, and a full search for non-USMI causes is crucial first.

**When to consider procedures:** If meds don't give good control, stop working, or cause side effects—or if you prefer to reduce daily medication—your vet may discuss minimally invasive injections or surgery.

## 4) Surgical & interventional options

### Option 1: Endoscopic urethral bulking injections (minimally invasive)

**What it is:** Via cystoscope, tiny depots of a bulking material (historically collagen; now also dextranomer/hyaluronic acid or other biomaterials) are injected under the urethral lining to “plump” the sphincter and improve coaptation (seal). Pets usually go home the same day.



**How well it works (dogs):**

Cross-linked collagen injections: about 65–71% of dogs achieve continence early; effect can **wane over time**, and some need repeat injections. Mean/median duration in reports ranges from ~11 months (gelatin/proof-of-concept) to ~17–46 months for collagen in selected cohorts; longer owner-survey follow-ups also exist.

Dextranomer/hyaluronic acid (a widely used human bulker): success at  $\geq 6$  months around 58%, with low complication rates in published veterinary series.

**Complications & rates:**

**Generally low and transient**: occasional brief hematuria (blood in urine) or stranguria (straining). One 100-case review reported no major complications and only one minor (transient hematuria).

Like in people, rare issues such as migration or urethral irritation are possible; most are managed conservatively. (Human literature lists UTIs, temporary retention, pseudocysts; veterinary reports to date suggest a low rate.)

**Good to know**: Some dogs still need PPA or estriol after bulking, but often at lower doses. Bulking is a favourite next step for owners wanting to avoid permanent implants or bigger surgery, but it might only provide a temporary and incomplete relief.

**Option 2: Urethropexy and colposuspension (suspension procedures; dogs)**

**What it is**: Surgical repositioning/support of the bladder neck and proximal urethra to reduce “sagging” into the abdomen and improve pressure transmission to the urethra during rest and activity.

**How well it works:**

A frequently cited review notes **~50% of dogs are continent long-term after colposuspension alone** (results vary by case selection/surgeon).

**A combined urethropexy + colposuspension series reported 70% complete resolution** (“excellent” outcome) at ~3-year median follow-up, with no major complications and only ~10% mild transient dysuria. (Another large report cites 53% success and ~11% complication rate—mostly minor.)

**Complications & rates:**

Transient dysuria (straining), temporary retention, or UTIs in a minority; major complications are uncommon when cases are well selected.

**Good to know**: These surgeries are anatomy-dependent; they’re less popular today than bulking or an artificial sphincter but remain useful in selected dogs, especially when the urethra is mobile/caudally positioned.

**Option 3: Hydraulic/Artificial Urethral Sphincter (AUS/HO)**

**What it is**: A silicone cuff placed around the urethra is connected to a subcutaneous reservoir/port. After healing, your vet fine-tunes the cuff’s pressure by adding/removing sterile fluid—tight enough to stop leaks, loose enough for normal urination.

**How well it works (dogs):**

Multicentre and institutional series report functional continence in roughly two-thirds to >80–90% of dogs, with adjustability improving results over time. A widely cited retrospective reported strong improvement and owner satisfaction; another study reported 67% functional continence; small long-term series showed marked drops in leak frequency and volume after placement.

**Complications & rates:**

Obstruction (too tight) requiring deflation or revision; implant infection, urethral erosion, or device leakage can occur. In some dogs, complications necessitate device removal. These are not common but are the key downside owners should understand.



**Good to know:** AUS is often chosen when bulking and medicines haven't delivered or when incontinence is severe. It requires a committed owner for aftercare and occasional adjustments.

#### Option 4 (rare/advanced): Feline surgical options

True USMI is uncommon in cats, but when present can be severe and refractory: Hydraulic occluder (HO/AUS) has been used in small feline case series with encouraging continence and acceptable safety.

Uncommon congenital urethral hypoplasia (near-absent urethra) is a different scenario; specialized reconstructive approaches have been described in small numbers. Your surgeon will advise if this applies.

There's even a single-cat AUS case report with resolution of incontinence—proof of concept more than a standard path.

#### 5) What to expect around procedures

Before: urine culture, possibly imaging (ultrasound; contrast studies) to rule out other problems; discussion of goals (full dryness vs “mostly dry”). □

Wiley Online Library

Anesthesia: bulking is endoscopic and brief; suspension surgeries and AUS placement are longer. Your team will use careful pain control and peri-operative antibiotics as appropriate.

After: many dogs urinate normally right away; some need a short adjustment period. Skin care often improves dramatically once leaks ease. For AUS, expect follow-up visits for gentle cuff adjustment over weeks.

#### 6) Complications & typical rates

Numbers vary by center, technique, and how “success/complication” is defined. The ranges below synthesize owner-relevant data from veterinary studies.

##### A. Urethral bulking (dogs)

Continence: roughly 58–71% at ≥6 months depending on material; collagen series often report ~65–70% early success with many dogs improved even if not fully dry. Durability can decline, and repeat injections are common; mean/median benefit spans ~11–46 months across materials/studies.

Complications: usually minor and transient (brief hematuria/straining). In a 100-case review, no major complications and only one minor event were recorded. Rare risks (reported mostly from human data) include local irritation, infection, or migration.

##### B. Colposuspension ± urethropexy (dogs)

Continence: about 50% long-term for colposuspension alone in reviews; ~70% complete resolution (“excellent”) in one combined urethropexy+colposuspension series at ~3-year follow-up.

Complications: ~10–11% in published series—mostly transient dysuria; major complications uncommon.

##### C. Artificial/ hydraulic urethral sphincter (dogs)

Continence: many dogs achieve functional continence; reports vary ~67% to >80–90% improved/continent depending on cohort and definitions; owners typically report a marked drop in leak frequency/volume.

Complications: partial obstruction (over-tight cuff), UTIs, device infection, fluid leakage, or urethral erosion; explantation (removal) may be required in a subset. These risks are why AUS is generally reserved for refractory cases.



#### D. Cats

Evidence is limited. Small case series of hydraulic occluder in cats suggest good continence with few complications, but numbers are too small for firm percentages. Medical therapy (off-label PPA) may help some cats, but the priority is excluding other causes of feline incontinence first.

### 7) Putting choices in context (how vets decide)

- Juvenile urinary incontinence should always be investigated. Congenital conditions such as ectopic ureters do not respond to the medical management and only respond to surgery.
- Start with meds (usually PPA; ± estriol in spayed bitches). Many dogs never need anything else.
- If leaking persists, bulking injection is a common next-step because it's minimally invasive and repeatable, with low complication rates.
- If anatomy suggests benefit—or when owners want a one-and-done approach—suspension surgery (urethropexy/colposuspension) can help, with ~50–70% long-term success in reported cohorts.
- If incontinence is severe and refractory, or prior options failed, AUS/HO offers adjustable control but carries implant risks—great for many, but best under experienced teams and with owners ready for occasional adjustments.

### 8) Special notes for male dogs and for cats

- **Male dogs can have USMI too (less common).** PPA may help; AUS can be particularly useful if meds fail (male urethras are easier to cuff), though obstruction and implant issues can occur and sometimes require removal.
- **Cats:** true USMI is rare. If suspected after a full work-up, vets may try off-label PPA first; minimally invasive or AUS solutions are case-by-case and typically reserved for severe, well-documented sphincter incompetence.

### 9) Owner checklist: setting your pet up for success

- **Weight & water:** keep lean; don't restrict water unless your vet says so (concentrated urine increases UTI risk).
- **Potty routine:** last walk late evening; more frequent daytime breaks.
- **Skin care:** keep the groin clean/dry to prevent rashes; consider diapers or waterproof bedding during the trial phase.
- **Expect tweaks:** many dogs need dose adjustments over time; work with your vet. If meds lose efficacy or side effects crop up, discuss bulking or surgery.
- **After procedures:** follow instructions on activity, antibiotics (if prescribed), and rechecks (especially AUS adjustments). Report straining, inability to pass urine, fever, or pain promptly.

### 10) Frequently asked questions

#### “Will my dog be 100% dry?”

Often yes with meds; if not, bulking or AUS can tip the balance. Set goals (e.g., “no night puddles,” “only rare drips”) with your vet so success feels tangible.

#### “Does spay timing matter?”

Spay is linked with higher USMI risk in bitches; talk to your vet about the right timing for your dog and household. Once USMI exists, we treat it—timing can't be changed retroactively.



**“If bulking wears off, can we repeat it?”**

Yes—bulking is repeatable and often repeated when leaks return. Some dogs also need a low dose of meds afterward.

**“Is AUS permanent?”**

Yes; it's implanted. It's adjustable and can be lifesaving for severe cases but has implant-related risks (infection, obstruction, erosion) that your team will discuss.

**“What about cats?”**

First, make sure we're not missing another cause. If true USMI is confirmed and severe, off-label PPA or, in rare cases, hydraulic occluder/AUS may help.

## 11) Selected veterinary references (English; owner-friendly pages + key studies)

### Owner-level overviews & consensus

- Urethral Sphincter Mechanism Incompetence in Dogs (review/guide)—risk factors, work-up, and options (Today's Veterinary Practice).
- ACVIM 2024 Consensus on Canine Urinary Incontinence—diagnosis and management framework (veterinary-professional, but accessible).
- UCDavis VMTH: Urinary Incontinence in the Dog—owner-focused explanation of bulking and medical options.

### Bulking agents (dogs)

Collagen injection—long-term outcomes: ~68% continent; some decline over time; repeatable; mostly mild transient adverse events.

Dextranomer/hyaluronic acid vs collagen—≥6-month success 58–71%; low complication rate.

Cross-linked gelatin—proof-of-concept; median continence ~11 months; transient signs in ~7%.

### Suspension surgeries (dogs)

Colposuspension review—about 50% long-term continence.

Combined urethropexy+colposuspension—70% complete resolution; mild transient dysuria (~10%); no major complications reported in that series.

### Hydraulic/Artificial urethral sphincter (dogs & cats)

Dogs—AUS outcomes: strong improvement/continence; 67% functional continence in one study; notable owner satisfaction.

Long-term HO series—marked drop in leak frequency/volume in most dogs.

Complications of AUS—obstruction, infection, leakage, erosion; sometimes requires removal.

Cats—HO/AUS—small case series and a case report showing feasibility in severe feline cases

### Background & surveys

International survey (2024)—PPA widely used as first-choice drug for USMI. (open source)

Review articles—management updates and long-term perspectives.

## 12) Bottom line for pet owners

In dogs, USMI is common after spay and in larger breeds—but very treatable. PPA (± estriol) helps most; if leaks persist, bulking (minimally invasive), suspension surgery, or AUS are proven options with good success rates when matched to the right patient. Expect low, usually transient complication rates



from bulking; ~50–70% long-term success from suspensions; and ~67–90% functional continence from AUS, balanced against device-related risks.

In cats, true USMI is uncommon; work closely with your vet to rule out other causes. Selected cats may benefit from off-label PPA or, rarely, hydraulic occluder/AUS in severe, proven sphincter incompetence.

**If you're deciding what to do next, ask your vet:**

- “Are we confident this is USMI and not infection, stones, ectopic ureters, or a nerve problem?”
- “If medicines don't fully control things, would bulking or a suspension be a good next step for my dog's anatomy—or is AUS the better match?”
- “What outcomes and complication rates does your team see with these procedures?”
- With a thoughtful plan, most pets with USMI can be kept comfortably dry and avoid skin/UTI issues—often with simple meds and, when needed, well-chosen procedures.