“Easy as Peeing in Bed”
Diagnosis, Treatment & Prevention of Canine Urinary Incontinence

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Speaker Disclosure

FINANCIAL DISCLOSURE:
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Canine Urinary Incontinence

Micturition

• normal process of storing and voiding urine
• integration of central, sympathetic, parasympathetic & somatic nervous system with smooth + strained muscle of urinary bladder & urethra

Incontinence

• involuntary passage / leakage of urine
• “void urine when your dog did not intend to”
• represents weakening or loss of normal micturition
Canine Urinary Incontinence

Causes of canine urinary incontinence

• urethral sphincter mechanism incompetence (USMI)
  • hormonal-responsive incontinence

• congenital lower urinary tract anomaly
  • ectopic ureter, vaginal/vestibular stricture

• urine retention and overflow
  • spinal cord disease
  • urethral calculi, detrusor-urethral dyssynergia

• urinary tract inflammation
  • bacterial UTI
Client History - Urinary Incontinence

• timing and location of periuria

• onset of incontinence - when did it begin
  • puppy that is “hard to house train”

• detailed description of micturition
  • initiation of urine stream, dysuria ?, stranguria ?

• average water intake & estimated urine output
  • polydipsia and polyuria disorders

• identify that pet is unaware of urine passage
Client History - Urinary Incontinence

- timing and location of periuria
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Physical Examination
Physical Examination

- priority to observe patient while urinating
- urinary bladder palpation
- vulvar (or prepucial) exam
- digital vaginal exam
- digital rectal exam
- orthopedic exam
- neurologic exam
Diagnostic Testing

Urinalysis
  • sediment findings
  • urine specific gravity

Imaging study
  • radiographs (survey, contrast)
  • ultrasound
  • CT (contrast)

General lab (CBC/Chem)
Canine Urinary Incontinence

Disorders of Urethral Muscle Competence

- **Urethral Sphincter Mechanism Incompetence (USMI)**
  - reduced urethral muscle tone allows leakage of urine
  - usually when resting or sleeping
  - occurs in up to 20% of neutered female dogs
  - higher prevalence in larger breed females
  - Boxer, Doberman, Germ Shep, Weimeraner, OESD
  - increased risk with early “spay”
  - UI onset within 1-4 years of ovariectomy
Mechanism for development of USMI after “spay”?

- influence of pituitary-gonadal axis (hormonal)
- effect on urogenital tissue (urethra)
- effect on supporting structures of pelvic region (muscular girdle)
Mechanism for development of USMI

Pituitary-gonadal axis

• post-ovariectomy decline in estrogen level

• increase in FSH & LH levels

• reduction in number & function of α-adrenergic receptors

• decrease effective urethral smooth muscle tone
Urethral Sphincter Mechanism Incompetence

Mechanism for development of USMI

Urogenital structures

- post-ovariectomy decline in blood/tissue estrogen level
- reduces urogenital vascular network & blood flow
- reduces tissue matrix growth & support

*decreases effective urethral muscle tone*
Mechanism for development of USMI

Supporting structures of pelvic region

• post-ovariectomy decline in blood/tissue estrogen level

• reduces urogenital vascular network & blood flow

• reduces tissue matrix growth & support

• “pelvic” bladder positioning

• decreases effective urethral closing pressure
Urethral Sphincter Mechanism Incompetence

Treatment Objective - restore continence

• increase urethral smooth muscle tone
• increase α-adrenergic receptors numbers
• increase α-adrenergic receptor stimulation
  • Estrogen treatment
• α-adrenergic agonist treatment
Urethral Sphincter Mechanism Incompetence

Treatment - estrogen supplementation

• **Effect** - increase urethral alpha receptor numbers

• **Drug options**
  
  • Diethylstilbestrol (DES)
  
  • Estriol (Incurin)
  
  • Premarin (conjugated estrogen)
Diethylstilbestrol (DES)

- oral estrogen replacement drug
- discontinued product in human medicine
- available via veterinary compounding

**Efficacy**
- 65% reported success

**Safety & Side Effects**
- estrus induction
- gynecomastia
- bone marrow suppression? wide safety margin (Endocrinology 1941)

Urinary incontinence in spayed bitches: new insights into the pathophysiology and options for medical treatment. 
*Arnold S1, Hubler M, Reichler I* Reprod Domest Anim. 2009
Treatment - Estrogen replacement therapy

Diethylstilbestrol (DES)

- 0.5 mg PO < 15kg
- 1.0 mg PO > 15kg

- Treatment schedule

  PO dose q 24hr  (1st week)
  PO dose q 48hr  (2nd week)
  PO dose q 72hr  (3rd week)
  PO dose q 5-7 days

  may discontinue after 2-3 months if effective
  may have to resume future treatment
Treatment - Estrogen replacement therapy

Estriol (Incurin™)

- natural short-acting biologically active estrogen
- FDA approved canine incontinence

**Efficacy**
- 83% response rate (60% complete response)

**Safety & Side Effects**
- estrus induction
- gynecomastia
- bone marrow suppression not reported

Treatment - Estrogen replacement therapy

Estriol (Incurin™)

• 1 mg tablet

• Treatment schedule

  2mg dose QD x 14 days
  1mg dose QD x 7 days
  0.5mg dose QD x 7 days
  minimum effective dose QOD thereafter
Treatment - Estrogen replacement therapy

Premarin\textsuperscript{R} (conjugated estrogen)

- 20 mcg/kg PO q 4-5 days

- **Efficacy**
  - did not appear to be as reliable

- **Safety & Side Effects**
  - estrus induction
  - gynecomastia

- more expensive
Urethral Sphincter Mechanism Incompetence

Treatment - alpha adrenergic agonist

- **Effect** - stimulate urethral alpha receptors

- **Drug options**
  - Phenylpropanolamine
  - Pseudoephedrine

Phenylpropanolamine

- non-selective adrenergic agonist activity
- increases norepinephrine at nerve ending
- stimulates both alpha & beta adrenergic receptors
- * smooth muscle contraction in visceral organs
- mild vasoconstriction, increases HR
- mild CNS stimulation
- reduces nasal congestion
- reduces appetite
- following PO maximal effects 2-6 hr, duration of effect 8-12 hr
Treatment - alpha-adrenergic agonist

Phenylpropanolamine

• alpha adrenergic agonist activity to increase urethral tone

• Efficacy
  • 85% reported success in multiple studies

• Safety & Side Effects
  • hypertension
  • restlessness, insomnia, decreased appetite

Effect of phenylpropanolamine and pseudoephedrine on the urethral pressure profile and continence scores of incontinent female dogs.
Byron JK1, March PA, Chew DJ, DiBartola SP. J Vet Intern Med. 2007 Jan-Feb

Evaluation of phenylpropanolamine in the treatment of urethral sphincter mechanism incompetence in the bitch.

Clinical response and urethral pressure profile changes after phenylpropanolamine in dogs with primary sphincter incompetence.
Treatment - \(\alpha\)-adrenergic agonist

Chronic phenylpropanolamine administration for USMI control

- satisfactory control !!

- once daily use?

Clinical evaluation of a single daily dose of phenylpropanolamine in the treatment of urethral sphincter mechanism incompetence in the bitch
Stéphanie Claeys, Frederico Rustichelli, Stéphanie Noël, and Annick Hamaide Can Vet J. 2011 May

Evaluation of once daily dose of phenylpropanolamine in the treatment of urethral sphincter mechanism incompetence in spayed bitches
Halit KANCA, Kübra KARAKAŞ, İlkür PİR YAĞCI, Timuçin BAŞARAN: Ankara Üniv Vet Fak Derg, 2012

- loss of efficacy due to down regulation of alpha-receptors?
Treatment - alpha-adrenergic agonist

Phenylpropanolamine

- Proin™ (PRN Pharmacal)
- FDA approved
- flavored chewable tablet (25mg, 50mg, 75mg)

- Efficacy
  - 90+% client satisfaction
Urethral Sphincter Mechanism Incompetence

USMI refractory to alpha-agonist or estrogen treatment

• may consider higher dosage or frequency
  • be careful of potential side effects at higher dosages

• evaluate UA for possibility of concurrent UTI
• evaluate for other disorders (anatomic)

• if conclude refractory/partially responsive USMI then consider :
  • use of both PPA + estrogen for synergistic effect
  • urethral collagen injection
  • surgical procedures
• incontinent patient failing medical management
• no other urethral / LUTD disease evident

• Urethrosopic procedure inject collagen into submucosa in circumferential pattern
Urethral collagen injection Rx


- 40 female dogs
- 27 good response, 10 improved
- 3 no improvement
- 16 worsened again over 12 months
- need to continue USMI drug(s) if partial response

Submucosal Collagen Injection for Management of Urinary Incontinence Following Urethral Stent Placement.
Kilpatrick S, Hill T. Top Companion Anim Med. 2017
Surgical treatment

- cystopexy, urethropexy
- cystourethroplasty
- colposuspension
- urethral hydraulic occlusion
Urethral Hydraulic Occluder Treatment

Surgical implant
Urethral Hydraulic Occluder Treatment

Surgical implant
Canine Urinary Incontinence

Disorders of Male Urethral Muscle Function

• Urethral Sphincter Mechanism Incompetence (USMI)

• Urethral muscle hyperreflexia (DUD)
Canine Urinary Incontinence

Disorders of Male Urethral Muscle Function

- Urethral Sphincter Mechanism Incompetence (USMI)
  - alpha agonist therapy
  - post-castration hormonal-responsive
    - testosterone
    - estrogen
- urethral collagen treatment
Disorders of Male Urethral Muscle Function

Urethral muscle hyperreflexia
• Detrusor-Urethral Dyssynergia (DUD)

• failure of urethral relaxation during micturition
• initiate urine stream then dribbling/no urine despite continued effort
• differential diagnosis - urethral calculi

• treatment with drugs to relax urethral muscle and decrease anxiety
  • alpha-adrenergic antagonist (prazosin, tamsulosin)
  • diazepam, alpazolam
Canine Urinary Incontinence

Conclusions

• Obtain complete history and physical examination to establish UI diagnosis

• Urethral Sphincter Mechanism Incompetence (USMI)
  • common post-ovariectomy females
  • treatment with drugs to increase urethral muscular tone
  • treatment with collagen or surgical treatment

• Detrusor Urethral dyssynergia (DUD) in male dogs