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Urinary incontinence in the dog: clinical workup and differential diagnosis

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Continence is an expression which refers to the condition during the filling phase of the urinary bladder. The physical condition for continence requires that the urethral closure pressure is higher than that of the bladder pressure. It follows that in the reverse situation, when the bladder pressure exceeds the urethral closure pressure, will result in the loss of urine. This situation occurs at micturition. But, if the bladder pressure exceeds the urethral closure pressure during the filling phase of the bladder an uncontrollable loss of urine occurs, this is urinary incontoninence,.

If the anatomical conditions are normal, two pathophysiologically different mechanisms can result in urinary incontinence: An increased bladder pressure with a normal urethral closure function or an insufficient urethral closure function with a normal bladder pressure (= sphincter incompetence). Rosin and Barsanti (1) proved for the first time, that urinary incontinence after spaying is caused by sphincter incompetence.

Urinary continence is the ability to control voluntarily micturition. For an animal to be continent several different functions of the nervous system and the urinary tract have to be co-ordinated in the following manner (2):

1. The ureters must lead into the bladder.
2. The urinary bladder has to serve as a reservoir and to have the ability to expand without elevating the intravesical pressure.
3. The urethra has to generate the necessary “resting-pressure” in order to prevent urinary loss during the filling phase of the bladder.
4. Once the bladder has reached the limit of its capacity the efferent neurons must send a signal to the spinal cord and from there to the central nervous system.
5. The central nervous system has to react with an appropriate return signal.
6. The impulse must be transmitted by the spinal cord to efferent neurons, which in turn initialize the contraction of the abdominal muscles and the detrusor muscle.
7. As soon as the bladder contracts, the bladder neck has to relax, and the reflex, which leads to a reduced urethral tonus, has to occur.

A complex and functionally coherent system is the requirement for continence. There are many possible causes for urinary incontinence. Urinary incontinence is classified as either neuregenic or non-neurogenic. But in many cases this grouping is unsuitable. For example urinary incontinence in bitches after spaying is classified as non-neurogenic, because the the neurological examination is normal. In spite of that most cases respond to treatment with alpha-adrenergica, which act like a neurotransmitter.

Although sphincter incompetence due to spaying is the most common, a thorough examination should be performed on every incontinent animal. First, a detailed history is necessary as it provides important clues on the type of incontinence, and in turn assists in decisions on the diagnostic work-up. If urinary incontinence was present before the operation, an insufficient education or a congenital malformation (ectopic ureters, persistent urachus, intersex) of the urogenital tract should be considered. If the onset of urinary incontinence occurred immediately after surgery, an iatrogenic ureterovaginal fistula could be the cause. If incontinence exclusively occurs after a walk then a urovagina has to be considered. Affected bitches mainly loose urine where they sit down. Urovagina can also be caused by a vaginal neoplasia, which prevents urine passing by the vestibulum. In many cases urine collects in the vagina when the bitch urinates, in the absence of a pathological condition. If, by history, the bitch is incontinent after long walks an instability of the detrusor could be the underlying cause. This may be due to a persistent urachus, which prevents a complete retraction of the empty bladder. Thus, the bladder is forced into a certain position that may result in a transient instability of the detrusor, in particular after heavy exercise. If incontinence exclusively occurs during sleep and the bed is wet, it is most likely a urethral sphincter incompetence. If spots of urine are found far away from the bed it rather points out an emergency urination, which has nothing to do with incontinence. Dogs with polyuria and polydypsia are more prone to urinate during the night and are erroneously presented as incontinent. Therefore, information on the daily water intake is required. In many cases a bacterial cystitis causes contractions of the detrusor during the filling phase of the bladder, leading to an involuntary urine loss. Because sphincter incompetence predisposes the bitch to bacterial cystitis, the urinary incontinence may remain in spite of a successful treatment of the cystitis. For very young bitches presented for urinary incontinence, an intravenous contrast study should be performed, in order to rule out congenital malformations. An urethrocystogram combined with a pyelogram is suitable for ruling out iatrogenic ureterovaginal fistulas, in bitches which became incontinent immediately after surgery. Possible neoplasia of the urinary tract in elderly bitches can usually be verified by endoscopy or radiography.

If the history, or the physical exam, is suggestive of a neurological problem, a thorough neurological exam should be performed. Depending on the location of the lesion, radiological procedures or cerbrospinal fluid analysis is indicated to determine the underlying cause (degeneration, neoplasia or inflammation). If a spayed incontinent bitch is presented with a typical history (urinary loss while asleep), and the above mentioned causes for incontinence can be ruled out, it is then most likely a urethral sphincter mechanism incompetence (USMI) due to neutering.

Minimal data base in a bitch presented for urinary incontinence:

- Physical exam (including careful examination of the lumbar spine!)
- Neurological exam (in particular examination of the anal and patellar reflexes)
- Vaginoscopy
- Serum biochemical profile
- Hematology
- Bacterial culture of urine
- Urinalysis
- (Radiological examination if necessary)

In addition in male dogs:

- Thorough examination of the prostate (digital palpation, ultrasonography, radiography)
- Exclusion of ectopic ureters (at any age, also in sexually intact males!)

The general risk for urinary incontinence is low (0-1%) in intact bitches (3-5). In contrast, urinary incontinence is a common problem in spayed bitches affecting up to 20% (6).

The underlying pathophysiological mechanism is a reduction of the urethral closure function after spaying (7-9). It is believed that there is a direct relationship between the removal of the ovaries and urinary incontinence (10). This was clearly demonstrated by the epidemiological study of Thrusfield (11).

References

1. Rosin AE, Barsanti JA. Diagnosis of urinary incontinence in dogs: Role of the urethral pressure profile. J Am Vet Med Assoc 1981;178(8): 814-822.
2. Barsanti, J. A., Finco, D. R. (1983). Hormonal responses to urinary incontinence. In: R. W. Kirk (Hrsg.): Current Veterinary Therapy VIII. Philadelphia: W. B. Saunders Co., 1086-1087.
3. Holt PE, Thrusfield MV. Association in bitches between breed, size, neutering and docking, and acquired urinary incontinence due to incompetence of the urethral sphincter mechanism. Vet Rec 1993; 133: 177-180.
4. Krawiec DR. Diagnosis and treatment of acquired canine urinary incontinence. Comp Anim Pract 1989; 19: 12-20.
5. Thrusfield MV. Association between urinary incontinence and spaying in bitches. Vet Rec 1985; 116: 695.
6. Arnold S, Arnold P, Hubler M, Casal M, Rüsch P. Incontinentia urinae bei der kastrierten Hündin: Häufigkeit und Rassedisposition. Schweiz Arch Tierheilk 1989; 131: 259-263.
7. Holt PE: Simultaneous urethral pressure profilometry: Comparison between continent and incontinent bitches. J Small Anim Pract 1988; 29: 761-769.
8. Nickel RF. Studies on the function of the urethra and bladder in continent and incontinent female dogs. PhD thesis, Utrecht: University Press; 1998.
9. Arnold S: Urinary incontinence in castrated bitches. Part 1: Significance, clinical aspects and etiopathogenesis. EJCAP 1999; 9: 125-129.
10. Joshua JO. The spaying of bitches. Vet Rec 1965; 77: 642-647.
11. Thrusfield MV, Holt PE, Muirhead RH. Acquired urinary incontinence in bitches: its incidence and relationship to neutering practices. J Small Anim Pract 1998; 39: 559-566.

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of patterns, distribution of the pattern (asymmetric vs. symmetric), and intensity of patterns. Other findings of importance include bronchiectasis, pneumothorax, pleural effusion, diaphragmatic hernia, mass lesions, bullae or cysts, megaesophagus, or thoracic foreign bodies. Lack of radiographic abnormalities in an animal with respiratory signs does not definitively rule out pulmonary disease. Metastatic nodules may be too small to identify, recent inflammatory lesions may not be visible, and thromboembolism (PTE) may not cause radiographic change.

Ultrasonography has limited utility in pulmonary medicine since air is an extremely poor media for sound waves. Ultrasound is used to examine pulmonary mass lesions, consolidated lungs lobes, vascular patency, and to guide aspiration of lesions. It may also rule out cardiac, pleural, and mediastinal disease. Ultrasonography is widely available, safe and does not result in exposure to radiation. It is very operator dependent and requires animal restraint.

Computerized tomography (CT) is the gold standard for detection of pulmonary metastasis. It can be used to detect vascular lesions or to demonstrate location and extent of parenchymal, interstitial and bronchial lesions. CT provides excellent detail on anatomic relationships and can be used to guide aspirates and biopsies. Contrast allows evaluation of vascularized structures. Unlike conventional radiography, CT requires heavy sedation or general anesthesia and equipment is more expensive (although increasingly available). There are a variety of types of CT imaging, each with its unique ideal usages, advantages, and disadvantages.

Specialized imaging techniques that have some use in pulmonary medicine include fluoroscopy, angiography, nuclear scintigraphy, magnetic resonance imaging, and positron emission tomography. Familiarity with the utility of these techniques will allow for appropriate referral

VISUALIZATION

All forms of direct visualization of the lungs and airways are to some degree invasive. Bronchoscopy allows a scope to be passed through the airways. Mucosal condition, amount of mucus, presence of hemorrhage, structural airway integrity, mass lesions, or foreign bodies can be visualized. Bronchoscopy can also be used to guide sample collection for culture and cytologic evaluation and to remove foreign material. Bronchoscopy allows separate evaluation of different lung lobes. It requires general anesthesia and will occlude airway lumen. Supplemental oxygen provided through the biopsy channel of the scope or via catheter passed along the side of the scope may minimize hypoxemia. The technique requires special equipment and some degree of expertise. Respiratory distress is a relative but not absolute contraindication to bronchoscopy.

The pulmonary parenchyma can be visualized directly via thoracotomy or thoracoscopy. Both are invasive procedures but allow directed tissue biopsy and removal of abnormal lung tissue. Thoracoscopy may allow shorter recovery times, but requires specialized equipment and some degree of expertise. These techniques will mentioned again in part II.

SUGGESTED READING

Textbook of Veterinary Diagnostic Radiology. Thrall D, editor. 4th ed. Saunders (Elsevier), 2002.

Textbook of Respiratory Disease in Dogs and Cats. King LG, editor. 1st edition, Missouri, Saunders (Elsevier), 2004.

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