

Communication

[Comunicação]

**Urinary tract infection caused by *Corynebacterium urealyticum* in a male dog**

[Infecção do trato urinário por *Corynebacterium urealyticum* em um cão]

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Urinary tract infection (UTI) is one of the most common canine infections, and among the most common indications for antimicrobial therapy. Although a presumptive diagnosis of UTI can be made based on the clinical signs along with a urinalysis, urine culture and sensitivity testing is indicated for the definitive diagnosis as well as for the choice of appropriate antimicrobial therapy (Ling, 2000). Its etiology is generally credited to Gram negative rods as *Escherichia coli*, *Proteus* spp. and *Klebsiella pneumoniae*. Nevertheless, opportunistic microorganisms may also determine UTI, while its role remains to be clearly elucidated.

*Corynebacterium urealyticum* is a nonhemolytic, slow growing, Gram positive aerobic and non-spore forming bacillus (Performance..., 2002). Although it is known as an opportunistic pathogen in humans, mainly in urinary tract infections (UTI) (Nieto, 2000), it has not often been described in animal infections (Suarez et al., 2002; Bailiff et al., 2005).

Since *C. urealyticum* is strongly urease-positive, splitting urea to form ammonia, with resultant alkalization of the urine, the infection caused by this agent frequently leads to an alkaline-encrusted cystitis, or pyelitis, a chronic inflammatory condition of the bladder or kidney characterized by deposits of ammonium magnesium phosphate (struvite) on an already damaged mucosal surface (Funke et al., 1997).

Only few *C. urealyticum*-related cases have been reported in dogs (Suarez et al., 2002; Bailiff et al., 2005). As a typical opportunistic pathogen, it is most commonly found in patients who have previously undergone urologic procedures or had preexisting abnormalities of the bladder mucosa. Little is known of the clinical features of *C. urealyticum* UTI in veterinary practice or the outcome of treatment. The purpose of this communication was to report a case of canine UTI caused by *C. urealyticum* including clinical and microbiological approaches.

An adult entire male aged six years of 12kg weight was referred to the authors with history of pollakiuria and dysuria accompanied by occasional reports of haematuria for two weeks. The dog had been submitted three months before to a surgery in order to remove bladder calculi, but there was no information about its chemical nature. On admission, the dog was unmedicated for more than five weeks and was submitted to a physical examination and to ultrasonography using a 4.5 MHz transducer. Fifty millilitres of urine were collected by ultrasound-guided prepubic cystocentesis and divided into equal aliquots for urinalysis and bacteriological culturing.

For bacteriology the urine sample was immediately plated on 5% sheep blood agar (Difco) and incubated at 37°C. After 48 hours colonies were quantified according to standard laboratory protocols (Ling, 2000). The obtained isolate was identified on the basis of colony

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characteristics, Gram stain, haemolysis on the 5% sheep blood agar and other biochemical reactions, mainly catalase, urease activity test, nitrate reduction test, penicillin resistance and oxidase activity test. The susceptibility to antimicrobial agents was determined by the agar disc diffusion method on Mueller Hinton Agar (Difco) incubated at 37°C, as described (Performance..., 2002). Discs of amoxicillin associated with clavulanic acid (30µg), amoxicillin (30µg), ampicillin (10µg), penicillin G (10U), oxacillin (5µg), amikacin (30µg), gentamicin (10µg), cefuroxime (30µg), ceftriaxone (30µg), ciprofloxacin (5µg), lomefloxacin (10µg), norfloxacin (10µg), nalidixic acid (30µg), azithromycin (15µg), chloramphenicol (30µg) and tetracycline (30µg) were tested. After measuring the antimicrobial zone diameters and following the standards, the isolate was characterized as susceptible or resistant to each drug.

At the moment of the clinical examination, the dog was alert with a rectal temperature of 38.8°C and the mucous membranes were normally red-colored. Pain was observed at the abdominal region palpation. The wall of the urinary bladder was thickened but with no palpable masses.

Abdominal ultrasonography revealed a bladder with extensive thickening of the wall and acoustic shadows associated with sediment. No calculus was recognized. Prostate was augmented with a homogeneous parenchymal pattern with a medium to fine texture, but no obstruction of the urinary via was observed. On the urinalysis the presence of struvite crystals and intense bacteriuria was observed, associated to 20-30 red blood cells (RBC) and mild pyuria, represented by 6-10 leucocytes per microscopic field. The pH of the urine was alkaline (8.2) but no other abnormal elements were observed, except for a slight proteinuria. Specific gravity was 1.032.

Bacteriological examination yielded Gram positive rods in pure culture ( $10^5$ UFC/mL). It was the only isolated microorganism. Biochemical tests of the isolate confirmed it as *Corynebacterium urealyticum*. The isolate was susceptible to amoxicillin associated with clavulanic acid, azithromycin, chloramphenicol, ciprofloxacin, cefuroxime, lomefloxacin, norfloxacin, tetracycline, gentamicin, nalidixic

acid and ceftriaxone. It was resistant to oxacillin, amoxicillin, amikacin, penicillin G and ampicillin.

*C. urealyticum* has rarely been implicated in UTIs in dogs (Elad et al., 1992; Gómez et al., 1995). In humans, risk factors for the occurrence of this infection include urological manipulation, prolonged bladder catheterization (Elad et al., 1992) and exposure to a nosocomial infection (Nebreda-Mayoral et al., 1994). In dogs, reported risk factors include neurological disorders, urethral or urinary bladder traumas, undergone surgery, and long term antibiotic therapy (Gómez et al., 1995). In the present case, the animal presented two of those factors, i.e. recent urinary tract surgery and prolonged antibiotic therapy in the last three months.

Although *Corynebacterium* spp. has been reported to be part of the normal flora of the genital tract of cats (Strom Holst et al., 2003), the source of the infection for dogs is not yet determined, since previous attempts to isolate the organism from the skin of dogs have failed (Suarez et al., 2002).

An unexpected finding in this case is related to the antimicrobial susceptibility of the agent. Although *C. urealyticum* is described as a multidrug resistant pathogen, resulting in limited antimicrobial therapeutical choices (Bailiff et al., 2005), in the present report the isolated strain showed to be susceptible to ten from the sixteen tested drugs, including aminoglycosides and quinolones. As expected, the strain was resistant to penicillin, as well as the majority of the members of the penicillin class tested, except to amoxicillin associated with clavulanic acid. After fifteen days of oral ciprofloxacin administration (10mg/kg body weight), the dog was clinically healed. An ultrasonography performed ten days after the end of the antibiotic therapy revealed no abnormalities on the bladder mucosa.

In conclusion, this report describes a case of canine UTI determined by *Corynebacterium urealyticum*, an unusual opportunistic pathogen. Risk factors are concordant to those cited in the literature, as well as clinical and microbiological features.

Keywords: dog, urinary infection, *Corynebacterium urealyticum*

## RESUMO

Um cão adulto, com histórico de infecção do trato urinário, foi apresentado aos autores. O cão foi submetido ao exame físico, ultrassonografia, urinálise e cistocentese para cultura bacteriológica. O exame bacteriológico evidenciou a presença de bastonetes Gram positivo em cultura pura como único microrganismo isolado. Provas bioquímicas do isolado confirmaram tratar-se de *Corynebacterium urealyticum*. O patógeno mostrou-se susceptível às quinolonas e aos aminoglicosídeos, e resistente à maioria das penicilinas. O tratamento com ciprofloxacina apresentou sucesso.

*Palavras chave:* cão, *Corynebacterium urealyticum*, infecção urinária

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