Journal of Feline Medicine and Surgery (2011) **13**, 967–975
doi:10.1016/j.jfms.2011.08.001

jfms

Risk factors and clinical presentation of cats with feline idiopathic cystitis☆

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Feline idiopathic cystitis (FIC) is the most common cause of feline lower urinary tract disease (FLUTD). This retrospective, case-controlled study evaluated possible risk factors associated with FIC and compared different clinical presentations in 64 cats with FIC. Several risk factors known to be involved in FLUTD were identified as playing a role in FIC. Of the stressful situations considered, most did not occur with increased frequency in cats with FIC compared to controls, except for a house move. The presence of pyuria, haematuria and an increased urine protein:creatinine ratio were significantly higher in obstructed males compared with non-obstructed males. An obstruction was significantly more likely in cats with struvite crystalluria compared with cats without struvite crystalluria. These findings suggest that urethral plugs might be an important cause or contributing factor of obstruction in FIC. Episodes of FIC seem to occur mainly in susceptible cats in combination with a deficient environment.

Date accepted: 11 August 2011

Feline lower urinary tract disease (FLUTD) is a general term used to describe the various causes of lower urinary tract signs in cats, which include idiopathic, urolithiasis, urinary tract infection, and anatomic and neurological abnormalities. Several studies have found feline idiopathic cystitis (FIC) to be the most common cause of FLUTD. These studies showed that 54–64% of all cats presenting with FLUTD were idiopathic,[1–5] and 20–55% of those had an urethral obstruction.[1,5] Urethral plugs were diagnosed in 10–22% of cats with FLUTD,[1,2,5] and in one study, urethral plugs were found in 59% of obstructed males.[1] A diagnosis of FIC can only be made when an underlying cause for the clinical signs of FLUTD cannot be identified after a proper evaluation.[2]

The pathogenesis of urethral obstructions in cats with FIC remains unclear. Obstructive FIC may result from inflammation of the urethra, urethral muscular spasms, neurological dysfunction and intraluminal plug formation. Urethral plugs can consist of an accumulation of inflammatory cells, erythrocytes, and a matrix of proteins and crystals.[6–8] Several authors have concluded that struvite is the most common type of crystal found in urethral plugs.[2,9,10] Recent studies have shown that urethral obstruction in male cats is associated with uroliths in 29% of cases, urethral plugs in 18% of cases, and it is idiopathic (without a urethral plug) in 53% of cases.[5,11]

Several studies have investigated risk factors for FLUTD (which can be regarded as a group of different diseases).[3–5,12–14] Some of the most important identified risk factors include being overweight, inactive and experiencing several stressful situations. In contrast, only one case-controlled study assessing the risk factors in cats with FIC has been performed.[15] In that study, cats with FIC were significantly more likely to be male, pedigreed, longhaired and overweight. Several possible stress factors for FIC were identified, the most important of which was living in conflict with another cat in the same household. Many other factors were not found to be significantly different between cases and controls.[15]

☆Part of this work was presented as an abstract at the annual BSAVA congress in Birmingham, UK, 8–11 April 2010.

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1098-612X/11/120967+09 $36.00/0

Because there are few studies evaluating specific risk factors associated with FIC, the first objective in this study was to evaluate possible risk factors associated with FIC. The second objective was to evaluate whether different clinical presentations of FIC (with or without obstruction and with or without struvite crystalluria) are associated with different risk factors.

Materials and methods

A retrospective, case-controlled study of cats with FIC was performed. Medical records were reviewed for all cats that presented with signs of obstructive or non-obstructive FLUTD at the companion animal clinic at the Faculty of Veterinary Medicine of Ghent University (Belgium) between 2002 and 2008. Inclusion criteria for the FIC group included the presence of clinical signs typically associated with FLUTD and the exclusion of other underlying causes of FLUTD based on the results of a physical examination, urinalysis including a culture, and abdominal ultrasound. A diagnosis of FIC was made for cats with a negative urine culture and no evidence of urinary stones or neoplasia based on bladder and proximal urethral ultrasonography. An equal number of cats that had never experienced signs of FLUTD were also evaluated as a control group. The FIC and control groups were matched for gender and age. Cats in the control group were randomly selected from clients, students and friends. A questionnaire was completed by telephone interview of each owner.

The following information was gathered for all cats: breed, coat length, gender, neuter status, body weight, body condition score, age at first episode of cystitis, food (dry/canned), water intake, use of a litter box, number and location of litter boxes, sleeping location, access to the outside, activity level, hunting behaviour, number of cats in the household, interaction with outdoor cats, general behaviour of the cat (nervous, fearful or aggressive), reaction towards unknown visitors in the house, presence of conflict between cats, position in conflict (submissive, neutral or dominant), occurrence of specific stressful situations during a 3-month period prior to the first episode of cystitis (building work in/at the house, house move, prolonged absence of primary caretaker, cat on holiday/boarding, introduction of new animals or baby, or other stress factors the owner could think of). Additional information from the cats with FIC was gathered as follows: duration of hospitalisation, clinical signs, duration and season of episodes, results of urinalysis and ultrasound examination, concurrent medical illnesses, management, total number of episodes, interval between episodes, relapses, life status and cause of death.

First, all cats with FIC were compared with the controls for all the variables. Then, male cats with FIC that had at least one urethral obstruction were compared with male cats with FIC without any episodes of obstruction. For this analysis only a limited number of variables were compared: body weight, age, food, access to the outside, total number of episodes and interval between episodes. Specifically for the results of urinalysis and ultrasound examination, comparisons were made between male cats with obstruction at presentation and male cats without obstruction at presentation. Finally, comparisons were made between cats with FIC with and without struvite crystalluria. The same limited number of variables was compared as above, as well as the presence or absence of obstruction at presentation.

Urine was collected by cystocentesis or urinary catheterisation. Within 30 min of urine collection, microscopic evaluation of urinary sediment was performed by a clinician onsite, followed by a semi-quantitative urinalysis and urine culture. Urine protein:creatinine ratios (UPCs) above 0.4 were considered to be elevated. Haematuria or pyuria were considered present when more than 25 red or white blood cells/μl were counted. An automated urine analyser performed cell counts by flow cytometry (UF 100, Sysmex). The number of red or white blood cells per high power field multiplied by a conversion factor of 5.5 is comparable with the number of cells per μl.

For statistical analysis, the Fisher exact test was used for binary variables and nominal categorical variables, the Wilcoxon rank sum test was used for ordinal categorical variables and the *t*-test was used for continuous variables. Differences were considered significant when $P < 0.05$. Percentages were measured based on the number of cats with available or applicable data.

Results

Medical records from 179 cats with possible signs of FLUTD (dysuria, stranguria, pollakiuria, haematuria and periuria) were reviewed, resulting in the inclusion of 64 cats with FIC in the study.

Comparison between the FIC group and the control group

The predominant breed of cats with FIC was the domestic shorthair or longhair ($n = 51$). Persian ($n = 4$), British Shorthair ($n = 3$), Norwegian Forest ($n = 2$), Oriental Shorthair ($n = 1$), Maine Coon ($n = 1$), Russian Blue ($n = 1$) and Ragdoll breeds ($n = 1$) were also represented in the FIC group. No significant breed predispositions were found ($P = 0.234$). The Persian breed was not represented in the control group. Cats with FIC had a significantly ($P = 0.004$) higher body weight (5.5 kg ± 1.5) than the control cats (4.7 kg ± 1.5). The mean number of cats in the household of a cat with FIC (2.6 ± 2.5) was significantly ($P = 0.044$) higher compared with the control cats (1.9 ± 1.2).

Results for possible risk factors are listed in Table 1. Cats with FIC were significantly more likely to use a litter box ($P < 0.001$), had a lower water intake