UNIVERSITI PUTRA MALAYSIA

CLINICOPATHOLOGICAL CHANGES AND BACTERIURIA IN PRE-AND POST-RELIEF OF URETHRAL OBSTRUCTION IN CATS WITH LOWER URINARY TRACT DISEASE

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BY

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Abstract of report presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Veterinary Medicine

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Sept 2013- 2014

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Abstract

Feline lower urinary tract disease (FLUTD) is an inflammatory condition involving the bladder and urethra of the cat. Although there are many possible causes of FLUTD, cats generally exhibit similar clinical signs of stranguria, dysuria, pollakiuria, and haematuria. Obstructive FLUTD is an emergency as it is potentially life-threatening and requires intensive monitoring during hospitalisation. Death most frequently occurs as a result of impaired renal function leading to failure of toxin removal and maintenance of adequate fluid and electrolyte balance in the body. The purpose of this prospective study was to determine assess the changes inelectrolytes, renal parameters, urinalysis, electrocardiogram, and the presence of bacteriuria in cats diagnosed with obstructive FLUTD in University Veterinary Hospital, Universiti Putra Malaysia (UVH-UPM) from January to April 2014.Twenty hospitalised male cats presented with obstructive FLUTD and incompressible urinary bladders were recruited. The breeds included Domestic shorthair (n=10), Siamese (n= 1) and

Persians (n=8) with the mean age of 36 months. Laboratory results (specifically renal parameters, urinalysis, urine culture), systolic blood pressure and electrocardiogram changes were obtained pre- and post-catheterisation. White blood cells count, urea, creatinine, potassium, and inorganic phosphate were significantly higher in obstructive FLUTD group compared to healthy group. No cats were found hypotensive in this study. Common finding in urinalysis were haematuria, leucocytes, and proteinuria. Interestingly, majority of the urine (n=13/17, 76%) was found no crystaluria.Triple phosphate (n=3/17, 18%) was the most common crystal in urinalysis. Urine bacteria culture revealed that 57% of urine samples collected on the first day of admission had no growth (n=8/14). Bacteriuria was evident in 79.6% (n=11/14) of urine samples collected by day 3 post-catheterisation. The most common bacteria cultured were *Escherichia coli* and *Kleibsella pneumoniae.* 81% (n=13/16) were hyperkalaemic (serum potassium > 5.5mmol/L). There was significant relationship between serum potassium level and changes on electrocardiography (r= 0.75, P(1-tailed) <0.001). Statistically, the serum potassium level was significantly related to ventricular heart rate (τ=-0.40, P=0.015). From this study, catheterisation related urinary tract infection was evident. Despite electrolyte derangement, these obstructive FLUTD cats were not affected with hypotension. Future prospective studies that with a larger sample size and duration that includes urine bacterial culture and antibiotic sensitivity test is recommended.

Abstrak laporan yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Sarjana Perubatan Veterinar

CIRI–CIRI KLINIKOPATOLOGI DAN BACTERIURIA SEBELUM DAN SELEPAS PELEGAAN PENYUMBATAN URETHRA KUCING YANG MENHIDAPI PENYAKIT SALURAN BAWAH KENCING

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Abstrak

Penyakit saluran bawah kencing kucing (FLUTD) adalah satu keadaan radang yang melibatkan pundi kencing dan urethra kucing. Walaupun terdapat banyak sebab FLUTD, kucing biasanya mempamerkan simtom-simtom klinikal seperti susah bila kencing, kurang berkencing, kencing banyak kali tetapi kurang air kencing, dan kencing berdarah. Sumbatan FLUTD adalah satu kecemasan sebab ia boleh meragut nyawa dan memerlukan penjagaan yang rapi di hospital. Kematian biasanya berlaku kerana kerosakan fungsi ginjal yang menyebabkan kegagalan ginjal mengeluarkan toksin dari badan dan kegagalan mengekalkan cecair yang cukup dan keseimbangan elektrolit dalam badan. Tujuan penyelidikan ini adalah

untuk mengkaji perubahan dalam elektrolit, parameter ginjal, kencing analysis, elektrokardiogram, and bacteria dalam kencing kucing-kucing yang dikenalpastikan dengan penyakit penyumbatan saluran bawah kencing di Hospital Universiti Veterinary , Universiti Putra Malaysia (UVH-UPM) dari Januari hingga April 2014. Dua puluh kucing jantan yang masuk hospital dengan penyakit penyumbatan FLUTD dan pundi kencing yang keras, tidak dapat dikompres, disertakan dalam kajian ini. Baka-baka kucing termasuk Domestic shorthair (n=10), Siamese (n=1) and Persians (n=8) dengan purata umur 2.4 tahun. Laporan Laboratory makmal (khasnya parameter ginjal, analisa kencing, kultur kencing), tekanan darah sistol and perubahan elektrokardiogram diperolehi sebelum dan selepas pemasangan kateter.

Sel-sel darah putih, urea, kreatinin, kalium dan fosfat bukan organic adalah lebih tinggi dalam kumpulan FLUTD obstruktif berbanding dengan kumpulan yang sihat. Tiada kucing ditemui tekanan darah rendah dalam kajian ini. Penemuan yang sama dalam ujian kencing adalah hematuria, leukosit dan proteinuria. Kebanyakan air kencing (n=13/17, 76%) didapati tidak ada kristal. Triple fosfat (n=3/17, 18%) adalah kristal yang paling biasa. Dalam ujian kencing kultur bacteria didapati bahawa 57% daripada sampel air kencing yang dikumpul pada hari pertama kemasukan hospital tidak mempunyai pertumbuhan bakteria (n=8/14). Bacteriuria terbukti dalam 79.6% (n=11/14) sampel air kencing yang dikumpul selepas 3 hari pemasangan kateter. Bakteria yang biasa dikulturkan adalah *Escherichia coli* dan *Kleibsella pneumoniae*. 81 % kucing (n=13/16) adalah hyperkalaemic (kalium serum > 5.5mmol / L). Terdapat hubungan yang signifikan antara tahap kalium serum dan perubahan pada elektrokardiografi (r=0.75, P(1 -tailed) <0.001). Statistik tahap serum potassium adalah signifikan dengan ventrikel kadar jantung (τ=-0.40, P =0.015). Dari kajian ini, jangkitan bacteria di saluran kencing bawah adalah berkaitan dengan pemasangan kateter. Walaupun kekalutan elektrolit kucing bermasalah obstruktif FLUTD tidak terjejas dengan tekanan darah

rendah. Kajian masa depan dengan populasi kucing obstruktif FLUTD yang lebih besar dan jangka masa yang panjang lagi, bersama dengan kultur bacteria dalam kencing dan ujian kepekaan antibiotik adalah disyorkan.

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1.0 INTRODUCTION

Feline lower urinary tract disease (FLUTD) illustrates a collection of conditions that affect the cat's urinary bladder and urethra and is commonly seen in veterinary practices. Clinical signs of FLUTD are inclusive of stranguria, pollakiuria, and haematuria. Obstruction of the urethra often occurs in this disease. Incidence was estimated range from 1 to 10 % (Lee and Drobaltz, 2003). FLUTD can be categorized into two major groups upon presentation, i.e. obstructive FLUTD where the urethra is obstructed and non-obstructive FLUTD where the urethra is patent. Obstructive FLUTD is a potentially life threatening disease. The reported mortality rates for cats with FLUTD ranged from 6% to 36% (Gerber et al., 2008; Nelson RW and Couto CG, 2008). Hyperkalaemia and uraemia are the major cause of death of cats with urethral obstruction (Nelson RW and Couto CG, 2008).

The most common cause of urethral obstruction in male cats was urethral plugs (Kruger JM, 1991) but in more recently years, idiopathic disease has received vast attention. Other potential causes include urolithiasis with or without a bacterial UTI, urethral spasm, and, rarely, stricture or neoplasia (Hostutler RA, 2005).

Depending upon the duration of the urethral obstruction, cats with acute urethral obstruction can be presented with a broad spectrum of clinical signs ranging from comparatively normal to moribund (Lee *et al.*, 2003). More severely affected cats often have azotemia, hyperphosphatemia, ionized hypocalcemia, hypermagnesemia, metabolic acidosis, as well as hypovolemia, which may occur due to reduced water intake and emesis (Lee *et al.*, 2003). Several of these electrolyte and acid/base changes can lead to cardiovascular dysfunction including cardiac conduction disturbances, altered cardiac output, and changes in vasomotor tone (Braun *et al.,* 1955; Finco DR and Cornelius LM, 1977; Orchard CH, 1990;

Drobatz KJ and Hughes D, 1997).

Urethral catheterization is important treatment to relief urethral obstruction in obstructive FLUTD. Catheter-associated urinary tract infection (CAUTI) is a major health concern in humans. It is accountable for 40% of nosocomial infections (Mittal R, 2009). However, in cats, few groups have reported the risks of bacteriuria associated with urinary catheterisation. Lees (1981) shown a high risk in (56%) of developing bacteriuria in an experimental study of 51 normal male cats managed with an open indwelling urethral catheterisation system. Besides that, the occurrence of bacteriuria in 18 catheterised cats with obstructive lower urinary tract disease was reported in year 2013 (Hugonnard *et al.*, 2013). There has never been a similar investigation in our local tropical climate setting.

Several biochemical changes that occur in critically ill cats with obstructive FLUTD such as ionized hypocalcemia, hyperkalemia, and severe academia may lead to cardiovascular compromise that could result in arterial hypotension (Malouin A, 2007). However, no studies have been published regarding blood pressure measurement in cats with urethral obstruction locally.

In order to investigate obstructive FLUTD in our local setting, my study is divided into three objectives as follows:

1. To determine the clinicopathological changes in haemogram, electrolytes, urea, creatinine, electrocardiography also known as ECG, and blood pressure in obstructive FLUTD cats compared to healthy cats.
2. To determine the clinicopathological changes in urea, creatinine, electrolytes and urinalysis between pre- and post-relief of urethral obstruction in FLUTD cats.
3. To determine the incidence of bacteriuria in pre- and post-relief of urethral obstruction in FLUTD cats.

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