URETHROCYSTOSCOPIC DIAGNOSIS AND THERAPEUTIC MANAGEMENT OF URINARY TRACT DISORDER IN FEMALE DOGS

V.P. Chandrapuria¹, Dinesh Gupta², Apra Shahi³, Dharmendra Kumar⁴ and Somil Rai⁵

¹Professor & Head,²PG Scholar,³Associate Professor,⁴Assistant Professor,⁵PhD Scholar
Department of Surgery and Radiology, College of Veterinary Science and A.H., NDVSU, Jabalpur.

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The lower urinary tract disorders are common in small animal practice with multiple factors which contribute to complicate recurrent urinary infection. The modern diagnostic imaging urethro-cystoscopy has proven to be a highly effective, minimally invasive technique for diagnosis of lower urinary tract diseases in dogs and cats. In many aspects, urethro-cystoscopy provides enhanced examination of the urinary system compared to other diagnostic procedures such as ultrasonography. Urethro-cystoscopy allows direct visualization of the vestibule, vagina, urethral opening, urethra, urinary bladder and ureteral openings. The present research work was carried out in eighteen clinical cases of adult female dogs with urinary disorders.

Introduction

Urethro-cystoscopy allows direct visualization of the vestibule, vagina, urethral opening, urethra, urinary bladder and ureteral openings. The chronic inflammation can be defined with its extent. Apart, it also visualizes lesions of lower urinary tract for assessment of recurrent urinary tract infections, chronic cystitis, tumours of lower urinary tract and hematuria. Biopsy could be obtained for histopathological and mucosal culture study. The calculi can be collected for analysis of its composition. It is the procedure of choice for assessment of urinary trauma (Adams et al., 2008 and Defarges and Dunn, 2008). It can also be used for therapeutic purpose. Operative indications include performing and judging coaptation during periurethral injections, assess elevation of urethral-vaginal junction during needle urethropexy and suburethral sling procedures, facilitate surgical repair of urinary tract fistula and urethral diverticulum and evaluate the ureters and bladder mucosa for inadvertent damage during surgery (Cundiff and Bent, 1996).

Material and method

The present research work was carried out in the Department of Veterinary Surgery and Radiology, Teaching Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh.

Eighteen clinical cases of adult female dogs were taken for the studies which were divided into two groups. Group I (control) comprised of 6 apparently healthy adult animals irrespective of age and breed and Group II - Comprised of 12 adult animals with lower urinary tract affections. Animals of both the groups were subjected to ultrasonographic examination before treatment (0th day) and group II were also examined on 10th and 20th day post treatment. Animal was restrained in dorsal recumbancy and site prepared aseptically. For ultrasonographic examination of urinary bladder and urethra animal was restrained in dorsal recumbency and Transducer was placed at the midline cranial to the pubis and parallel to the long axis. Ultrasonographic examination was done by using real time B mode, gray scale dual frequency (3.7/5 M Hz) ultrasound machine of Famiio 5 (SSA 510 A, Toshiba Japan). Coupling media was applied on the skin surface. The urinary bladder was scanned for its shape, anatomical position, contents, bladder wall thickness and other abnormalities.

Animals of both the groups were subjected to urethro-cystoscopic
examination before treatment (0th day) and Group - II were also examined on 10th and 20th day post-treatment. The animals were pre-medicated with Atropine Sulphate @ 0.04 mg/kg b. wt., I.M. and after five minutes administration of Xylazine Hydrochloride @ 1-2 mg/kg b. wt., I.M. and then after ten minutes administration of Ketamine @ 5-7 mg/kg body weight, I.V. Animal was restrained in ventro-dorsal or lateral position followed by insertion of 2.7 mm diameter, 18 cm long and 30° angle rigid endoscope enclosed in a sheath through urethra along with the infusion of normal saline through working channel of endoscope. The lesions in the urethra and mucosal layer of bladder was recorded and interpreted.

Cases were treated medicinally and/or surgically as per the clinical condition diagnosed. The response of the therapy was evaluated by ultrasonography and urethro-cystoscopy on 10th and 20th post-treatment day.

Results and discussion

Cystitis

Ultrasonography

In group II (a) at day '0' (pre-treatment) Ultrasonography of the urinary bladder revealed slightly thick bladder wall and several hyperechoic fine crystals in the urinary bladder, which represents bladder sludge.

Nyland and Mattoon (1995), Leveille (1998), Kundu and Ghosh (2006) and Sutherland (2008) detected cystitis ultrasonographically and found that bladder wall thickness was more cranio-ventrally, became generalized in severe cases of cystitis. Green (1996) reported presence of blood, pus and cellular debris in the urine, which visualized as small echoic in anechoic urine. In several cases bladder wall became thick, hyperechoic and irregular. The findings were the result of cystitis in animals of group II (a). Durmas and Han (2005) also reported that changes in bladder echogenesity depend upon the concentration of urine.

On 10th post-treatment day ultrasonographic study of the urinary bladder revealed reduced thickening of the bladder wall in all the cases and hyperechoic bladder sludge and cellular debris reduced when compared to day 0.

On 20th post-treatment day ultrasonographic detail of the urinary bladder showed almost normal thickening of the bladder wall in all the cases. The bladder sludge and cellular debris was absent. The mucosa of urinary bladder was also smooth and appeared like normal urinary bladder. These findings support the response of treatment given for cystitis.

Urethro-cystoscopy

In group II (a) on 0th day urethro-cystoscopic examination of urinary bladder showed mucosal hyperemia, corrugation in mucosa and sloughing of bladder epithelium. Hyperemia and erythema are the usual features of chronic cystitis, but the urothelium also had general, ragged, fimbriated appearance. Hyperemia in bladder mucosa may be due to inflammation and corrugation of mucosa occurs due to increased chronicity which causes increased mucosal opacity and decreased elasticity when these changes occurs, the bladder mucosa become corrugated. In present cases there might be chronic cystitis. Such findings were also reported by McCarthy (2005), Henderson (2007) and Moore and Ragni (2012).

On 10th post-treatment day hyperemia of bladder mucosa and epithelial cast were present in the urinary bladder and on 20th day bladder mucosa was observed almost normal and corrugation on bladder mucosa and epithelial cast were absent. These findings showed that the treatment given in the present study was effective in cystitis of animals of the present study.

Fimbriated growth in the urethra

Ultrasonography

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In group II (b) on 0\textsuperscript{th} day (pre-treatment) ultrasonographic view of the urinary bladder revealed anechoic structure surrounded by a thin hyperechoic wall with normal thickness. No abnormal pathology was observed in bladder on sonography. On sonography neck of urinary bladder and proximal urethra could be visualized but distal urethra remains unassessable. These findings are similar to Leveille (1998).

The ultrasonographic findings remained same on 10\textsuperscript{th} and 20\textsuperscript{th} post-treatment day of this group.

**Urethro-cystoscopy**

Transurethral cystoscopic study on 0\textsuperscript{th} day (pre-treatment) revealed granulomatous (pulmonary) lesions in urethra, it showed fimbriation similar as described for the urethral transitional cell carcinoma. The lumen of the urethra was partially obliterated with finger like projection of the growth. Such papillary fingers are described as urethral transition cell carcinoma. In present case there might be initiation of the carcinoma in urethra. Similar findings were also reported by McCarthy (2005), Henderson (2007), Iqball et al. (2011) and Moore and Ragni (2012).

The urethro-cystoscopic findings remained same on 10\textsuperscript{th} and 20\textsuperscript{th} post-treatment day of this group. Because owner of dog was not convinced for surgical treatment or anticancerous therapy, hence on request simple treatment of cystitis was initiated for symptomatic relief.

**Polyp in urinary bladder**

**Ultrasonography**

In group II (c) at day '0' (pre-treatment) ultrasonography of the urinary bladder revealed a hyperechoic structure attached with the dorsal aspect of the bladder near the neck of urinary bladder and urethra. It was measuring 7.5 mm. This hyperechoic masses did not form any acoustic shadow and attached with bladder wall, suspected for polyp. The findings were similar to Green (1996) and Olausson et al. (2005). Owner of dog was not convinced for surgical removal or anti-cancerous therapy so at 10\textsuperscript{th} and 20\textsuperscript{th} post-treatment day, ultrasonographic detail of the urinary bladder was found hyperechoic mass similar to shape and size as compared to day '0' (pre-treatment).

**Urethro-cystoscopy**

The urethro-cystoscopic findings revealed one club shaped mass appeared dark red in colour and seen lying across the relatively normal urothelium and was indicative of polyp in urinary bladder. Polyp is a proliferative condition of the bladder that is usually induced by chronic irritation. Similar findings were described by McCarthy (2005) and Moore and Ragni (2012) for polyp in bladder of canine.

On 10\textsuperscript{th} and 20\textsuperscript{th} post-treatment day urethro-cystoscopic detail of the urinary bladder showed similar finding as compared to day '0' (pre-treatment). Because owner of dog was not agreed with surgical removal or anticancerous therapy hence only medicinal treatment was given for symptomatic relief.

**Ulceration and petechial hemorrhage in urinary bladder**

**Ultrasonography**

In group II (d) at day '0' (pre-treatment) ultrasonography of the urinary bladder showed large size hyperechoic irregular patch at the apex of bladder which was measuring approximately 17 mm. The mucosa of this area was not clear. The bladder also contains several hyperechoic crystals present in the lumen of bladder. Similar findings were also observed by Green (1996).

On 10\textsuperscript{th} post-treatment day ultrasonography of the urinary bladder revealed ulceration of bladder wall which was reduced slightly as compared to day '0' (pre-treatment) and hyperechoic crystals in the anechoic urine were also reduced slightly.

On 20\textsuperscript{th} post-treatment day ultrasonography of the urinary bladder showed slight
irregular mucosa of bladder wall, suggestive of erosion of bladder mucosa.

**Urethro-cystoscopy**

In group II (d) at day '0' (pre-treatment), urethro-cystoscopic study showed swelling, roughening and petechial hemorrhages on bladder wall and urethral mucosa, which were the confirmatory diagnostic signs of ulceration and hemorrhage on mucosal surface of bladder. It may be due to chronicity and inflammation of mucosa. Similar findings were also observed by McCarthy (2005) and Moore and Ragni (2012).

On 10\textsuperscript{th} post-treatment day urethro-cystoscopy of the urinary bladder revealed ulceration of bladder wall which was reduced in size as compared to 0\textsuperscript{th} day (pre-treatment) and hyperechoic crystals in the anechoic urine were also seen slightly.

On 20\textsuperscript{th} post-treatment day the urethro-cystoscopy showed slight irregular mucosa of bladder wall and erosion of bladder mucosa which was the indication of healing. These findings reflect the positive response of the treatment given.

![Ultrasonogram group II (d) showing ulceration](Image 1)

![Ultrasonogram group II (e) showing calculi in urinary bladder](Image 2)

![Urethrocystoscopy group II (d) showing corrugation and ulceration in urinary bladder](Image 3)

![Urethrocystoscopy group II (e) showing calculi in urinary bladder](Image 4)

**Cystoliths**

**Ultrasonography**

In group II (e) at day '0' (pre-treatment) ultrasonography of the urinary bladder revealed three hyperechoic areas with distal acoustic shadow, visualized in the lumen of urinary bladder, suggestive of calculi. These calculi were measuring 11.9, 7.5 and 7.5 mm in diameter. Feeny and Johnson (1986) stated that variation of echogenesity and amount of acoustic shadow, with the composition and
compactness of calculi. At higher frequency the calculi may be hyperechoic. Similarly Nyland and Mattoon (1995) also observed changes in the images of hyperechoic calculi with the position of animal and always tend to move to dependent portion. Bumin and Temizsoyulu (2000) found that radiography and ultrasonography are very helpful for diagnosis of cystic calculi in dogs.

**Urethro-cystoscopy**

The urethro-cystoscopy of urinary bladder showed white, round or oval masses of varying size of bladder cystoliths, resting at apex of bladder. Spiculated surface was looking like calcium ammonium phosphate calculus. Bladder wall revealed cicatricial pillars along with thickening because of chronic inflammation. This was the confirmatory diagnosis of cystoliths. In the present study calculi may be struvite calculus. Similar findings were observed by McCarthy (2005) stated that cystic and urethral stones can be easily seen with cystoscopy. Their appearance varies widely depending their composition.

Findings in the present study coincide with the observations of McCarthy (2005) and Handerson (2007).

**Therapeutic management**

The six animals of group II (a) were treated medicinally with Nitrofurantoin, Oxybutynin Chloride, Ranitidine and Sodium Acid Citrate. Retrograde flushing of bladder was also being done with a mixture of normal saline, Povidone Iodine and Metronidazole for twice a week. The combination of Povidone Iodine and Metronidazole might have acted on aerobic and anaerobic bacteria, resulted to absence of infection as shown animal of present study.

Guardabassi et al. (2011) advised Nitrofurantoin for treatment of urinary tract infection caused by multidrug-resistant bacteria.

Colgan and Williams (2011) and Olson and Haith (2012) reported that Nitrofurantoin is the first drug of choice for treatment of acute uncomplicated cystitis in human being.

On the basis of findings of present study Nitrofurantoin was found effective for cystitis in dogs.

De Castro et al. (1984) reported Oxybutynin Chloride as the first drug of choice for neurogenic bladder dysfunction.

Three animals of the treated group were not responding to treatment at 10th post-treatment day thus the treatment continued for next 10 days. The examination on day 20th revealed disappearance of clinical signs, urine analysis showed normal urine colour without sediments macroscopically, microscopically absence of erythrocytes, leukocytes and cast and multistrip examination showed normal pH and specific gravity and negative for glucose, ketone bodies, bilirubin, urobilinogen, protein and nitrates. Ultrasonographic details of the urinary bladder showed almost normal thickening of the bladder wall in all the cases. The mucosal border was smooth and a hypoechoic to isoechoic bladder sludge and cellular debris were absent. Urethro-cystoscopic study showed almost normal bladder mucosa. Corrugation on bladder mucosa and epithelial cast were also absent.

In group II (b) and group II (c) owners of dogs were on the basis of findings of present study Nitrofurantoin was found effective for cystitis in dogs.

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In group II (b) and group II (c) owners of dogs were not convinced for any surgical treatment and anticancerous therapy, hence on request simple treatment of cystitis was initiated for symptomatic relief. On 10th and 20th days of observation the fimbriated growth in urethra and polyp in the urinary bladder were present same as seen in pre treatment day. Animals had got symptomatic relief it indicate the good response of treatment.

The group II (d) was subjected to antibiotic Amoxicillin+ Sulbactum, Ranitidine and Sucralfate. The animal showed symptomatic relief while the ultrasonographic and urethro-cystoscopic examination revealed decrease in the diameter of ulcer and none of the petechial hemorrhage was noticed on 10th post treatment day and looking to the response of treatment for next ten days.

On 20th post treatment day clinical signs were disappeared and urine examination found normal urine colour without sediments macroscopically. Absence of erythrocytes, leukocytes and cast microscopically and multistrip examination showed normal pH and specific gravity and absence of glucose, ketone bodies, bilirubin and urobilinogen, protein and nitrates. Ultrasonographic and urethro-cystoscopic examinations revealed only irregular mucosa of bladder wall and erosion of bladder mucosa. These findings observed good response of treatment. The healing of ulcer occurs due to effect of antiulcer drug which produce an ulcer adherent complex with proteinaceous exudates, inhibiting the pepsin activity. Similar findings reported by Papich (1993) in canine.

The group II (e) was treated with Inj. DNS, Inj. Amoxicillin+ Sulbactum, Ranitidine and Sucralfate, Neeri and Cystone. Being animal died on 8th post-treatment day so the response of treatment remains obscured.

Singh et al. (2013) found that use of fluid, antibiotics, analgesics, anti-inflammatory drugs, B-Complex, oral urinary antiseptics i.e. Cystone tablets after surgery were found to be useful for control of recurrence of calculus in urinary system in canines.

References
medica e chirurgica, 6:795-803.
electrohydraulic lithotripsy in 28 dogs
with bladder and urethral calculi.
Journal of Veterinary Internal
Medicine, 22: 1267-1273.
Sonography of renal and urinary
bladder in horses. Indian Veterinary
Journal, 82: 784-785.
The kidney and ureters. In: Thrall D.E.
(ed.) Text Book of Veterinary
Diagnostic Radiology. W. B. Saunders
Ultrasound. 2nd Edn., Lippincott R.
William and Wilkins Publishing Co.,
Guardabassi, L., Maaland and Marit.
(2011). In vitro antimicrobial activity of
nitrofurantoin against Escherichia coli
and Staphylococcus pseudointermedius
isolated from dogs and cats. Publishing
and the Ecology of European Research
Elsevier.
Henderson, A. (2007). Advances in veter-
ary Cystoscopy highlight: collagen
injection for urinary incontinence.
Iqball, A., Wazir, V.S., Tripathi, A.K. and
promising technique in canines. Indian
graphic study of urinary bladder
diseases in dogs. Indian Journal of
Veterinary Surgery, 27: 33-34.
urinary bladder disorders. Veterinary
Clinics of North America: Small Animal
Practice, 28: 799-821.
McCarthy, T.C. (2005). Veterinary endosco-
py for the small animal practitioner. 1st
Edn., Elsevier Saunders Publishing Co.,
Elsevier (U.S.A.).
Clinical manual of small animal
endosurgery. 1st Edn., Blackwell
Publishing Co., Ames U.S.A., pp 209-
230.
Small Animal Diagnostic Ultrasound.
2nd Edn., W. B. Saunders Publishing
electrohydraulic lithotripsy in 28 dogs
with bladder and urethral calculi.
Journal of Veterinary Internal
Medicine, 22: 1267-1273.
Sonography of renal and urinary
bladder in horses. Indian Veterinary
Journal, 82: 784-785.
The kidney and ureters. In: Thrall D.E.
(ed.) Text Book of Veterinary
Diagnostic Radiology. W. B. Saunders
Ultrasound. 2nd Edn., Lippincott R.
William and Wilkins Publishing Co.,
Guardabassi, L., Maaland and Marit.
(2011). In vitro antimicrobial activity of
nitrofurantoin against Escherichia coli
and Staphylococcus pseudointermedius
isolated from dogs and cats. Publishing
and the Ecology of European Research
Elsevier.
Henderson, A. (2007). Advances in veter-
ary Cystoscopy highlight: collagen
injection for urinary incontinence.
Iqball, A., Wazir, V.S., Tripathi, A.K. and
promising technique in canines. Indian
graphic study of urinary bladder
diseases in dogs. Indian Journal of
Veterinary Surgery, 27: 33-34.
urinary bladder disorders. Veterinary
Clinics of North America: Small Animal
Practice, 28: 799-821.
McCarthy, T.C. (2005). Veterinary endosco-
py for the small animal practitioner. 1st
Edn., Elsevier Saunders Publishing Co.,
Elsevier (U.S.A.).
Clinical manual of small animal
endosurgery. 1st Edn., Blackwell


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