

Bacteriological Studies on Nephritis in Cattle

Mervate Milad

Fayoum Provincial Laboratory
Animal Health Research Institute- Agriculture Center

ABSTRACT

A total of 34 urine samples from cows suffering from painful urination and passage of body urine in addition to the samples from kidney, ureters and urinary bladders of "6" dead cases were examined bacteriologically.

The Bacteriological examination of the urine samples revealed that, all urine samples were bacteriologically positive. *Corynaebacterium renale* the most frequent isolates with a percentage (32.35%), followed by *E. coli* (20.58%), *Pseudomus aeroginosa* (11.76%) *Staph. aureus* (8.82%), *Strept. Zooepidemicus* (8.82%).

As regards to mixed infection (6 cases) *Corynae bacterium renale* mixed with *E.coli* (8.82%), *Staph. aureus* mixed with *Kl. pneumoniae* (8.82%). The antibiotic sensitivity test showed that all tested strain of *Corynaebacterium renale* were sensitive to penicillin and erythromycin while tested strain of *E. coli* were sensitive to gentamicin and ciprofloxacin, while *Pseudomus aeroginosa* were sensitive to gentamicin and ciprofloxacin, while *Staph. aureus* and *Strept. Zooepidemicus* sensitive to ciprofloxacin & gentamicin.

INTRODUCTION

Contagious pyelonephritis is a specific infection of urinary tract of cattle and characterized by chronic purulent inflammation in the bladders, ureters and kidneys, many bacterial pathogens may be implicated in this disease (1), Seventy- three percent of pylonephritis cases developed within first 90 days after calving, suggesting that, the post-partum period is a critical time for initiation of infection (2).

The diseases is highly fatal either in calves or adults (3) and cows appear to more susceptible than buffalo which appear apparently healthy but harbor the causative organisms that can be isolated from their genital tract and urine. The disease is not haematogenous but ascending from the urethra and vagina of cows to their ureters and kidneys (4). An increase in clinical cases in usually found in colder seasons and the heavily fed, high producing dairy herds appear to be more susceptible (5). Early clinical sign mainly the passage of bloody urine, attack of acute colic and painful urination (6).

Corynaebacterium renale is most frequently isolated from bovine cases with

urinary tract infection (UTI) and less common causative organisms include various coliform species and members of the *Corynaebacterium- renale* groups as recorded by Mills-Wallace et al. (7).

In this study, many cases of diseased cows at some commercial dairy herds in Fayoum governorate from September 2005 up to February 2006 were showed clinically sings of urinary tract infection and death of some cases with poor response to line of treatment. So that this investigation was directed to confirm the clinical diagnosis through quantitative culture of a urine samples and identification of the causative organisms, to help in specific treatment and to limit the spread of organisms through preventive and control program.

MATERIAL AND METHODS

Thirty four dairy cows at private farm at Fayoum govenorate were used in this study. These animals were showed clinical sign of urinary tract infection (UTI) which includes dysuria and gross hematuria and pyuria- During urination, the rate of urine flow was decreased with painful urination. These clinical signs were of urine flow was

decreased with painful urination. These clinical signs were recorded within the first 90 days after calving. Urine of affected cows was characterized by the presence of blood and purulent debris.

Sampling and lab. Investigation

Thirty four urine samples were collected from affected cows by catheterization for bacteriological evaluation, in addition to tissues samples from kidneys, ureters and bladders of recently dead 6 cases for also bacteriological examination.

Bacteriological examinations

The urine sample were centrifuged at 3000 rpm for 15min., the sediment and the organ samples of dead cases were cultured on blood agar, media, macConkey bile salts agar media and milk agar media then incubated aerobically at 37°C for 24 hrs. All suspected growing colonies were identified morphologically and biochemically (8, 9).

Experimental infection

The pathogenicity of *Corynaebacterium renale* and *E. coli* isolated were detected in mice by S/C inoculation of 62 mice, 0.5 ml (10^9 c.f.u/ ml) of 24 hr broth culture from pure well identified isolate (2 mice for each strain, 10 mice control).

The number, time of death, post mortem examination were recorded and kept under observation for one week (10, 11).

Antibiotic sensitivity test

All the isolated strain were identified and purified and tested against different common used chemotherapeutic agent for detection of the most effective antibiotic by using disk diffusion technique (12). The following 10 types of drugs were used: ampicillin, erythromycin, gentamicin, cephalothim, neomycin, cefatoxim, amoxicillin, chloramephenicol, ciprofloxacin, streptomycin.

Table 1. Type and incidence of bacterial isolate in the examined diseased and dead cows .

Type of isolated strain	Animal health condition			
	Diseased (34)		Dead (6)	
	N	%	N	%
Single				
Corynae bact. Renale	11	32.35	1	16.66
E. coli	7	20.58	0	0
Pseud aerogenousea	4	11.76	0	0
Staph. aureus	3	8.82	0	0
Strept zooepidemicus	3	8.82	0	0
Total	28	82.35	1	16.66
Corynae bact renale + E. coli	3	8.82	4	66.66
Staph. aureus + kl. Pneumoniae	3	8.82	1	16.66
Total	6	17.64	5	83.3

RESULTS

The results of bacteriological examination of urine sample revealed that, all samples were bacteriologically positive and 28 out of them were characterized by the presence of single bacterial infection cases, where *Corynae bacterium renale* was the most frequent isolates, (11) isolates with a

percentage of (32.35%) from diseased cases. (1) isolate from dead cases (16.66%) followed by (7) isolates of *E.coli*, (4) isolates of *Pseudomonas aeruginosa*, (3) isolates of *Staph. aureus* and (3) isolates of *Strept. Zooepidemicus* as shown in (Table 1).

As regards to the mixed infection (6 cases) showed that the isolation of *Corynae*

bacterium renale mixed with *E.coli* isolates from (3) diseased cases (4) isolates from dead cases and *Staph aureus* mixed with *Kl. Pneumoniae* from (3) disease cases, (1) isolates from dead cases.

Pathogenicity test

The results of pathogenicity showed that all mice inoculated with *Corynae bacterium renale* were died 2-3 days post infection and the causative agent was isolated from all the internal organs of dead mice (19 isolate), while all inoculated mice with *E.coli* isolates were died during the first week (14 isolates). All the dead mice characterized by presence of blood and mucoserous discharges in urinary bladder and renal pelvis.

Results of antibiotic sensitivity test

The antibiotic sensitivity test showed that all tested strain of *Corynaebacterium ranale* were sensitive to penicillin and erythromycin and resist to the rest of used antibiotic while the tested strain of *E.coli* were sensitive to gentamicin, ciprofloxacin and cefatoxime and resist all rest antibiotic. As regards to *Pseudomonas aeroginosa*, isolates the results showed that all isolates were sensitive to gentamicin followed by ciprofloxacin and resist all other antibiotic. Tested isolates of *Staph. aureus* and *Strept zooepidemicus* were sensitive to ciprofloxacin followed by gentamicin.

DISCUSSION

The most common urinary tract infection (UTI) representing by cystitis, ureteritis and pyelonephritis in ruminants usually results ascending urinary tract infection with *Coryn. Renale* or *E.coli* while renal infection via hematogenous route is much less common.

The bacteriological examination of 34 urine samples of diseased cows suffered from renal colic and painful urination with passage of bloody urine, revealed the isolation of (11) strains of *Corynaebacterium renale* in single form and (3) strain mixed with *E.coli* strains and (7) isolate of *E.coli* in single form. Similar finding were reported by *Fatih* and

Ado (13) and Reblum et al. (5) who study the kidney infection in cows and isolated *Corynae bacterium renale* and *E.coli* strains either in single or mixed form, (4) isolate of *Pseudomonas aeroginosa*, 3 isolates of each of *Staph. aureus* and *Strept zooepidimcus* were revealed from examined urine of diseased cows, the same findings were recorded when studied the pyelonephritis in cows and buffalo in Mousal area in Iraq (3,14).

As regards to examined "6" dead cases (3) cases revealed the isolation of *Corynae bacterium renale* and *E.coli* in mixed form and (3) cases revealed *Staph aureus* mixed with *Kl. Pneumoniae*, these results agree with several investigator (5, 15, 16) who isolated *Staph. aureus* in mixed form with some gram negative bacteria (*E.coli*, *Kl. Pneumoniae* and *Proteus vulgaris*) from kidney and urinary bladder.

The experimental infection of *Corynae bacterium* and *E.coli* in mice proved the pathogenicity of *Corynae bacterium renale*, causing dead of all inoculated mice after 2-3 days with renal lesions. Similar picture was recorded by previous researchers (10,11,17) who attributed the predilection site of this microorganisms to the kidney to its clinical character manifested by its high urease activity. Moreover, the urease is nephrotoxic which lead to fatal results in late stage of infection without treatment. The antibiotic sensitivity test showed that the tested strain of *Corynaebacterium renale* were sensitive to erythromycin and penicillin, this finding was suspected by *Rbhuyn et al. (5)* who used penicillin for 3 weeks for treatment of cattle with renal infection in a dose of 22.000IU / kg 1/M (2 time daily) and the all treated cases were recovered.

The effective of erythromycin and penicillin on the *Corynaebacterium renale* isolate from urinary tract infection in cattle has been recorded (18).

REFERENCES

1. Higgins, R. J. and Weaver, C. R. (1981): Diagnosis of urinary infection in cattle and sheep. Vet. Rec., 109-256.

2. **Markusfeld, O., Nahari, N., Kessner, D. (1989):** Observation on bovine pyelonephritis. *Br. Vet. S.* 45: 573-579.
3. **Angus, K. W. (1990):** Nephropathy in young lambs and ewes. *Vet. Rec.*, 126: 525-528.
4. **Hitamune, T. (1972):** Epidemiological studies on pyelonephritis in cattle. *Res. Vet. Sci.*, 13: 82.
5. **Rebhun, W. C. Stephen, G. D.; John, A. P. and Hafield C. E. (1989):** Pyelonephritis in cows and sheep. *JAVAMA*, Vol. 194 No. 7, April 1.
6. **Radostits, O. M. Gay, C.C. Blood, D. C. and Hincheliff, K. W. (2003):** *Medicine. A textbook of the disease of cattle, sheep, pigs, goats and horses.* 9th Ed., Bailliere Tindall lid., London.
7. **Milch- Wallace, L. L.; Bouchard, G.; Nicholson, W. (1990):** Polypoid cystitis, pyelonephritis, and obstructive nephropathy in cows. *J. Am. Vet. Med. Assoc.*, 1181 – 1183.
8. **Quinn, P. J.; Carter, M. E.; Markey, B. K. and Carter, G. R. (19994):** *Clinical Veterinary microbiology* . Wolfe, USA.
9. **Koneman, E. W.; Steven , D. A. ; Dowell, V. R.; William, M. G.; Herber, M. S. and Washington, C. W. (1992):** *Diagnostic Microbiology* . 4th Ed. J. B. Lippincott. Philadelphia U.S.A.
10. **Buxton, A. and Fraser, G. (1977):** *Animal Microbiology*. Black Well Scientific publication, Oxford, London, Edinburgh, Melbourne.
11. **Takai , S.; Yanagawa, R. and Kitamura, Y. (1980):** pH dependent adhesion of piliated *Corynebacterium renale* to bovine bladder cells. *Infec. Immune.*, 28 : 669-674.
12. **Finegold, S. and Martin, W. (1982):** *Diagnostic Microbiology.* 6th Ed. C. V. Mosby Co St. Louis Toronto, London.
13. **Fatih, M. Y. and Addo, P. B. (1991):** Isolation of *Corynebacterium renale* from slaughtered cattle and sheep at the zaraia abattoir Nigeria *Revue d' Elevage et de Medicine Veterinaire des pays tropicaux*, 44 : 160-161.
14. **AL- Sultan, I.T.; Dawood, K. A.; Mahran, E. M. (1987):** A study of renal diseases in sheep and cattle in Mosul area of Irap. *Indian Vet. J.*, 64 (5): 376-379.
15. **Hayashi, A. (1985):** Studies on *Corynebacterium renale* in ewes. *Am. J. Vet. Res.*, 46 : 409.
16. **Divers, J. (1983):** Diagnosis and therapy of renal disease in cattle and sheep. *Am. Assoc. Bovine Pract.*, 15 : 74-78.
17. **Lovell, R. and Cotchin, E. (1952):** Experimental infection of *Corynebacterium renale* mice . *J. Comp. Pathol.*, 62 : 245.
18. **Cetin, C. and Kahraman, M. (1993):** Studies on *Corynebacteria* isolated from urinary system infection in cattle and sheep. *Veterinarian*, 4 (2): 21-26.

الملخص العربي

دراسات بكتريولوجية على التهاب الكلى فى الأبقار

مرفت ميلاد عبد الله
المعمل الفرعى بالفيوم
معهد بحوث صحة الحيوان- مركز البحوث الزراعية

تم فحص عدد ٣٤ عينة بول من أبقار مريضة تعاني من احتباس البول وبول مدمم بالإضافة إلى فحص عينات من الكلى والحالبين والمثانة لعدد من ٦ من الأبقار النافقة وأضح من الفحص البكتريولوجى لعدد ٣٤ عينة بول من الأبقار المريضة والنافقة أنها جميعا موجبة وأن أهم المعزولات هى كورينى رينال بنسبة ٣٢,٣٥% يلية الميكروب القولونى بنسبة ٢٠,٥٨% والسيدوموناس أيروجينودا بنسبة ١١,٧٦% والأستاف أوريس بنسبة ٨,٢٨% - والأستربت ذو إبيدميكس بنسبة ٨,٢٨% - بالأشارة الى العدوى المختلطة (٦ حالة) تم عزل الكورينى رينال والميكروب القولونى بنسبة ٨,٢٨% الأستاف أوريس والكلسيلا نيمونى بنسبة ٨,٨٢%.

وتم عمل اختبارات الحساسية للعترات المعزولة وجد أن البنسلين والأرتروماسين هى الأكثر حساسية لميكروبات الكوريتى رينال والجنتاماسين والسبروفلوكساسين هى أكثر حساسية للميكروب القولونى أما ميكروب الأستاف أوريس والأستربت ذو أيدميكس أكثر حساسية للسبروفلوكساسين يلية الجنتاميسين وقد أعطيت التوصيات اللازمة للحد من انتشار التهاب الكلى فى الأبقار.