**PATHOGENESIS**

Urinary calculi are commonly observed at necropsy in normal animals, and in many

appear to cause little or no harm. Calculi 'may be present in kidneys, ureters, bladder, and urethra. In a few animals pyelonephritis, cystitis, and urethral obstruction may occur. Obstruction of one ureter may cause unilateral hydronephrosis, with compensation by the

contralateral kidney. The major clinical manifestation of urolithiasis is urethral obstruction, particularly in wethers and steers. This difference between urolithiasis and obstructive urolithiasis is an important one. Simple urolithiasis has relatively little importance but obstructive urolithiasis is a fatal disease unless the obstruction is relieved. Rupture of the urethra or bladder occurs within 2-3 days if the obstruction is not relieved and the animal

dies of uremia or secondary bacterial infection. Rupture of the bladder is more likely to occur with a spherical, smooth calculus that causes complete obstruction of the urethra. Rupture of the urethra is more common with irregularly shaped stones that cause partial obstruction and pressure necrosis of the urethral wall.

**CLINICAL FINDINGS**

Calculi in the renal pelvis or ureters are not usually diagnosed ante mortem although obstruction of a ureter may be detectable on rectal examination, especially if it is accompanied by hydronephrosis. Occasionally the exit from the renal pelvis is blocked and the acute distension that results may cause acute pain, accompanied by stiffness of the gait and pain on pressure over the loins. Calculi in the bladder may cause cystitis and are manifested by signs of that disease.

**Obstruction of the urethra by a calculus**

This is a common occurrence in steers and wethers and causes a characteristic syndrome of abdominal pain with kicking at the belly, treading with the hind feet and swishing of the tail. Repeated twitching of the penis, sufficient to shake the prepuce, is often observed, and the animal may make strenuous efforts to urinate, accompanied by straining, grunting and grating of the teeth, but these result in the passage of only a few drops of bloodstained urine. Cattle with incomplete obstruction - 'dribblers' - will pass small amounts of

bloodstained urine frequently.

On rectal examination, when the size of the animal is appropriate, the urethra

and bladder are palpably distended and the urethra is painful and pulsates on

manipulation.

In rams with obstructive urolithiasis, sudden depression, in appetence, stamping

the feet, tail swishing, kicking at the abdomen, bruxism, anuria or the passage of

only a few drops of urine are common.

**Rupture of urethra or bladder** If the obstruction is not relieved, urethral rupture or bladder rupture usually occurs within 48 hours. With urethral rupture, the urine leaks into the connective tissue of the ventral abdominal wall and prepuce and causes an obvious

fluid swelling, which may spread as far as the thorax. This results in a severe cellulitis and toxemia. The skin over the swollen area may slough, permitting drainage, and the course is rather more protracted in these cases. When the bladder ruptures there is an immediate

relief from discomfort but anorexia and depression develop as uremia develops.

**CLINICAL PATHOLOGY**

**Urinalysis**

Laboratory examinations may be useful in the diagnosis of the disease in its early

stages when the calculi are present in the kidney or bladder. The urine usually contains

erythrocytes and epithelial cells and a higher than normal number of crystals, sometimes accompanied by larger aggregations described as sand or sabulous deposit. Bacteria may also be present if secondary invasion of the traumatic cystitis and pyelonephritis has occurred.

**Serum biochemistry**

Serum urea nitrogen and creatinine concentrations will be increased before either

urethral or bladder rupture occurs and will increase even further after wards. Rupture of the bladder will result in uroabdomen. Because urine has a markedly low sodium and chloride concentration.

**Abdominocentesis and need le aspirate of subcutaneous tissue**

Abdominocentesis is necessary to detect uroperitoneum after rupture of the bladder

or needle aspiration from the subcutaneous swelling associated with urethral rupture.

**Ultrasonography**

Ultrasonography is a useful for the diagnosis of obstructive urolithiasis in rams. All parts of the urinary tract must be examined for urinary calculi.

**TREATMENT**

-The treatment of obstructive urolithiasis is primarily surgical.

- Cattle or lambs with obstructive urolithiasis that are close to being marketed can be slaughter.

-It used to be thought that calculi cannot be dissolved by medical means, but recent studies suggest that administration of specific solutions into the bladder can rapidly dissolve most uroliths.

- In early stages of the disease or in cases of incomplete obstruction, treatment with

smooth muscle relaxants such as phenothiazine derivatives (aminopromazine,

0.7 mg/kg of BW).

-Animals treated medically should be observed closely to insure that urination occurs and

that obstruction does not recur.

**PREVENTION**

A number of agents and management procedures have been recommended in

the prevention of urolithiasis in feeder lambs and steers.

1- the diet should contain an adequate balance of calcium and phosphorus

to avoid precipitation of excess phosphorus in the urine.

The ration should have a Ca:P ratio of 1.2:1, but higher calcium inputs (1.5-2.0:1)

have been recommended.

2-Every practical effort must be used to increase and maintain water intake in feeder steers

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3-The salt fed at a concentration of 3-5 % under practical conditions higher concentrations causing lack of appetite.

4-supplementary feeding with sodium chloride helps to prevent urolithiasis by decreasing the rate of deposition of magnesium and phosphate around the nidus of a calculus.

5- Feeding of pelleted rations may predispose to the development of phosphate calculi by reducing the salivary secretion of phosphorus.

6-The control of siliceous calculi in cattle which are fed native range grass hay, which may contain a high level of silica, is dependent primarily on increasing the water intake.

7-An alkaline urine (pH > 7.0) favors the formation of phosphate-based stones and calcium-carbonatebased stones. Feeding an agent that decreases urine pH will therefore protect against phosphate-based stones.

8- The feeding of ammonium chloride (45 g/ daily to steers and 10 g daily to sheep) may

prevent urolithiasis due to phosphate calculi, but the magnitude of urine acidification achieved varies markedly depending on the acidogenic nature of the diet. For this reason, urine pH should be closely monitored when adding ammonium chloride to the ration, because clinically relevant metabolic acidosis.

9- An acidic urine (pH < 7.0) favors the formation of silicate stones, so ammonium chloride manipulation of urine pH is not indicated in animals at risk of developing siliceous calculi.

10-When the cause of urolithiasis is due to pasture exposure, females can be used to graze the dangerous pastures since they are not as susceptible to developing urinary tract obstruction.

10-In areas where the oxalate content of the pasture is high, wethers and steers should be permitted only limited access to pasture dominated by herbaceous plants.

11- the adequate intake of vitamin A especially during drought periods and when animals are fed grain rations in feedlots.

12-Deferment of castration, by permitting greater urethral dilatation, may reduce the incidence of obstructive urolithiasis but the improvement is unlikely to be significant.