

ADVANCES IN THE DIAGNOSIS AND SURGICAL MANAGEMENT OF URINARY SYSTEM AFFECTIONS IN VETERINARY PRACTICE

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The urinary system is vested with a variety of functions which are unusual combinations. In a broadest concept it is a system concerned with excretion of metabolic end products. But in addition the system also helps in maintenance of fluid electrolyte balance, acid base balance, calcium and phosphorus balance, vascular tone and erythropoiesis – in brief a vital role in the maintenance of internal environment.

The diseases of urinary system had attracted attention long before the medical science had started scientific documentation. Surgical interventions for urinary tract obstruction/uroliths was probably the first of its kind. Till the 20th century, the practice of surgery had undergone improvement but in the passing century the sophistication had come in urologic medicine and surgery has been tremendous both in diagnosis and management. The last two decades have witnessed the impact of it in veterinary surgery also. In veterinary surgical/clinical practice the recent techniques are mostly copied from human medical/surgical practice. Of course, in veterinary surgical practice there are constraints imposed by the anatomical and physiological variations that exist between species. Hence adoption of all techniques useful in human surgery/urology cannot be adopted *in toto* in animals.

Conditions which affect the urinary system in animals can be congenital, acquired, traumatic, developmental, degenerative, neoplastic and so on and caused by pre renal, renal or post renal pathology. Since large number of species of animals are to be considered, generalization also can have its restriction. The concept of management of disease affecting the urinary system in animals has also undergone changes during the last few decades. The newer information on anatomy and physiology of the organs has led to the adoption of newer diagnostic procedures and surgical management of urologic disorders.

The diagnostic procedure were,

1. Evaluation based on clinical features like -
Abnormal constituents in urine - Variation in urine flow and volume - Pain and behavioural changes - Signs of uremia/azotemia
2. Laboratory examination - Urine analysis-

Estimation of BUN - Creatinine in urine/blood

3. Renal function tests : Correlated to urinalysis, specific gravity, osmolality of urine, presence of enzymes in urine, PSP clearance test, water deprivation tests, etc.

4. Radiography : Plain:

Lateral and ventro – dorsal:

Contrast radiography – IVP/excretory urography, pneumoperitoneography, nonselective angiography etc.

5. Exploratory laparotomy, rarely as a diagnostic tool.

The radiographic procedures had limitations in large animal practice. The relevance of biochemical values can also be different between ruminants and non-ruminants.

In the past two decades diagnostic procedures have been added to this list so that the structure and function could be better understood in healthy and diseased. Therapeutic modalities have also undergone improvement on account of this. Additions of non-invasive techniques have substantially reduced the risk also in clinical management. Organs could be studied in cross-sectional or sagittal planes by employing some of these modern methods.

The recent diagnostic techniques are :-

1. Radiography :

- a) Contrast radiographic studies using more than one contrast media to study the lumen/space occupying lesions etc.
- b) Antegrade pyelography/ureterography
- c) Selective angiography to study renal arterial/ channels.
- d) Retrograde urethro-cysto-ureterography.

Use of non-ionic contrast media have also become more popular and useful in such techniques.

2. Ultrasonographic procedures : - Non invasive techniques which can be employed for diagnosis of lesions of kidneys, ureter and bladder. Ultrasonic guided biopsy procedures are also adopted in diagnosis.

3. C.T.Scanning : - For detection of space occupying lesions, cysts, urolithiasis.

4. Endoscopic procedures : - Urethrocystoscopy, urethro-cysto-ureteroscopy- as a noninvasive procedure in females and using fibre optic pliable probe in males in small animals.

Urethrostomy and endoscopy in male animals. Laparoscopic examination of urinary organs. Endoscopic aided catheter biopsy is also employed as diagnostic procedure.

5. Electromyography of anal sphincter and correlating it to urethral sphincter function, because both are innervated by the same nerve. The electrical activity of the muscular component of urethral sphincter can be measured directly.

6. Urodynamic studies : Employed in lower urinary tract affections which cause urinary incontinence. This include cystometrogram, Urethral pressure profile and uroflowmetry for studying the pressure, volume, flow relationship within bladder and urethra, usually in incontinence.

7. Renal clearance studies using inulin or para aminohippuric acid. Quantitative scintigraphy using a radio-isotope is a rapid non-invasive study.

8. MRI : - MRI can be used in urinary system diseases but report of it use in animals is scanty.

Surgical procedures for the treatment of disease of the urinary system have been routine in both large and small animals but mostly for correction of obstruction. In large animals, but for the equines, the procedures other than the ones for urethral obstruction or certain congenital defects, have not become every popular. It is not proper to list all the age old surgical procedures on the urinary system, to consider the recent trends.

In considering surgical management of urinary system three aspects of it have to be outlined.

1. Anaesthetic management
2. Operative management
3. Post-operative care

1. **Anaesthetic management** : Anaesthetic management in urinary system surgery deserves special mention because of the change in internal environment effected by the diseases. In ruminant animals general anaesthesia is seldom needed for surgery of the urinary system. Sedation combined with local anaesthesia is

sufficient in them. In the equines general anaesthesia or narcosis in combination of local anaesthesia will be needed. In the small animals premedication with general anaesthesia or narcotic analgesia or epidural anaesthesia can be employed. In small animals with acidosis or azotemia thiobarbiturates may be used with caution. Anesthetics which augment sympathoadrenal activity or agents which produce hypotension may adversely affect cardiovascular function in renal diseases. Fluorinated hydrocarbon anesthetics may have nephrotoxic effects but isoflurane is satisfactory.

2. Operative management/Therapeutic management :

For purpose of operative management the diseases could be classified as congenital, obstructive disease, injuries, rupture of organs and incontinence. Surgical procedures for each of these conditions are well established safe procedures. The principles of surgical intervention in these conditions is to restore anatomical continuity and physiological function, maintain functional stability and prevent complication.

Some of the recent techniques in the manipulative procedures are :-

1. Percutaneous nephrolithotomy and nephrostomy under fluoroscopic guidance to cause calculi disintegration and expulsion.

2. Extracorporeal shockwave lithotripsy : A technique that has not been reported extensively in veterinary practice.

3. Selective arterial embolization under fluoroscopic guidance to arrest haemorrhage in renal trauma.

4. Manipulation of the ureter under fluoroscopic guidance – dilation, stenting, occlusion, removal of foreign bodies.

5. Stenting in urethrostomy/urethrotomy.

6. Percutaneous drainage of cysts, fluid collection under fluoroscopy.

7. Cystoplasty/bladder wall replacement procedures using prosthetic materials/biological grafts – allogenic or xenogeneic.

8. Endoscopic/laparoscopic manipulations.

3. **Post-operative management** : In urinary system affections therapeutic management alone with operative procedures is equally important. In obstructive disorders along with decompression, correction of fluid and electrolyte imbalance has to be adopted using Dextrose saline or poly-ionic solutions and alkalisers. Elimination of accumulated waste has to be augmented with use of diuretics. All this can be recommended if the structural damage has been corrected.

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