



# **Urogenital and Perineal Surgery for Advanced Practitioners Mini Series**

## **Session Two: Surgical Treatment of Obstructive Disease Part 2**

**Benito de la Puerta DVM Cert SAS Dip ECVS  
MRCVS  
European and RCVS Specialist in Small Animal  
Surgery**



## Urethral obstruction

Urethral obstruction is a common cause of morbidity in dogs and cats, especially male cats. Urethral obstruction is reported in 18-58% of male cats with lower urinary disease. Urethral obstruction may be partial or total. Total obstruction is an emergency, failure to remove the obstruction results in uremia in 2-3 days and death in 3-6 days. Prolonged bladder distension secondary to the obstruction may result in loss of contractile function. Urethral obstruction can be caused by uroliths, urethral plug, neoplasia, granuloma, bladder displacement secondary to herniation, strictures, trauma or idiopathic.

Urethral calculi or plugs are common cause of urethral obstruction in male dogs and cats. The incidence has decreased in the last years. In male dogs the calculi usually lodge at the ischial arch or caudal to the os penis. In cats it occurs in the distal third of the urethra.

The majority can be dislodged by hydropulsion into the bladder and removed through a cystotomy. If they cannot be dislodged then a urethrotomy or urethrostomy proximal to the obstruction can be performed.

### Surgical Procedures:

- Cystotomy
- Urethrotomy
- Scrotal urethrostomy
- Perineal urethrostomy in cats

### Urethrotomy

Is the creation of a temporary opening in the urethra. It's indicated when calculi can not be hydropulsed into the bladder. It can also be used to expose obstructive lesions or masses for biopsy. The site is based on the location of the obstructive lesion. The prescrotal region is preferred in dogs due to the superficial position of the urethra and limited surrounding of cavernous tissue. It also permits the possibility of proximal revision if there is a complication. Perineal or prepubic can also be performed in male dogs and cats.

Prescrotal urethrotomy:

- Dorsal recumbency
  - Abdomen is clipped and prepared as for a cystotomy including the scrotum
  - A retrograde urinary catheter is placed to identify the area of obstruction
  - A 1-2 cm incision is made ventral midline cranial to the scrotum.
  - Dissection is performed until we get to the penis
  - The paired retractor penis muscle are identified and displaced laterally
  - The urethra is identified. Longitudinal incision is performed midline over the calculus or catheter
  - Profuse hemorrhage tends to occur, this is controlled with direct pressure
  - The calculi is removed and the urethra is flushed and checked there are no other uroliths.
  - The incision can be sutured or not. If not sutured there tends to be more bleeding but no difference in healing
    - Monofilament absorbable suture, interrupted or continuous pattern, 4-0/5-0
- Complications: bleeding and if not sutured may need to be sutured. Urethral stricture is uncommon and may be more due to the trauma of the urolith more than because of surgery

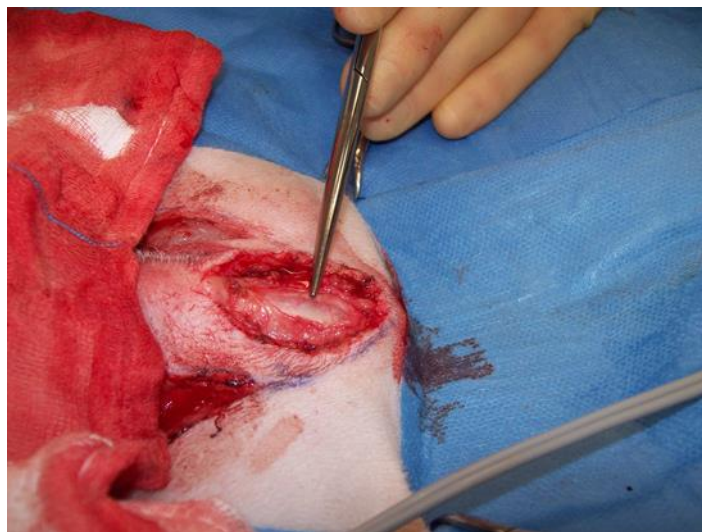
### Urethrostomy:

Permanent damage of the distal urethra may require long term urinary diversion by urethrostomy. It can also be performed to decrease the likelihood of obstruction in animals that chronically have urinary calculi. Repeated urethra obstruction is the primary indication for perineal urethrostomy in cats. Urethrostomy may increase the risk of chronic urinary infection.

In male dogs urethrostomy can be performed at prescrotal, scrotal, perineal or prepubic. The preferred area is scrotal urethrostomy because the urethra is more superficial and wider. Prescrotal or perineal may lead to urinary scalding. In cats it is performed in a perineal or prepubic region.

Scrotal urethrostomy in male dogs:

- Dorsal recumbency
- Elliptical incision around the base of the scrotum is performed. Care is taken to leave adequate skin on the lateral aspects for closure.
- Castration is performed in intact males
- The retractor penis muscle is freed and retracted laterally.
- Small incision is made ventral midline onto the urethra
- Incision is extended 2.5-4 cm with a fine scissors. Remember that the stoma will reduce in size
- Urethra mucosa is sutured to skin using 4-0/5-0 monofilament non absorbable simple interrupted pattern.
- Catheter is passed into the perineal urethra and bladder



Most common complications is persistent hemorrhage, normally around 4 days. Urine scalding, urinary tract infections and obstruction have also been reported

Perineal urethrostomy in male cats:

- Ventral recumbency, with the hindquarters elevate over a padded surface.
- Elliptical incision around the scrotum and prepuce, ventral to anus

- The penis is freed ventrally from its attachments
- The ventral penis ligament is resected
- The ischiocavernosus m muscles are identified and transected
- The retractor penis muscle is identified and excised
- Dissection continues until the bulbourethral glands are identified
- The urethra is incised dorsally to the level of the bulbourethral gland, the urethra diameter is around 4-5 mm.
- The urethral mucosa is sutured to the skin with non absorbable monofilament sutures 4-0/5-0 in an interrupted pattern. Beginning at the dorsal aspect
- The distal penis is resected and the rest of the wound is closed routinely.





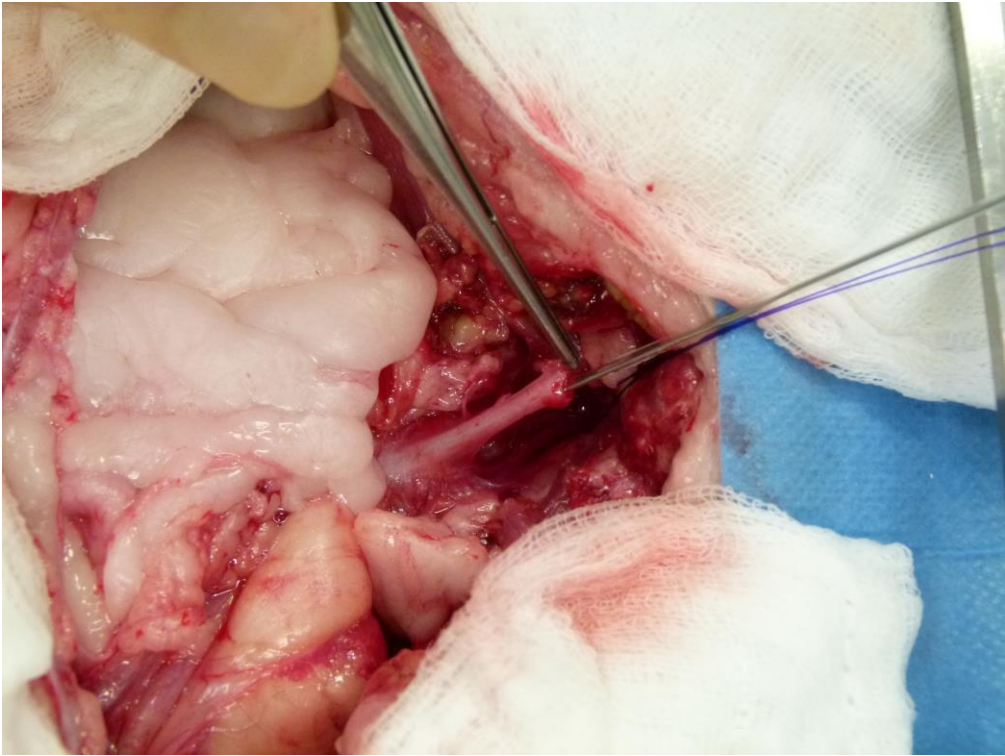
Complications include hemorrhage, stricture formation, wound dehiscence, urine extravasation 25% of cats. 28% chronic UTI

#### **Prepubic urethrostomy:**

Is only used as a salvage procedure, when functional integrity of the distal urethra is compromised. The urethrostomy is created on the ventral midline just cranial to the pubis in cats and female dogs, in male dogs its placed parapreputial.

- Ventral midline celiotomy
- Urethra is identified and bluntly dissected from its attachments.
- Urethra is transected
- The distal end of the proximal urethra is brought through the abdominal incision. Should pass through the abdominal wall muscle, subcutis and skin in a gentle arc to prevent kinking.
- The abdominal wall is closed routinely
- The urethra is spatulated with a 5-10mm incision and the urethral wall is sutured to the skin with 3-0/4-0 monofilament non absorbable sutures.

Complications: urinary incontinence, urine scalding, stoma stricture, chronic UTI.



## **Urinary tract trauma**

### **Renal trauma**

Report of renal trauma are extremely rare in veterinary medicine. The kidney or its vasculature can be injured due to blunt trauma or by sharp penetration of projectiles, animal bites. Trauma can result in capsular tear, parenchymal fractures, perirenal or renal hematomas, crush injuries, vascular avulsion or renal prolapse. The most serious acute concern is uncontrolled hemorrhage into the retroperitoneal or peritoneal space. The greatest long term is loss of renal function.

Renal or renal vascular trauma is usually suspected based on clinical finding of anemia, with or without renal azotemia and retroperitoneal hemorrhage detected by ultrasound and verified by aspirates.

Treatment may just need stabilization or may need unilateral ureteronephrectomy.

### **Ureteric trauma**

Ureteric trauma is also very uncommon; the most common cause is iatrogenic and associated with ovariohysterectomy. The incidence is not known; it's more common in dogs than in cats and may be due to secondary inadvertent ligation, transection or resection or from obstruction secondary to ovarian, uterine or vaginal granuloma formation. Clinical signs associated with uremia occur shortly after injury if uroabdomen or bilateral ureteral obstruction occurs. If there is unilateral ligation signs may take longer to appear.

Blunt abdominal trauma may result in a ureteral crushing injury with subsequent obstruction and hydronephrosis, or more common uroabdomen or ureteroperitoneum.

Clinical signs of uroperitoneum include lethargy, vomiting, anorexia, abdominal pain, ascites, hypothermia and possible hematuria. Animals may have mild to moderate azotemia. Animals with ureteroperitoneum tend to have more subtle signs.

The diagnosis is confirmed based on increased abdominal or retroperitoneal fluid creatinine and potassium concentrations compared to serum. Excretory urography is used after the patient has been stabilized and hydrated, as contrast can further cause renal injury. CT pyelography and retrograde or antegrade pyelography may be useful to identify the injury.

Treatment of ureteral injury involve ureteral reimplantation for mid to distal ureteral avulsion or ureteronephrectomy for proximal avulsions.

### **Bladder Trauma**

The bladder is the most common site of urinary tract rupture after trauma. Bladder rupture can occur secondary to trauma, severe cystitis, bladder neoplasia, urethral obstruction by calculi or tumour, complications of bladder surgery, iatrogenically after cystocentesis, bladder catheterization or manual bladder expression.

Clinical signs include hematuria, anuria, dysuria, abdominal bruising or abdominal pain, or other signs such as depression, vomiting or associated with shock or metabolic changes resulting from uroabdomen. The typical metabolic abnormalities are azotemia, dehydration, metabolic acidosis and hyperkalemia with death after 47-90 hrs. animals may still urinate normally with a ruptured bladder.

A diagnosis of uroabdomen is made by determining there is free abdominal fluid and cytology and measurement of creatinine, urea and potassium, especially creatinine and potassium will be higher than serum. It's important to also determine if there was an UTI because of the possible progression to a septic peritonitis.

Diagnostic imaging should be done, abdominal ultrasound will determine the presence of free fluid, other abdominal organ damage and potentially the damage to the bladder may be observed. Simple radiographs may not be too helpful but a retrograde positive contrast urethracystogram will determine the presence of contrast leakage into the peritoneal cavity. If this was normal then an IVU should be performed to assess the kidney and ureters for any leakage.

The patient should be stabilized and once stabilized the patient can be anaesthetized and an exploratory laparotomy performed to detect and repair the bladder defect. Any unviable bladder tissue should be removed and the bladder closure should be omentalized. Complete recovery should be expected after uncomplicated traumatic bladder tear.

### **Urethra trauma**

The severity varies from contusion and lacerations to partial or complete urethral disruption. Male dogs and cats suffer urethral trauma more frequently than female likely due to the length and accessibility in males. Trauma occurs due to blunt or penetrating injuries or iatrogenic damage. Urethral trauma was due to catheterization in 79% of cats in contrast 70% of dogs that suffered traumatic trauma was due to car accidents.

Clinical manifestation depend on site, extent and duration of injury. Proximal urethral trauma may result in urine retention in the peritoneal cavity or retroperitoneal space. Distal urethral damage may result in subcutaneous urine leakage. Accumulation of urine within tissues results in extensive cellulitis and tissue necrosis and may result in formation of a urethrocutaneous fistula.

Many animals with partial damage may still urinate normally. It is often possible to also pass a catheter into the bladder.

### **Urogenital neoplasia**

#### **Renal Neoplasia**

Primary renal tumour are uncommon in dogs and cats accounting for less than 2% for all tumors. The majority of primary tumours are malignant. In cats the most common tumour is lymphoma. In cats an FNA should always be performed as they can be very responsive to chemotherapy and surgery may not be required. Renal cell carcinoma is the most common kidney tumour in dogs. Other renal tumours include transitional cell carcinoma, transitional cell papilloma, anaplastic sarcoma and carcinomas, hemangiosarcoma, lymphoma and nephroblastoma.

Clinical signs are non specific may include hematuria, weight loss, lethargy inappetence or a palpable mass. Hematology changes are non specific some may have anemia, biochemically there can be a mild azotemia. Abnormalities in urinalysis are more common, hematuria, pyuria and proteinuria can be seen. Rarely paraneoplastic syndromes can be observed like nodular dermatofibrosis, polycythemia, hypertrophic osteopathy, hypoglycemia, hypercalcemia.

Diagnostic imaging should include thoracic and abdominal radiography, abdominal ultrasound and if nephrectomy is considered, evaluation of function of the unaffected kidney. Abdominal metastasis is observed in 54% of dogs, with the liver and ipsilateral adrenal gland most commonly affected.

#### **Treatment**

Because of improved imaging modalities renal neoplasm are more frequently being detected as small asymptomatic masses. Unilateral nephrectomy is the most common treatment for affected animals in which the contralateral kidney is normal. In one study the median survival time for dogs with carcinomas was 16 months, 9 months for sarcomas and 6 months for nephroblastomas. In this study chemotherapy had no effect on survival. In another study for haemangiosarcomas the median time for survival was 278 days.



## Nephrectomy

Indications: include irreparable trauma, persistent infection, renomegaly, obstructive calculi with present hydronephrosis, renal or perineal masses. This is a non reversible procedure, the surgeon should consider the risk of leaving the kidney in situ is greater than the risk associated with removing it. The surgeon should strive to ensure the remaining kidney will be capable of sustaining the patient's life. If possible the function of the kidney left behind should be evaluated with scintigraphy before the nephrectomy is performed.

Surgical Technique:

- Ventral midline celiotomy, from the xiphoid two thirds of the distance to the pubis, but it could be extended to the pubis if we need more space.
- Both kidney are evaluated, to make sure there are two kidneys and the other kidney is grossly normal.
- The intestine is retracted to the opposite site to improve visualization.
- The kidney is freed from its retroperitoneal attachments
- The perirenal fat surrounding the hilus is separated and the vein and artery are identified. In the normal position the renal vein is ventral to the artery. If the kidney is elevated from its fossa and rotated ventromedially, the renal artery will lie laterally to the renal vein.
- The artery and vein are dissected and at least two sutures are placed around each vessel. There may be more than one artery or the artery may branch. The left renal vein receives the left gonadal vein. Ideally we would use two circumferential sutures and a transfixing suture. The suture will be a long lasting absorbable suture or a non absorbable suture.
- The ureter is easily dissected from its retroperitoneal space to the bladder.
- The ureter is ligated close to the bladder and transected.



### Nephrectomy vs nephroureterectomy

In veterinary medicine nephroureterectomy is more common. In humans they tend to leave the ureter in place. The risk of urine reflux and UTI is around 1%. Clinical findings with ureteral stump syndrome includes fever, abdominal pain and hematuria.

Complications: precipitation of preexisting kidney disease, acute renal failure, failure to resolve underlying clinical signs, hemorrhage and damage to other organs.

## Ureteral Neoplasia

Primary ureteral neoplasia is rare in dogs and not reported in cats. They tend to present with hematuria, polyuria polydipsia, anorexia, lethargy, pyrexia or abdominal pain. Tumours described: benign fibroepithelial polyps, transitional cell tumours  
The treatment is nephroureterectomy.

## Bladder Tumours

Around 1% of all tumours, but the bladder is the most common site of tumours of the urogenital system. Transitional cell carcinoma is the most common one, also lymphoma, rhabdomyosarcoma, adenocarcinoma, squamous cell carcinoma, hemangioma, hemangiosarcoma, fibroma, fibrosarcoma, leiomyoma and leiomyosarcoma. In a study 97% of tumours of the bladder were malignant. Transitional cell carcinoma is highly invasive and has a predilection for the trigone, this can extend to the urethra, prostate and ureters.

Presenting signs are dysuria, hematuria and pollakuria. Urine cytology only shows exfoliated cells in 30% of animals. Urine antigen tests lack specificity. Ultrasonography is very sensitive method for diagnosis, degree of invasion and extension into ureters and urethra, as well as possible metastasis. Lymph node metastasis was reported in 16 -40% of cases Double contrast radiographs can also be performed, as well as retrograde urethrocytograms or IVU. CT can also be performed also to evaluate the extension into the pelvis or lungs. Definitive diagnosis is obtained through biopsy, which can be achieved through a catheter biopsy technique. FNA can be performed but there is the risk of seeding.

Treatment: chemotherapy and nonsteroidal drugs such as mitoxantrone, doxorubicin, carboplatin, cisplatin, cyclophosphamide and piroxicam have been used. The response rate to single agent is less than 25% and the survival time less than 6months. Combination treatments can increase survival.

Radiation therapy has been used with poor results.

Surgery:

- Partial cystectomy
- Total cystectomy
- Palliative placement of cystostomy tubes
- Urethral stenting

