MINIMALLY INVASIVE MANAGEMENT OF STONE DISEASE

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INTRODUCTION

Minimally invasive management of stone disease is currently considered the standard of care in veterinary medicine according to the ACVIM. Urolithiasis is a common problem in veterinary medicine and knowing the stone type is mandatory in providing the best treatment and prevention for clients and patients. Different uroliths are treated in different ways, some of which can be dissolved, others need to be removed, and some can be cautiously monitored and bypassed when necessary. The invasiveness and side-effects associated with some traditional surgical or medical techniques (i.e. surgery of the ureter for ureteral obstructions, endoscopic visibility for bladder and urethral stones, etc) makes the use of less invasive alternatives using interventional options more appealing.

Kidney and Ureter

Percutaneous Nephrolithotomy (PCNL)
Kidney stones can result in progressive renal failure, intractable infections, ureteral pain, and bleeding. Surgical nephrectomy can be invasive and is associated with significant morbidity. In people, percutaneous nephrolithotomy is considered the standard-of-care for kidney stones too large to be treated with shockwave lithotripsy or retrograde laser lithotripsy, and has recently been performed successfully in clinical veterinary cases. This minimally invasive procedure aims to minimize morbidity, and preserve as much renal function as possible while gaining access into the kidney for stone removal.

ESWL for Nephro/Ureterolithiasis
Extracorporeal shock-wave lithotripsy (ESWL) is another minimally invasive alternative for the removal of upper tract calculi in the renal pelvis, or ureters. ESWL uses external shockwaves that is passes through a water medium directed under fluoroscopic guidance in 2 planes. The stone is shocked and the debris is then left to pass down the ureter into the urinary bladder over a 1-2 week period. This procedure can be performed safely in nephroliths smaller than 1 cm, and ureteroliths. For stones of larger sizes PCNL is recommended.

Ureteral stenting and SUBs (Subcutaneous ureteral bypass device) is performed for a variety of disorders to divert urine from the renal pelvis into the urinary bladder. This technique can be useful in patients with ureteral obstruction due to ureteral stones, obstructive cancer, strictures etc. This, along with SUBs, will be further discussed in the ureteral intervention talk.

Urinary Bladder and Urethra

Laser lithotripsy is involves the intracorporeal fragmentation of bladder and urethral stones (and rarely ureteral or kidney stones), which is assessed using a rigid or flexible cystoscope or ureteroscope. The stone is fragmented until the pieces are small enough to be removed normograde through the urethral orifice, either via voiding urohydropropulsion or with the assistance of a stone basket. This process is useful for cystic and urethral calculi. All stone types are able to be fragmented using laser lithotripsy.

Percutaneous Cystolithotomy (PCCL) is our preferred minimally invasive technique, which combines cystic and urethral stone retrieval in any size, sex or species, and is very easy to perform in both cats and dogs. This procedure is performed with a small ventral midline skin incision made over the bladder apex approximately 1 cm in size. A trocar is advanced into the bladder lumen and a rigid cystoscope is advanced through the trocar into the urinary bladder for stone removal with an Endoscopic...
stone basket. The entire mucosal surface of the bladder and entire urethra are visualized and stones stuck inside the urethra can be removed as well, without the need for urethrotomy. During this procedure the bladder can be explored carefully for polyps or masses and removed with the laser or biopsied if necessary. Once the scope and trocar are removed the incision is closed.

REFERENCES

Available upon request
  a. Holmium:YAG
  b. Both Diode or Holmium:YAG