“Number 1 with a Side of Wasaabi”

Molly M. McAdams

Mississippi State University

College of Veterinary Medicine

Class of 2021

Clinicopathologic Conference

August 21, 2020

Advisor:

Hayley Gallaher, DVM, MS, DACVS-SA

Introduction

A common and potentially life-threatening occurrence in small animal emergency practice is feline urethral obstruction, especially in males due to their longer and narrower urethras[7]. A frequently utilized surgical treatment for such obstructions is a perineal urethrostomy—dissection of the tissues to the bulbourethral glands, to expose wider urethral tissue and suture its mucosa to the skin[6]. This technique is widely used among small animal practitioners and is fairly well described in the literature. However, like many surgical procedures, it comes with its own complications and risks. When this technique fails, causing cats to re-obstruct, revision methods for such complicated urethral disorders should be considered. Multiple salvage procedures exist, including transpelvic, subpubic, or prepubic urethrostomies, depending on the level at which urethra has strictures. The following case details a complicated male feline urethral obstruction, and its resolution after a transpelvic urethrostomy. This case involves previous surgical intervention before its referral to the MSU CVM, as well as diagnostic, surgical, post-operative, and pathophysiological components to discuss.

History and Presentation

Wasaabi is a 3-year-old male neutered domestic shorthair cat that presented to MSU-CVM Emergency Service after not being able to urinate appropriately. A perineal urethrostomy had been performed about 3 months prior to this visit at his primary care veterinarian. He was able to urinate appropriate afterwards and was prescribed mirtazipine as needed. Over a period of one week prior to re-presenting to veterinarian, Wasaabi demonstrated periuria and began to vocalize. On February 21, 2020, he was stranguric and his bladder could not be expressed; after undergoing a decompressive cystocentesis at his RDVM the next day, he was brought to MSU.

On presentation, Wasaabi was bright and alert with a weight of 4.6 kilograms and a body condition score of 7 out of 9. The abdomen was palpated, and no pain was elicited, nor were there any masses felt. The urinary bladder had mild turgor on palpation. His perineal urethrostomy stoma site appeared strictured and a few drops of red-tinged fluid were observed. Upon auscultation of the thorax, no murmurs, crackles, or wheezes could be distinguished. All lymph nodes were of normal size and shape. Some moderate amounts of scaling were observed on dorsal aspect of the skin and fur. He was mildly hyperthermic at 103.1°F. His heart rate and respiratory rate were moderately elevated at 200 beats/minute and 36 breaths/minute respectively. His mucous membranes were pink and slightly tacky, with a capillary refill time of less than two seconds. A systolic blood pressure using a Doppler was obtained and was markedly increased at 170 mmHg. A percutaneous pigtail catheter was placed into the bladder, to allow for adequate urine drainage, and to quantify his urine every four hours. After monitoring this catheter for several hours, a second pigtail catheter had to be placed due to a lack of patency. Through the night, his abdomen was monitored for free fluid every four hours using AFAST scans, and catheter care was provided frequently to ensure it was kept sterile. He was also administered intravenous maropitant as a preoperative antiemetic and as an adjunctive therapy for his visceral pain. He remained stable in the ICU in preparation for surgery, and then was transferred to Small Animal Surgery on Monday, February 24, 2020.

Diagnostic Approach

On presentation to Emergency Services, an iSTAT was performed and yielded no clinically significant abnormalities. In spite of his urethral obstruction, a normal serum potassium was present leading up to corrective surgery[1].

After his transfer to Small Animal Surgery, a complete blood count, and serum chemistry were performed. The CBC results showed a very mild normocytic normochromic anemia, and no other significant abnormalities. The serum chemistry panel yielded a mildly elevated creatine kinase, but no other clinically significant abnormalities.

Next, radiographs were performed to determine cause and location of the obstruction, as well as to determine surgical approach for his revision surgery. Survey abdominal radiographs were obtained, followed by a positive contrast cystogram. All images were examined by MSU CVM radiologists, who reported the following information about the studies. Findings in the abdomen included: decreased abdominal serosal detail; gas bubbles free within the peritoneal space; two pigtail catheters in situ, with one terminating ventral to the urinary bladder. These findings were most likely contributed to the recent percutaneous pigtail catheter placement, with one terminating in the peritoneum. A modified cystogram was performed, followed by a retrograde urethrogram. The bladder distended normally, and the urethra distended with contrast, more severely at the caudal portion. There was a filling defect within the urethra, as well as ill-defined contrast surrounding the cranial aspect of the filling defect extending past the margins of the urethra. At maximal volume, there was a small amount of contrast material cranioventral to the urinary bladder. The contrast was then removed from the bladder, and the retrograde urethrogram was performed. The contrast dissected through the periurethral tissue extending the length of the ischia. A second cystogram was performed, and the previously located urethrogram contrast decreased in opacity, extended more dorsally, and superimposed the urethra.

The findings of the caudal urethra were likely due to a urethral stricture with concurrent caudal urethral rupture. The dilation of the caudal urethra cranial to the filling defect was consistent with a urethral obstruction with possible concurrent urethritis. Urinary bladder wall

contrast leakage was likely due to pigtail catheter placement. With this information in mind, Wasaabi was diagnosed with perineal urethrostomy site stricture and urethral tears, with historical feline lower urinary tract disease. After considering the location of the tears, as well as the potential complications of the three salvage procedures, a transpelvic urethrostomy was selected as the surgical approach.

Surgery and Treatment

Wasaabi was anesthetized, an epidural was performed, and the ventral abdomen and perineal regions were clipped and aseptically prepared for surgery. The previously placed pigtail catheters were removed, and purse string suture was placed in the anus. Prophylactic antibiotics were administered before and during the surgery. Wasaabi was placed in dorsal recumbency, and an approximately 7-cm caudal ventral abdominal midline skin incision was made connecting the previous pigtail catheter stomata and ending just cranial to the pubis. The urinary bladder was exteriorized and a 3-0 PDS stay suture placed close to the apex. A 0.5-cm incision was made in the ventral portion of the bladder, and an 8-French red rubber catheter passed into the urinary bladder. It was secured in the bladder with a purse string suture. Sterile saline was infused through the catheter into the urinary bladder to check for leaks. The catheter was then advanced into the urethra. Using the pubis as a landmark, an approximately 3.5-cm incision was made through the skin and subcutaneous tissues to the level of the ischium. Freer periosteal elevators and a #15 blade were used to elevate the gracilis and external obturators from the median pubic symphysis. Lempert rongeurs were used to perform an ischial ostectomy—an approximately 1.5 cm x 1 cm window of ischial bone removed to allow exposure of the pelvic urethra. Careful dissection was performed dorsal to the pelvic urethra to isolate it from the surrounding soft tissue. The catheter was advanced until it encountered a stop at the distal extent of the pelvic

urethra (the site of the stricture) and an incision was made over the ventral aspect of the pelvic urethra until the catheter was exposed. The distal pelvic urethra was transected in a transverse manner to prepare it for spatulation of the mucosa to the skin. Two 4-0 Monocryl stay sutures were placed and blood was cleaned away from the urethra with moistened cotton tip applicators. The pelvic urethra mucosa was apposed to the skin with 4-0 Monocryl simple interrupted sutures. The previous PU stricture site (~ 0.3 cm in diameter) caudal to the transpelvic urethrostomy was excised en bloc in an ellipse with a #15 blade. The subcutaneous tissues and skin from this excision were individually apposed with 4-0 Monocryl simple interrupted sutures. The purse string and red rubber catheter were removed from the urinary bladder, and a sample of urinary bladder mucosa was excised from the cystotomy site and submitted for aerobic/anaerobic culture and sensitivity (which showed no bacterial growth after 48 hours). The cystotomy site was apposed with 3-0 Monocryl simple interrupted sutures. The red rubber catheter was passed from the newly created stoma into the urinary bladder so that a leak test could be performed. A small leak was noted, so an additional 3-0 Monocryl simple interrupted suture was placed, and no further leakage was noted. The catheter and stay sutures were removed. The caudal abdomen was lavaged thoroughly with warm sterile saline and suctioned. The linea alba, subcutaneous tissue, and skin were each apposed with 3-0 PDS, 3-0 Monocryl, and 4-0 Monocryl respectively. The caudoventral abdominal incision was covered with Telfa and Hypafix, and recovery from anesthesia was uneventful.

After surgery, Wasaabi returned to the ICU, where he spent the next 2 days. He was maintained on a fentanyl intravenous constant rate infusion from the time of surgery until 9 a.m. the following morning, at which point this was discontinued and intravenous buprenorphine and oral robenacoxib were administered for pain control. While in the ICU, he was also maintained

on intravenous fluids that consisted of Lactated Ringers Solution with added potassium chloride. An Elizabethan collar was placed after surgery to keep him from reaching his surgical sites. His TPU stoma care was a top priority, so his stoma was examined every four hours, and his abdominal incision received cryotherapy every six hours along with a bandage check. After his surgery, and continuously through his stay at MSU, a non-clumping litter such as Yesterday's News was provided in his litter box. He appeared comfortable during this period, though he was not interested in eating; as a result, carpromorelin was prescribed and a dose of mirtzapine was administered. With his stoma patent and healing appropriately, Wasaabi's intravenous catheter was removed and he was relocated to cat wards, a quieter and less stressful environment.

The change of scenery seemed to improve Wasaabi's attitude substantially, as well as his appetite. He transitioned from only eating a bite or two of his favorite snack treat, to eating small amounts of a canned urinary diet and canned tuna by hand. He did not receive another dose of mirtazapine, and his carpromorelin was discontinued at five days post-operation. His oral robenacoxib and buccal buprenorphine were discontinued at three days post-op and five days post-op respectively. His site appeared to be healing appropriately, and he was consistently urinating normally thought his stoma. On the night of day six post-op, a few drops of blood tinged urine were noted in Wasaabi's cage. He was observed trying to lick at his stoma, and though he could not reach the area, the hard plastic edge of the E-collar was indeed scraping his stoma and causing inflammation. In fact, two or three of the sutures had pulled through, resulting in granulation tissue formation rather than mucosa to skin apposition. The stoma was also slightly deviated to the right, and more fibrin was noted in the site than previously. To prevent further trauma to the area, a caudally facing soft E-collar was placed in addition to his plastic one. The next day, a sample via cystocentesis was submitted for urinalysis to determine if there

was a urinary tract infection, considering his recent trauma to the area, as well as a developing odor near the stoma site. Due to the delicate nature of the stoma, it was elected not to wipe or clean the area; however, the lack of grooming to this area caused the urine to precipitate around his perianal region, resulting in a urinary crust as well as persistent moisture. The urinalysis showed no bacterial growth, but as a precaution, a short course of oral antibiotics was started and continued for five days. Oral robenacoxib and buprenorphine were restarted due to the irritation of the site. Consequently, the site began to improve, and his oral medications were discontinued. To prevent further inflammation of the site, the area surrounding his stoma was gently wiped clean with soft moist cotton, or with a baby wipe; Wasaabi often cooperated for only a few minutes during these daily cleanings. The area improved, appearing less moist consistently, and the stoma being to invert appropriately with decreased granulation tissue. On day fifteen post-op, Wasaabi was given supervised time without any E-collars, to allow for grooming to the area. This was very beneficial in removing remaining crusts and even abating the odor around the site. On day sixteen, he was monitored throughout the day with no E-collars, and they were not replaced during the remainder of his stay. With a healed TPU stoma on day seventeen post-op, Wasaabi was discharged from the MSU CVM.

Pathophysiology

Many different factors come into play when considering feline male urethral obstruction. When cats strain to urinate, it indicates an increased urethral outflow resistance, lower urinary tract inflammation or pain, or a combination of both problems[3]. Of the potential causes for these symptoms, several are idiopathic, while infectious causes and urolithiasis are also common differentials[3]. In Wasaabi's case, more than one pathological process occurred, and likely,

concurrently. Not only did he have a history of an idiopathic lower urinary tract disease, he also had the complication of a strictured perineal urethrostomy site, and iatrogenic urethral tears.

Wasaabi's historical lower urinary tract disease is one that is hard to define. For many years, veterinarians have struggled to determine its exact etiology and diagnosis, and therefore the nomenclature surrounding this vague syndrome is evolving. Several of the following terms have been used, seemingly to refer to the same or similar disease process, including idiopathic feline lower urinary tract disease, feline idiopathic cystitis, feline interstitial cystitis, feline urologic syndrome, and Pandora syndrome, but most of these fall under the umbrella term of Feline Lower Urinary Tract Disease, or FLUTD[8]. And while indeed the pathogenesis of FLUTD and its counterparts is poorly understood, the literature suggests that "feline idiopathic cystitis" may be the most common cause of idiopathic FLUTD symptoms[5]. According to Forrester in 2015, "Although it remains a diagnosis of exclusion, studies over the last 2 decades suggest that [feline idiopathic cystitis] is a result of complex interactions between the urinary bladder, nervous system, adrenal glands, husbandry practices, and the environment in which the cat lives." To elaborate, it has been proposed that cats with suspected FIC appear to have an increased sympathetic nervous system response, as well as a decreased adrenal response to stress; these interactions also are associated with a possible effect on bladder wall permeability[5,8]. As veterinarians continue to learn more about this disorder, today it continues to be a disease of exclusion, in which infectious, urolithic, or other causes should be ruled out first before treating symptomatically, which will be discussed later in this section[5]. Wasaabi's more straightforward diagnosis was that of his perineal urethrostomy stricture. Positive contrast radiography is helpful in diagnosing these strictures, as well as using the other clinical signs to support the diagnosis. Occasionally, congenital strictures can be observed in young cats, though

the most common causes of urethral stricture are due to trauma, inflammation, or iatrogenic causes such as catheterization and—as in this case—surgery[4]. Stricture is the most common surgical complication in perineal urethrostomies, so communicating this risk and potentially guarded prognosis to owners is highly important[6]. The causes of stricture after a PU surgery are most likely from not creating a large enough stoma, excessive granulation tissue formation, or subcutaneous urine extravasation[6]. It is very likely that a combination of surgical complications with his historical FLUTD culminated in his painful, obstructed symptoms that brought him to MSU.

Though FLUTD can be a vague disorder, there are many treatment options available to help alleviate the symptoms and prevent them from reoccurring. First, identifying the cats that are most at risk for FLUTD is useful in prevention. Those at increased risk for FLUTD/FIC symptoms include include neutered middle aged (~2-7 years) males, overweight cats, and possibly even certain breeds, such as Persian, Manx, and Himalayan cats[5]. Other risk factors include some environmental components, such as an exclusively indoor environment and a lack of enrichment, which can increase stress[5]. Stress appears to be a recurring offender in the increased risk of FLUTD symptoms, and managing this stress can be crucial in prevention and treatment. Recommendations for reducing stress include: providing environmental enrichment, such as drawing out natural behaviors like scratching, hunting, hiding, elimination, and perching; increasing interaction with owners; minimizing conflict with other cats; providing multiple litter boxes in multi-cat homes; providing plenty of resources for cats to display natural behavior without conflict, such as plenty of toys, scratching posts, and hiding places[5,8]. Another method to attempt to decrease stress is by using pheromone therapy, such as synthetic feline facial pheromone, although more evidence is needed to scientifically support this method[5]. Since being

overweight is a risk factor for FLUTD, losing weight is another way that owners can try to alleviate recurrence[8]. One of the highest recommendations made by veterinarians about this is providing a therapeutic urinary diet. This diet aims to acidify the urine, increase water intake, and reduce the risk of urolith formation, which can be life threatening in any feline. While these goals do not target FLUTD directly, a urinary diet may also be helpful in mediating some nutritional factors that could be playing a role in its expression[5,8,3]. According to the literature, the best results for an increased quality of life in these cats involves multi-modal therapy involving all of these recommendations, as well as several other emerging modifications that may be beneficial[5,8,3]. These therapies were recommended to Wasaabi's owners after his discharge. The risk for a recurrence of FLUTD was also communicated to them, as relapses of painful symptoms is common[8].

Case Outcome and Conclusion

After Wasaabi returned home with his owners, they began noticing some mild bleeding at his site, presumably from him licking the area. As a precaution, his soft E-collar was replaced until his four-week post-op visit at his RDVM. Five days after his discharge, 22 days post-op, his owners noticed that his stoma was inflamed, with a small amount of debris inside. He was taken to his RDVM who removed the debris from the site and confirmed that it was still healing appropriately. According to his owners, he has fully healed and is urinating normally through his TPU site.

This case is just one example of a growing number of successful TPU surgeries in feline medicine. Only a handful of studies have been published on TPU's and their outcomes; however, those that have show an optimistic view of their usage in feline urinary obstruction. One such study in 2018, even suggests the possibility that one day TPU surgery might be considered as an

alternative to a PU for several reasons, such as the potential decreased risk for stricture, ventral access to the urethra, reduced risk of nerve injury to the area, and fewer complications[2]. Previously, TPU surgery was considered only a salvage procedure due to complications that were deemed worse than those of a PU, and for increased risk for urinary tract infections[6]. Therefore, more bibliographic evidence of the success of TPU's is needed to support the claim that they could be used as an alternative to PU's[2]. In Wasaabi's case, his surgical outcome was a success, and even with some minor complications, he has continued to have a good quality of life with his fully functional TPU stoma.

References:

1. Constable, Peter D. Disorders of Potassium Metabolism in Cats.*Merck Vet Manual.* August 2018.

2. Dourdas, G., I. Liapis. Transpelvic urethrostomy in three cats. *Hellenic Journal of Companion Animal Medicine* . Volume 7. Issue 2. 2018.

3. Filippich, Lucio John. The cat straining to urinate. In: Rand, Jacquie, Problem Based Feline Medicine. Elsevier, 2006; 173-192.

4. Filippich, Lucio John. The incontinent cat. In: Rand, Jacquie, Problem Based Feline Medicine. Elsevier, 2006; 193-204.

5. Forrester, S. Dru, Todd L. Towell. Feline Idiopathic Cystitis. Veterinary Clinics of North America: Small Animal Practice. 2015; 45(4) 783-806

6. Fossum TW. Surgery of the Bladder and Urethra. In: Fossum TW, Small Animal Surgery. 4th ed. St. Louis: Saunders Elsevier, 2013; 735-779.

7. George, Christopher M., G. Grauer. Feline Urethral Obstruction: Diagnosis & Management. Today's Veterinary Practice. 2016.

8. Heseltine, Johanna. Diagnosing and Managing Feline Lower Urinary Tract Disease. Today's Veterinary Practice. 2019.