Vaginal Leiomyoma in the Intact Canine

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INTRODUCTION

Vaginal and vulvar tumors are the second most common canine reproductive tumor, accounting for 2.4% to 3% of all canine tumors.[1,2] Most vaginal and vulvar tumors are benign smooth muscle tumors. Multiple studies have reported that 78 to 86% of these benign tumors are leiomyomas. [1,2,3] Leiomyomas are slow growing, noninvasive, non-metastatic, smooth muscle tumors that are commonly associated with the uterus or vagina in intact female dogs. [2,3,5,7] The purpose of this paper is to discuss the clinical presentation, pathophysiology and pathogenesis, diagnostic approaches, and surgical treatment for vaginal leiomyomas.

HISTORY AND PRESENTATION

Mia Thompson was an 11-year-old intact female Yorkshire Terrier that presented to Mississippi State College of Veterinary Medicine Surgery Department for a history of vulvar licking and swelling of the perineal area secondary to a mass-like structure. Mia's owner noticed the swelling approximately 4-5 weeks prior to presentation. At the time it was first noticed, it appeared comparable to an almond in size. On physical exam, Mia was bright, alert, and responsive. Her vital parameters were within normal limits (T 100.9 F, P 112 bpm, RR 32). She weighed 3.8 kg with a body condition score of 5/9. No murmurs were heard on cardiac auscultation and a sinus arrhythmia was consistent with inspiration. A mild cough was elicited on tracheal palpation and slight wheezes were heard upon thoracic auscultation. Mia's right eye was nonvisual, regressed, and sunken due to previous trauma. The remainder of the physical examination was within normal limits.

Upon rectal and vaginal palpation, a 6 x 5 x 5.2 cm subcutaneous, soft tissue mass that was firm upon palpation extending from the top of the vulva dorsally to the ventral anus was

appreciated. The mass was nonpainful and determined to be outside of vaginal lumen, likely originating from the outer vaginal wall.

It is not uncommon for vaginal tumors to reach an appreciable size before clinical signs are detected. [5] Mia presented with two most common clinical signs, vulvar licking with severe perineal swelling and protrusion of the mass (**Figure 1**). Mia's owner stated that her appetite had decreased, but water intake, urination and defecation were all normal. Clinical signs are rare; however, vulvar or perineal swelling, discharge, dysuria, pollakiuria, stranguria, hematuria, or tenesmus may arise depending on tumor location. [2,3] The majority of vaginal tumors measure 5 to 20 cm at the time of diagnosis. [3]

Figure 1: Distortion caused by the vaginal mass in the perineal region.

PATHOPHYSIOLOGY

Vaginal leiomyomas may be single or multiple, intraluminal or extraluminal. [4] Large intraluminal tumors may protrude through the vulva, while extraluminal tumors cause perineal swelling. [1,3,4] The majority of leiomyomas arise from the vestibule of the vulva rather than the vagina. [1] The tumor is usually well defined and encapsulated.

The cause of canine reproductive tumors is unknown, but ovarian hormones are strongly suspected to play a role in their development. [2,4] Vaginal leiomyomas are most commonly

diagnosed in intact females and have not been diagnosed in dogs ovariectomized at less than 2 years of age. [1] The role of this hormonal influence in the etiology of leiomyomas is unclear.

Experimentally, continuous administration of low levels of estrogen stimulates spontaneous formation of leiomyomas, as well as hyperplasia of endometrial and mammary tissue. [4] Statistically, 33% of leiomyomas are associated with ovarian cysts, cystic endometrial hyperplasia, and mammary tumors, which are known to result from hormonal influence. [1,2] Transition from hyperplastic to neoplastic tissue may play a role in reproductive tract tumor genesis, with estrogen acting as the stimulating factor. [4] As a result, complete surgical excision with concurrent ovariohysterectomy is the recommended treatment of choice to prevent tumor recurrence. [2,6] It has been reported that vaginal tumors may regress with ovariohysterectomy alone; however, evidence is lacking.[2]

DIFFERENTIAL DIAGNOSES

Differential diagnoses for perineal swelling includes extraluminal vaginal leiomyoma, perineal hernia, anal sac swelling and abscessation, rectal impaction or prolapse, vaginal hyperplasia, vaginal prolapse, granuloma, hematoma, or other neoplastic tumors of benign or malignant etiologies. Tumors of the reproductive tract of mesenchymal origin occur most commonly including leiomyoma, fibroleiomyoma and fibroma. [4] Leiomyosarcoma, lipoma, adenocarcinoma, squamous cell carcinoma and transmissible venereal tumors occur much less frequently. [4]

DIAGNOSTIC APPROACH & CONSIDERATIONS

Due to the low occurrence of vaginal tumors, minimal publications exist on the diagnostic approach to vaginal masses. [3] Prior to presentation, bloodwork and diagnostic imaging were performed by the referring veterinarian. A complete blood count and serum biochemical analysis did not reveal abnormalities pertinent to the case. Abdominal radiographs revealed an ill-defined mass of soft tissue opacity caudal to the pelvic canal, causing dorsal deviation of the rectum (**Figure 2**). Survey radiographs are useful as a screening tool but are of limited diagnostic value due to the intrapelvic location of the vagina. [3] Mia was referred at that time.

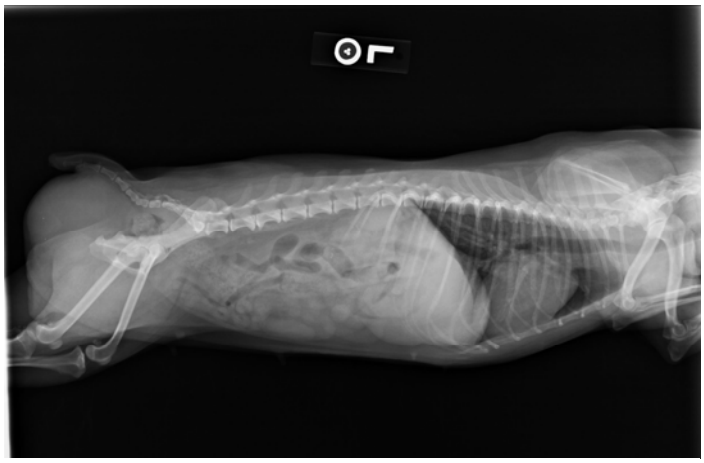

Figure 2: Left lateral radiograph showing mass-like structure of soft tissue opacity dorsally displacing rectum.

Diagnostics were continued by MSU-CVM Surgery Department. A urinalysis obtained by cystocentesis revealed no abnormalities. Thoracic radiographs were performed with findings attributed to age related changes and no evidence of metastatic disease. Computed tomography with contrast was performed to determine if the mass was resectable and to aid in planning of the surgical approach. Caudal to the pelvis was a large, well-defined, approximately 6 cm x 5 cm x 5.2 cm, soft tissue attenuating, heterogeneously contrast enhancing mass that was confluent with the

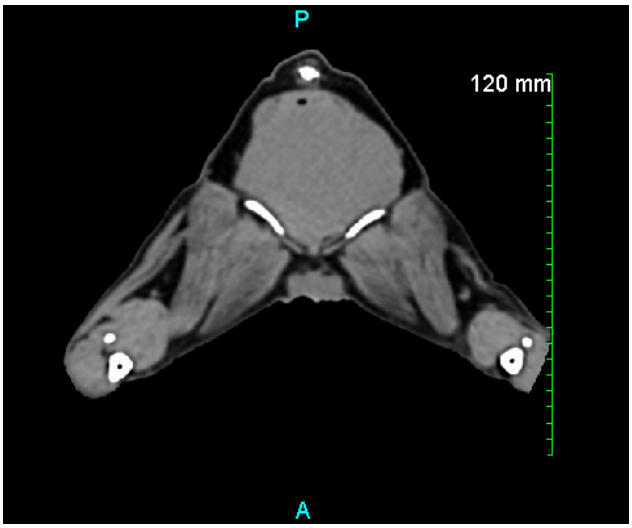

Figure 3: Transverse computed tomography post contrast medium showing midportion of the vaginal mass.

vaginal vestibule and causing dorsal deviation of the rectum (**Figure 3**). The mass was not associated with the urethral papillae as successful surgical outcome is associated with the proximity of the mass to the urethral orifice.[3] Consideration could be given to additional imaging modalities including ultrasound, magnetic resonance imaging, vaginourethrogram, and vaginoscopy when diagnosing a vaginal tumor. However, the information obtained from the history and diagnostics performed were sufficient to move forward with treatment without the addition of these modalities in this particular case.

TREATMENT

Surgical excision is the recommended modality along with ovariohysterectomy for treating and preventing the recurrence of leiomyomas. [2, 3, 4, 6, 8] The surgical approach should be planned based on the location of the tumor. This may include local resection via episiotomy or more aggressive procedures such as vulvovaginectomy, urethroplasty, and ventral pelvic osteotomy. [2,8] The episiotomy approach is preferred for benign neoplasms of the vulva and vagina. [6] Vaginal leiomyomas may be sessile or pedunculated. Pedunculated masses are relatively easier to remove in comparison to sessile masses.[2] Extraluminal leiomyomas can often be approached via dorsal episiotomy and removed via blunt dissection (**Figure 4**). [8] Based on the location of Mia's extraluminal mass, a dorsal episiotomy to allow for complete excision with concurrent ovariohysterectomy was deemed the best approach.

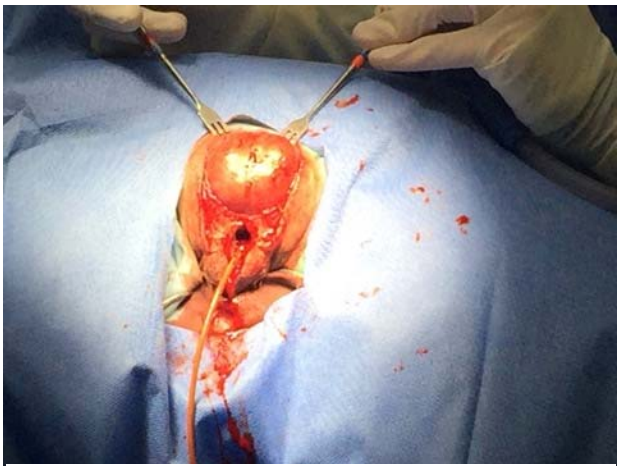

Figure 4: Surgical resection of extraluminal vaginal leiomyoma via an episiotomy approach. Foley catheter placed in urethral opening.

After anesthesia and surgical preparation, Mia was placed in sternal recumbency with the tail flexed cranially to allow adequate exposure of the surgical site. A urinary catheter was placed through the lumen of the vagina, advanced into the urethra, and patency was ensured before proceeding. This helps maintain visualization and avoid trauma to the urethra. A midline skin incision was made from the dorsal commissure of the vulvar labia to just ventral to the external sphincter muscle. The incision was extended with Mayo scissors through the musculature to expose the external capsule of the mass attached to the extraluminal vaginal wall.

Extraluminal leiomyomas are usually well encapsulated and poorly vascularized, as well as quite amenable to blunt dissection. [8] Following a combination of blunt and sharp dissection, the mass was easily visualized. It was found to be pedunculated, oval, and firm to the touch with a well-defined stalk attached to the extraluminal dorsal vaginal wall (**Figure 5**). After identification of the base of the tumor, the mass was excised and submitted for biopsy. A small portion of the dorsal vaginal wall was resected at the base of the mass. The vaginal mucosa where the tumor was excised was closed in a simple interrupted pattern, and the episiotomy site was closed routinely with a three-layer closure. Mia was then placed in dorsal recumbency and an ovariohysterectomy procedure was performed. No complications were noted, and Mia recovered uneventfully from anesthesia.

Figure 5: Vaginal leiomyoma originating from extraluminal vaginal wall.

POST-OP MANAGEMENT & POTENTIAL COMPLICATIONS

Postoperative analgesia was maintained with a constant rate of infusion of Fentanyl in accordance with Glasgow pain scores every six hours. Intravenous fluids were continued to ensure adequate hydration and Cefazolin was administered IV to prevent secondary bacterial infection due to the location of the surgical site. The indwelling urinary catheter was removed post operatively, and Mia postured for urination appropriately. She was monitored with twenty-four-hour care in ICU overnight and transferred to surgery wards in the morning after reassessment. Mia was discharged with instructions on surgical incision care and prescribed oral Tylenol 3, Carprofen, and Clavamox with biopsy results pending.

Although good success has been reported with surgical excision, the risk of complications should be addressed. Potential complications include iatrogenic damage to the urethra or other perineal structures, urethral obstruction or stricture, infection at the surgical site, and dehiscence of the incision. [2,4] The risk of these complications depends on size of the tumor, site of attachment, and association to other structures such as the urethra. [2]

CASE OUTCOME & PROGNOSIS

Examination of resected vaginal tissue revealed an irregular, multinodular, densely cellular neoplasm with a small focus of necrosis present in one section. Tumor cells were smooth muscle in origin and arranged in densely packed fascicles that were irregularly interwoven, with intervening areolar fine collagenous stroma and vessels (**Figure 6**). They were large and elongate with abundant finely packed myofibrillar, pink sarcoplasm and large, elongate,

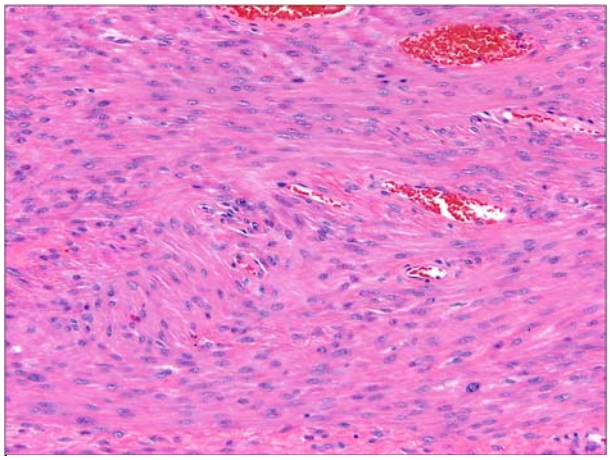

Figure 6: Photomicrograph of vaginal leiomyoma sample. The neoplastic cells are well differentiated smooth muscle.

centrocellular nuclei with lacy chromatin and a large central nucleolus. The definitive diagnosis of leiomyoma was made, elucidating the mass was a benign tumor, exhibiting little tendency to infiltrate locally.

Mia was given a good prognosis. This was determined based on the neoplasm not extending into the soft tissue/skeletal muscle surrounding the sections examined (**Figure 7**) and a concurrent ovariohysterectomy performed. Prevention and control of the disease is best achieved by ovariohysterectomy. [1, 2, 3, 4, 5, 6, 8] There is a 15% local tumor recurrence rate in intact and 0% in dogs following ovariohysterectomy. [1] Approximately fourteen months after the episiotomy and mass excision, the owner reported no regrowth to their knowledge or problems associated with the previous neoplastic tumor.

Figure 7: Vaginal leiomyoma following episiotomy. Placed next to penny for size comparison.

ADJUNCTIVE THERAPY

Radiation therapy may be considered if complete surgical removal of the tumor is not possible. [4] Chemotherapy has been reported successful in various tumors originating from the vulva following surgical resection of the mass. However, insufficient data are available for dogs with urethral or vaginal tumors treated with chemotherapy to allow any assessment of increased median survival time. [8] As previously stated, surgery is almost always curative for benign lesions, therefore, adjunctive therapy is rarely indicated.

CONCLUSION

Vaginal leiomyomas are an important topic in veterinary medicine, especially with consideration given to the hormonal influence of these tumors. Prophylactic ovariohysterectomy could decrease the probability of vaginal neoplasia. Often, clinical signs are not present until the tumor reaches appreciable size due to their slow growing, non-invasive nature. [5] The best prognosis is achieved though surgical intervention. Thus, diagnosing and effectively treating dogs with vaginal leiomyomas are important in ensuring quality of life and survival.

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