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Abstract

An adenocarcinoma of the uterine stump with abdominal metastases is described in a 12-year-old incompletely ovariohysterectomised female Domestic Short Haired (DSH) cat. At the time of presentation the adenocarcinoma had metastasised to the right peri-renal lymph node, the abdominal aorta, and the right ureter, resulting in the formation of a large cystic structure. This had compressed and displaced surrounding structures including the abdominal vena cava and the right kidney, and formed multiple adhesions to the body wall and adjacent abdominal structures. Metastatic extension to the aorta had resulted in its regression into a 2mm diameter non-pulsatile vessel.

Introduction

Uterine neoplasia is rare in the cat, comprising 0.29% of all feline neoplasms in one recent study (Miller et al 2003). Overall, uterine leiomyoma and adenocarcinoma have been the most common tumours described in retrospective studies limited to tumours of the feline reproductive system (Miller et al 2003, Paparella & Roperto 1984).

Uterine tumours are more commonly found in entire female cats, between 4 and 16 years of age (Belter et al 1968, Gil da Costa et al 2009, Meier 1956, Miller et al 2003, O'Rourke 1970, Preiser 1964, Sapierzynski et al 2009, Schmidt 1967). Only one case of uterine adenocarcinoma has been reported in an ovariohysterectomised female cat (Miller et al 2003).

Case history

A 12 and a half year old female neutered domestic short haired cat was presented to the University of Glasgow Small Animal Hospital with abdominal distension, weight loss, lethargy, and persistent signs of oestrus. Signs of oestrus had persisted despite two attempted ovariohysterectomies. A third surgery, performed eight months prior to referral resulted in the identification and removal of a cystic right ovary. At this time a fluid filled uterus was also identified as was a fluid filled structure near the right kidney. Two months before referral the cat started showing signs of oestrus again which persisted despite an injection of progesterone (delvosterone). Subsequent measurement of the serum oestradiol concentration was more than 200 suggesting the presence of functional ovarian tissue .

Clinical examination was limited due to poor patient compliance, but marked abdominal enlargement was noted. An abdominal ultrasound was carried out under light sedation. This demonstrated a large mid-abdominal mass with many complex cystic cavities. The contents of the cysts were strongly echogenic. The uterus was grossly distended (approximately 1 cm diameter) and contained echogenic fluid. The owners declined any further intervention at this time and a recheck was scheduled for the following week.

The cat re-presented as an emergency 48 hours later, as she had been increasingly dull, lethargic and inappetent since her previous examination. She had urinated only a small amount, and had not passed faeces. On examination she was severely painful over the abdomen and caudal thorax, and would not tolerate any handling over these areas. Her heart rate and peripheral pulses were strong. The respiratory rate was within normal limits.

Blood was taken for a pre-anesthetic profile, clotting factors and blood lactate levels. The packed cell volume was low (20%, r 30-45%), but electrolytes, urea, creatinine and clotting times were within normal limits. The blood lactate was 1.3mmol/l (**normal is considered <2.5mmol/l**).

The cat was premedicated with a combination of acepromazine (0.05mg/kg), morphine (0.04mg/kg), and ketamine (4mg/kg) injected intramuscularly. Anaesthesia was then induced intravenously with Propofol (2.4mg/kg), and maintained with isoflurane.

An exploratory coeliotomy was performed via a standard xiphoid- pelvic brim incision. A large multilobed cystic mass was identified occupying almost the entire abdominal cavity. The bladder was sitting immediately caudoventral to the mass, together with a distended uterine body containing purulent material

The vena cava was displaced to the left side of the abdomen, incorporated within the wall of the cystic mass, and was tortuously kinked due to multiple points of adhesion. The right kidney was also to the left of midline, and was adhered to the cranial aspect of the cystic mass. The proximal right ureter was visualized running into the mass, then terminating. The distal right ureter was identified leaving the mass and was followed to the trigone to confirm its provenance. The mass contained approximately one litre of fluid which biochemical analysis subsequently confirmed to have urea (9.3mmol/L 5.7-12.9) and creatinine (101umol/L 71-212) levels consistent with serum.

The left ureter was identified and traced intact from the trigone to the left kidney.

The mass was carefully and progressively dissected free of the vena cava, left kidney and renal vessels, and left ureter. Multiple adhesions between the body wall and the mass were transected. At this point a thin tubular structure approximately 2-2.5mm diameter was identified running within the left side of the cystic mass, which further evaluation confirmed to be the abdominal aorta. The aortic constriction extended from just caudal to the diaphragm to the caudal abdomen, where it terminated in a hard mass of fibrous tissue, immediately beside the uterine body. The vena cava also joined this fibrous area at which point a ballooning of the vessel walls could be seen. Unfortunately, at this point in surgery the cat suffered a full cardiorespiratory arrest and resuscitation was unsuccessful.

Histopathology of the uterus identified a thickened endometrium with papillary projections into the lumen, and irregularly shaped dilated endometrial glands lined with layers of tumour cells. There was extensive necrosis of tumour cells with many glandular spaces and the uterine lumen containing necrotic debris. The tumour cells were columnar with a moderate amount of eosinophilic cytoplasm, a hyperchromatic ovoid and central nucleus, and a prominent, central, deeply eosinophilic nucleolus. There was a moderate degree of anisokaryosis, a large number of multinucleate cells, and up to 3 mitotic figures per high power field.

Neoplastic cells were also identified in the aorta, perirenal tissue and cystic structure. The

cells seen within these structures differed from the tumour cells within the uterus as they were polygonal, rather than cuboidal, had more variance in the shape of the nuclei, and number of nucleoli, and demonstrated marked (as opposed to moderate) anisokaryosis and a higher mitotic index (up to 8 mitotic figures per high power field). The shared characteristics included the eosinophilic cytoplasm, and deeply eosinophilic nucleoli. These features are consistent with metastatic spread of the tumour, from a primary glandular tumour most likely from the endometrium of the uterine stump.

Discussion

The clinical signs of cats with uterine tumours vary but can include abdominal distension, weight loss, anorexia, pain, vaginal bleeding, and infertility. (Miller et al 2003, Cooper et al 2006, Sapierzynski et al 2009). In this case the cat was displaying signs of prolonged and recurrent oestrus despite attempted ovariohysterectomy, and had abdominal distension, weight loss and pain.

The persistent signs of oestrus could be attributed to ovarian remnant syndrome (ORS). ORS refers to the presence of functional ovarian tissue in a previously ovariohysterectomized animal (Wallace 1991, Miller 1995). There is some debate in the literature as to the cause of ORS. Suggested reasons include anatomical variation- the presence of an accessory ovary or extension of ovarian tissue into the ovarian ligament, which becomes functional after removal of the ovary; and surgical error- improper clamp placement, dropping of ovarian tissue, and a small surgical incision (Ball 2010, Miller 1995). The most common clinical sign of ORS is recurrent oestrus cycles, however there may be an interval of years between ovariohysterectomy and signs of oestrus (Wallace 1991). Diagnosis is based on history, clinical signs, hormonal assays, vaginal cytology and laparotomy.

This report represents a very unusual complication following an incomplete ovariohysterectomy. It is likely that the initial surgery and the inflammation caused by further surgical attempts, as well as hormonal drive from the remaining ovarian tissue, led to the development of uterine neoplasia. Invasion of the tumour tissue into surrounding structures created further complications- including the formation of a large cystic structure (urinoma?).

((A urinoma is an accumulation of extravasated urine within a fibrous sac (Tidwell et al 1990). It occurs due to persistent urine leakage from the ureter, triggering a fibroblastic reaction that acts to contain the urine within the retroperitoneal space. In humans, despite being rare, they have been reported to occur secondary to trauma (penetrating or blunt) or obstruction (neoplasia and calculi), and following surgery (urogenital, neurosurgery, orthopaedic and vascular procedures). In the veterinary literature there are only isolated case reports of urinomas, which include 3 cases in cats following road traffic accidents (Bacon et al 2002, Moores et al 2002, Worth & Tomlin 2004), and one in a dog following ligation during ovariohysterectomy (Tidwell et al 1990). In the case of this cat it is likely that invasion of the right ureter by the tumour led to a slow urine leakage out of the ureter forming a urinoma. To the authors knowledge there have been no previous reports of urinoma formation secondary to neoplasia in feline patients.

Urinomas have many synonyms including para-ureteral pseudocyst or uriniferous pseudo cyst. However, it is important they are differentiated from perinephric pseudocysts, which are fluid filled sacs surrounding the kidney, usually seen in association with chronic renal failure (Ochoa et al 1999, Worth & Tomlin 2004).))

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