CASE REPORT

Diagnosis and Successful Surgical Management of Concomitant Granulosa Cell Tumor and Pyometra in a Beagle Dog: A Case Report

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Ovarian tumor arises from the uncontrolled and abnormal proliferation of cells located in the ovary. It mostly affects older female dogs, especially the unspayed ones. The overall prevalence of ovarian tumours is 0.5% to 1.2%, but is as high as 6.25% in intact female dogs (Bhoi *et al*., 2022). Based on their origin, canine ovarian tumors are categorized into three groups: germ cell tumors, sex cord-stromal tumors, and epithelial cell tumors (Kennedy 1998). Granulosa cell tumors (GCTs) that originate from sex cord stromal cells are one of the most commonly reported neoplasms in canine ovary. This accounts for about 50% of all ovarian tumors (Diez-bru *et al*., 1998). GCTs cause increase in ovarian hormone levels such as estradiol, progesterone and inhibin-A (Pluhar *et al*., 1995). This increased hormonal secretion leads to development of clinical symptoms like persistent estrus, vulvar swelling with discharge, slow movement and especially persistent abdominal enlargement. It can also cause nymphomania, virilization, hyperadrenocorticism, alopecia and sometimes complicated mammary carcinoma (Headley *et al*., 2006; Buijtels *et al*., 2010; Chung *et al*., 2013). GCTs in bitches have various microscopic appearances, such as follicular, cystic or poly cystic, and solid. The more important and prominent pattern in some GCT is follicular solid sheet, cords, trabecular, or nests (Buijtels *et al*., 2010). Histologically, granulosa cells in this tumor are similar to normal granulosa cells and are often arranged like normal Graafian follicles. ET-1 (endothelin) and ET-A (endothelin-A receptor) are over-expressed in canine ovarian tumours, suggesting a potential role of these two molecules in canine ovarian carcinogenesis (Borzacchiello *et al*., 2010). Diagnostic tools like radiography and ultrasonography play vital role in early identification of tumors like GCTs. The present case report records diagnosis and surgical management of ovarian tumour (Granulosa Cell Tumour) and pyometra in a ten year old Beagle dog.

Clinical History and Observations

A 10-year-old nulliparous, intact female Beagle dog, weighing 15 kg, was presented to the RVP-TVCC, IVRI, Izatnagar (India) with an anamnesis of anorexia since 1 week, abdominal distension, and sanguine-purulent vaginal discharge since 1 month (Fig. 1). The dog had complete immunoprophylaxis and antiparasitic treatments, and was fed with commercial dog food. The general clinical examination revealed pale mucus membrane, depression, and abdominal pain on palpation. Rectal temperature, respiratory rate, and heart rate were 100.9°F, 26 bpm, 140 bpm, respectively, *i.e.,* within the normal range. The haematological parameters were within the normal range, except leukocytosis ($15.6\times10^3/mm^3$) and slight anaemia. The biochemical examination revealed slightly elevated creatinine and blood urea nitrogen values

Fig. 1: A 10-year-old nulliparous, intact female Beagle dog with abdominal distension

(Table 1). Abdominal ultrasonogrpahic examination revealed tumorous right-sided ovary and echogenic contents in uterus (Fig. 2). Patient was suffering from splenomegaly and cystitis

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as evident from ultrasonography. Uterus was enlarged with thickened wall. A moderately cloudy peritoneal fluid was seen. The body of the bladder was partially distended and the wall thickened. Radiograph examination also affirmed the same findings. So it was decided to perform ovariohysterectomy.

Table 1: Blood examination report

Blood parameters	Values	Reference standards
Hb (g %)	12.1	12-18
PCV (%)	39.1	35-57
TEC (x10^6 /µL)	5.08	5-7.9
TLC (x10^3 /µL)	15.6	5-14.1
Neutrophils (%)	76	58-85
Lymphocyte (%)	16	8-21
SGPT/ ALT (U/L)	38.19	10–109
SGOT/ AST (U/L)	66.65	13–15
Total Protein (g/dL)	4.71	5.4–7.5
Albumin (g/dL)	2.02	2.3–3.1
Creatine (mg/dL)	0.81	0.5-1.7
BUN (mg/dL)	9.64	8-28

Treatment and Discussion

For preparation, the dog was subjected to 12 h of solid food and 8 h liquids fasting. Ovariohysterectomy was performed under general anaesthesia. Pre-anaesthetics used were atropine suphate 0.04 mg/kg, s/c. and butorphanol 0.2 mg/kg, i/v. Induction was achieved with propofol 4 mg/kg, i/v till effect and maintained by the means of isoflurane. All the surgical plans were performed with no complications. The uterus was slightly symmetrically dilated containing purulent material. Post-operative antibiotics, antacids, analgesics, and other supportive medications were routinely administered. Histopathological examinations of affected ovary revealed neoplastic cells proliferated in a variety of patterns confirming a granulosa cell tumor (Fig. 3). The patient was in good condition, had a decent appetite, and no vaginal discharge. Owner stated that, three days later, the vaginal discharge had stopped according to phone conversations with the owner every two weeks for four months.

Many workers have reported that neoplastic processes primarily affect the older animals (Knapp *et al.,* 2004; Klein 2007). As per literature the mean age of the animals that are vulnerable to GCT is 9.45 years (Matos *et al*., 2019), as seen in the present case. An enlarged abdomen which was evidenced in this case may be associated with increased estrogen levels from ovarian tumor as described by Troisi *et al*. (2023). The GCT is predominantly unilateral, with a soft consistency and compact cream colored edges (Walter *et al*., 2018). The bitch described in this report had also similar condition, *i.e.* right sided unilateral ovarian tumor (GCT). Endocrine-related tumors are common causes of hormonal dysregulation,

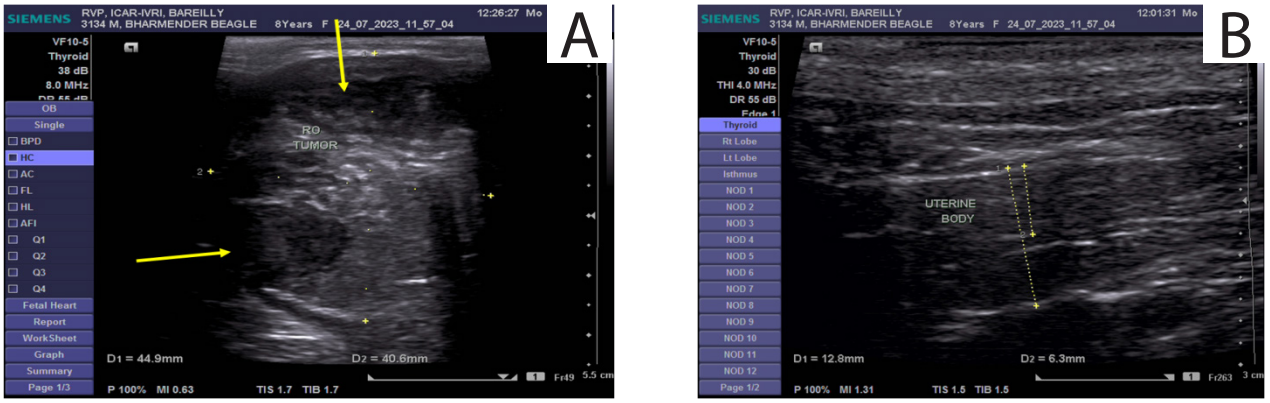

Fig. 2: (A) Right ovary, neoplastic, parenchyma-hyperechoic to hypoechoic, (B) Uterus- Enlarged and thickened uterine horn

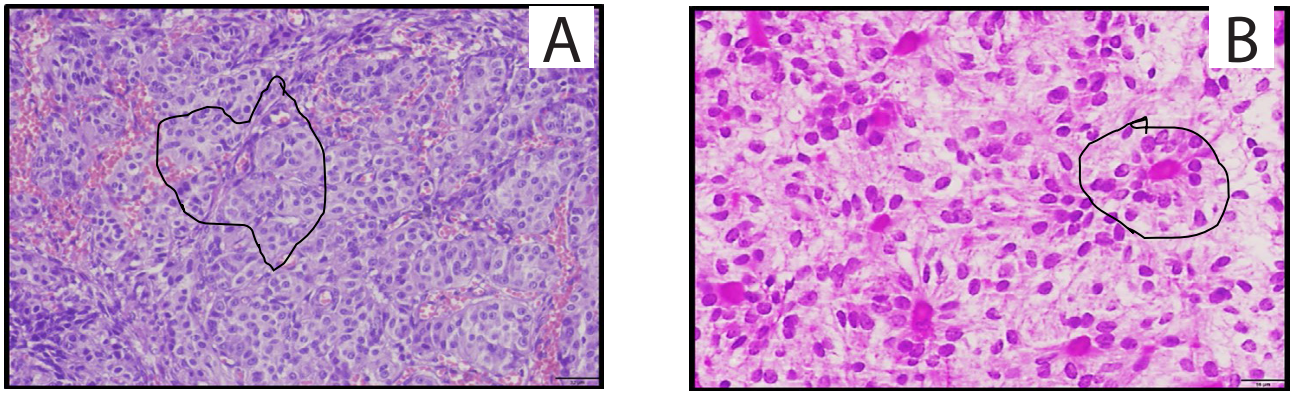

Fig. 3: (A) Follicular histological pattern, (B) Aggregate of tumour cells about a central deposit of eosinophilic material like Call-Exner body.

and GCT is one of the tumors more likely to occur in female dogs (Zanghi *et al*., 2007; Maya-Pulgarin *et al*., 2017). GCTs produce estrogen (2.00-35.00 nmol/L) and small amounts of progesterone (180-600 pmol/L). These changes are responsible for clinical symptoms and subsequent problems associated with GCT (Chung *et al*., 2013; Maya-Pulgarin *et al*., 2017). Cystic endometrial hyperplasia (CEH), which is frequently linked to GCT, is a reflection of how progesterone or estrogen affects the endometrium (Sivacolundhu *et al*., 2001). Ovariohysterectomy is the recommended course of treatment for GCT. In our case, histopathology confirmed that ovarian tumor was a granulosa cell tumor.

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