Proceeding of the SEVC
Southern European Veterinary Conference

Oct. 17-19, 2008 – Barcelona, Spain

http://www.sevc.info

Reprinted in the IVIS website with the permission of the SEVC
www.ivis.org
**Surgery**

**What are we doing with Mammary Tumors?**

**Dr. J. Kirpensteijn**

**Faculty of Veterinary Medicine**

**Utrecht University, Utrecht, Holanda**

---

**CANINE MAMMARY TUMOURS**

**Incidence**

Mammary tumours occur commonly in companion animals. In the bitch, the incidence of malignant mammary tumours is higher than that of any other cancer. Studies in California estimated the annual incidence to be about 260 per 100,000 in intact bitches (a lifetime risk of about 2.5%). Recent studies, however, indicate for intact bitches a much higher lifetime risk of up to 25%. The incidence of benign tumours is estimated to be 2–5 times higher than that for malignant lesions. The risk in male dogs is much lower; however, at 1%.

Ovari(ohyster)ectomy in young bitches significantly reduces the risk of mammary tumours. Where ovari(ohyster)ectomy is uncommon, injectable progestogens may be used to prevent oestrus. The use of injectable progesterons will lead to an increased risk of neoplasia. Mammary tumours are rare before the age of 2 years, although fibroadenomatous lesions occur in dogs and cats as young as 1 year of age. The incidence of mammary tumours increases slowly after the age of 4 years, rises steeply between 6 and 10 years, and then appears to decrease again.

**Clinical signs**

Mammary tumours may present as a solitary nodule and more commonly as multiple masses. The caudal mammary glands are more often affected than the cranial ones, probably because of their greater mass. Malignant tumours often grow more rapidly, are less circumscribed, may be fixed to underlying tissues and may be ulcerated more commonly. The presence of one or more of these signs is associated with an increased risk for malignancy, but this is not excluded by their absence. Large size may be the result of rapid growth or merely the result of a long delay before seeking veterinary care. Rapid growth can also occur in cystic lesions without necessarily being a grave sign.

**Diagnosis**

It is impossible to differentiate benign from malignant mammary tumours in the dog by physical examination alone. In some cases cytology of fine needle aspirates, preferably from a solid mass rather than fluid from cysts or secretions, may provide the diagnosis. Nodules that remained indolent for a long time may suddenly change, and a ‘wait–until–it-grows’ policy may turn an operable condition into an inoperable one, due to local invasion or metastasis. If surgical excision of the primary mammary tumour seems possible, regional metastasis should be checked for. Radiographs of the chest and FNAB of the draining lymph nodes are indicated.

**Surgery**

Many different surgical options have been described for the removal of mammary tumours. Per definition nodulectomy is the removal of the tumour nodule with adequate surgical margins (2-3 cm). A regional mastectomy is the removal of more than 1 mammary gland and an en bloc resection is the removal of mammary glands and the associated lymph node. Regional mastectomy does not result in higher survival times compared to nodulectomy as long as sufficient margins are obtained. As a guideline you can use this table:
Table 1. Guidelines for mammary tumour removal in the dog

<table>
<thead>
<tr>
<th>Localización o características del tumor</th>
<th>Tratamiento recomendado</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumores &lt; 5 cm</td>
<td>Nodulectomía</td>
</tr>
<tr>
<td>Tumores &gt; 5 cm</td>
<td>Mastectomía regional</td>
</tr>
<tr>
<td>Múltiples tumores en una región</td>
<td>Mastectomía regional</td>
</tr>
<tr>
<td>Tumores con signos de malignidad (p.ej. fijación al tejido subyacente)</td>
<td>Mastectomía regional incluyendo la capa muscular / fascia</td>
</tr>
<tr>
<td>Tumores en las dos primeras glándulas mamarias (torácica craneal y caudal)</td>
<td>Resección en bloque de las glándulas 1, 2 y 3. Extirpar los ganglios linfáticos axilares si es probable o seguro que estén afectados</td>
</tr>
<tr>
<td>Tumores en la tercera glándula mamaria</td>
<td>Nodulectomía / Mastectomía regional</td>
</tr>
<tr>
<td>Tumores en la cuarta (abdominal caudal) o quinta (inguinal) glándulas mamarias</td>
<td>Resección de las glándulas 3 a 5 más los ganglios linfáticos inguiuales superficiales</td>
</tr>
<tr>
<td>Múltiples tumores en glándulas no adyacentes</td>
<td>Resección de la cadena completa (unilateral)</td>
</tr>
<tr>
<td>Contraindicado en perros</td>
<td>Resección de cadenas bilateral</td>
</tr>
</tbody>
</table>

Regional mastectomy is indicated in dogs with multiple mammary masses. Multiple nodulectomies are often more time-consuming than either a regional or unilateral mastectomy.

**Nodulectomy**

Nodulectomy with sufficient margins (2–3 cm) may be considered for single, well circumscribed lesions that are not fixed to underlying tissues, provided that detectable distant metastases are absent. After resection, the tumour is classified as benign or malignant, and the completeness of excision is evaluated. Incomplete resection should be followed by a second, more aggressive, surgery.

**Surgical principles:**
- Dogs have usually 5 pairs of mammary glands
- The surgical method (nodulectomy versus mastectomy) is not important. However the technique is.
- Remove fascia, if the tumour is fixed to the underlying fascia and muscles
- Bilateral mastectomy are always staged (6 weeks apart)
- The inguinal lymph nodes is usually automatically removed with the fifth gland

**STEP BY STEP DESCRIPTION OF A NODULECTOMY**
The surgical site is clipped and all mammary glands & lymph nodes on both sides are palpated. Tumours and their location are described and measured. After aseptic preparation and draping of the surgery site all tumors and the margins to be obtained are marked and drawn. The skin is incised using an elliptical incision with #10 scalpel blade. Be sure only to incise skin and not to lacerate the subcutaneous vessels. It is easier to start your incision from left to right (for right-handed surgeons; left handed surgeons should perform the incision from right to left). The incision is completed on both sides of the tumour. Use either scissors or electrocoagulation to extend incision in subcutis while paying attention not to lacerate the larger vessels. The next step is to locate the fascia plane in the midline of the incision. After location this fascia plane the incision is extended using curved scissors or electrocoagulation surrounding the tumour. All mammary tissue and fat tissue between the fascia plane and the skin should be removed ‘en bloc’. Additional haemorrhage can be stopped using electrocoagulation, clamps or suture material (3-0 or 4-0 monofilament absorbable). After the cranial and caudal superficial epigastric artery & vein are located, these vessels should be ligated. For lesions in the cranial two glands it is recommended to include the fascia of the superficial pectoral muscle. It is easy to locate this fascia plane and remove it with the tumour, allowing a 2-3 cm deep margin. After removal of the tumour, bleeders are coagulated or ligated and the wound bed is lavaged. The skin is closed skin-tension-free using an inverted sliding tacking suture technique. Always use monofilament absorbable suture material. The subcutis is closed with 3-0 resorbable material in a continuous horizontal pattern. The skin is closed with 4-0 monofilament nonresorbable suture material in cruciate sutures. The use of drains is neither indicated nor recommended in most cases.

OVE
Adjunctive ovariectomy may be considered in bitches, not as a means of preventing metastatic growth, but in the hope that some inhibition of new benign tumours may be obtained. Furthermore, regression of active mammary tissue allows easier recognition of new lesions in remaining glands. Also, future surgeries are much easier in mammary glands that are inactive.

Adjunctive therapy
Neither chemotherapy nor radiation therapy has been reported effective in prolonging disease free interval and survival in dogs with malignant mammary tumours.

Follow up
Follow-up of all cases of malignant mammary tumour is advised at 1 month after surgery and then at 3–monthly intervals for the first year.

FELINE MAMMARY TUMOURS
Incidence
Mammary tumours occur less frequently in cats than in dogs. It is estimated that the incidence in cats is approximately half of that of dogs and humans. Mammary tumours in cats are much more frequently malignant than in dogs with approximately 80% being malignant. The effect of ovariectomy in preventing the occurrence of mammary tumours is also present in the cat as in the dog, however it is not as strong. The fact that oestrogen receptors were only found in about 10% of mammary tumours in cats (versus approximately 60% in dogs) may account for this difference. Many feline mammary tumours appear to be attached to the skin and may be ulcerated. Lymph node invasion is frequently present. Several studies have shown metastases to be present in approximately 80% of cats with mammary tumours. The main organs of metastasis are the lymph nodes, the lungs and the pleura. Mammary tumours should be differentiated from mammary hyperplasia.

Mammary hyperplasia
Hyperplasia may be lobular or fibroepithelial. Lobular hyperplasia occurs usually in older cats and is palpated as a mass in one or more glands (enlarged lobule with a cystic dilated duct). Fibroepithelial hyperplasia usually occurs in young cats in cyclus or pregnant cats. The glands are diffusely enlarged, oedematous and reddened. Hyperplasia is thought to be caused by hormonal stimulation of the glandular tissue (Figure 5).
Clinical signs
Tumours are often presented to the veterinarian at an advanced stage with ulcerated masses found in a quarter of the cases. In more than half the cases several different glands are involved. In some cases extensive involvement of the lungs or pleura may cause respiratory distress Pleural carcinomatosis may cause a pleural effusion containing malignant cells.

Surgical treatment
Radical mastectomy is the method of choice for treating mammary tumour in cats and consists of removal of all the mammary glands and lymph nodes on the affected side.

Surgical principles:

- Cats usually only have 4 pairs of mammary glands
- Always perform complete unilateral or bilateral mastectomy
- Remove fascia, if the tumour is fixed to the underlying fascia and muscles
- Bilateral mastectomy may be staged (6 weeks apart) or simultaneous
- The inguinal lymph nodes is usually automatically removed with the fourth gland
- Remove axillary lymph nodes only if enlarged or cytologically positive for tumour

STEP BY STEP DESCRIPTION OF AN UNILATERAL MASTECTOMY
An elliptical incision is performed around the 8 mammary glands with a minimum of 1 cm from the tumour. The incision is continued through subcutaneous tissue to the external fascia of the abdominal wall. Superficial haemorrhage is controlled with electrocoagulation, haemostats and/or ligation. An en-bloc excision of the mammary glands is performed by elevating one edge of the incision and separating subcutaneous tissue from the muscle fascia by using a smooth gliding motion of the scissors (Metzenbaum). Use traction on the elevated skin to facilitate dissection. The inguinal fat pads are to be removed containing the inguinal lymph nodes. The fascia is excised if the tumour has invaded underlying tissues and a portion of the body wall is removed if the tumour has invaded the musculature. The gliding scissor dissection is continued until major vessels are encountered: these are the cranial and caudal superficial epigastric vessels. Both vessels pairs need careful isolation and ligation. The specimen is removed and the skin advanced toward the centre of the incision if necessary using walking sutures (see Figure 1). The skin edges are apposed with a subcutaneous suture pattern, tacking the subcutaneous tissue to the underlying fascia. The skin is closed with appositional skin sutures.

Postoperative care
Most often antibiotics are not indicated after mastectomy except when long surgery times are obtained. Pain management is in order to facilitate recovery. The use of bandages are ill tolerated by cats in
general and often a simple e-collar will do the trick. Reevaluation should be planned every 3-4 months to check for local recurrence and metastases.

**Prognosis**
Important predictors of prognosis in both cats and dogs are tumor size (< 2 cm³ has a significant better prognosis), tumor type, tumor stage and ulceration.

**Reference**