Surgical Excision of a Nasal Mast Cell Tumor

Case Report
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Signalment: Abby, an 8 year old, female spayed, Labrador Retriever

History: Abby initially presented to her primary care veterinarian for her annual examination in February 2014. An approximately 3 mm pink plaque was noted at the ventral lateral aspect of the right nostril. Her owners reported that it had been growing slowly in size since November 2013. On April 2, 2014, an incisional biopsy was performed of this depigmented area. Histopathology was consistent with a cutaneous round cell tumor. Special stains were requested and a diagnosis of a grade II mast cell tumor with 2 mitotic figures/hpf was made. Abby was referred to the VMSG Surgical Service for further evaluation and presented on April 14, 2014.

Clinical Exam: A 7 mm x 3 mm pink/depigmented area was noted at the ventral-lateral aspect of the right nostril. 2 sutures were present. (see Fig 1)

Laboratory Findings: Pre-operative CBC, Chemistry, UA and PT/PTT were unremarkable.

Diagnostic Findings: Pre-operative thoracic radiographs and abdominal ultrasound were unremarkable with no evidence of metastasis.

Diagnosis: Grade II Mast Cell Tumor with 2 mitotic figures per high-powered field

Treatment/Management: On the evening of April 14, 2014, Abby was started on injectable doses of famotidine and diphenhydramine. On April 15, the mass was surgically removed and the nasal tissue was reconstructed using a recently reported modified nasal rotational flap technique described by ter Harr et al. The patient was positioned in sternal recumbency and the site was aseptically prepared for surgery. An outline of the planned area of excision was made so that there were 2 cm margins from the tumor in all dimensions (Fig 2A). The skin and mucosa in this outlined area were sharply excised (Fig 2B). Stay sutures were placed at the ventral alar margin to aide in positioning the rotational flap. The rotational flap and a triangular excisional area were then outlined along the dorsal and left lateral aspect of the nose in a manner similar to that reported by ter Harr et al. (Fig 2C). Tissue from the hairless, keratinized dorsocaudal aspect of the nasal planum was incorporated into the rotational flap to help reconstruct the ventrolateral aspect of the right naris. The excisional triangle on the left aspect of the nose was made to prevent a “dog ear” on closure of the defect. The nasal/skin flap was then undermined and stay sutures were used to rotate the flap into the proper position. The flap was sutured in place and the defect on the right lateral aspect of the nose was closed using simple interrupted dermal sutures with 4-0 PDS (Fig 2D). Bilateral nasal airflow was confirmed post-operatively.

After surgery, Abby was maintained on injectable opioids for pain control, crystalloid fluids and monitored overnight. She was discharged the following day with instructions for activity restriction, an Elizabethan collar for 2 weeks, cool compressing of the surgery site for 2 additional days and incision monitoring. She was discharged with prescriptions for tramadol, cephalexin, famotidine and diphenhydramine.

Fig 2. (A) Outline of planned excision. (B) Excised skin from the ventral and right lateral aspects of the right nostril. (C). Line drawing from Fig 1c of ter Harr et al. showing the approximate planned incision for reconstruction. Red area represents the area of tissue excised. The green lines show the planned incision lines for creation of the nasal rotational flap including the part of the nasal planum used to recreate the right wing of the nostril and the triangular excision area used to decrease “dog earring” of the tissue. (D) Frontal view after reconstruction of the nasal planum and closure of the skin.
Follow-up care: The histopathological diagnosis of the submitted mass was a grade II/low grade mast cell tumor with mild cellular atypia and mitotic index of 2. The mass was completely excised with 0.5 cm deep and 0.8 cm lateral margins. C-kit PCR testing was performed on the submitted tissue and this was negative for C-kit exon 8 and 11. At the two week recheck, Abby presented for suture removal and it was noted that the distal-most portion of the skin flap comprising the ventromedial aspect of the right naris had necrosed, but otherwise the tissue appeared to be healing sufficiently (Fig 3A). Bilateral airflow was once again confirmed. Following suture removal, Abby and her owners met with the VMSG Oncology Service. Additional diagnostics consisting of bilateral FNA of the submandibular lymph nodes were submitted. In both nodes, there was reactive lymphoid hyperplasia with a few mast cells. Because it is difficult to know if the mast cells were reactive mast cells or metastatic mast cells, Abby was started on a course of 8 vinblastine injections and prednisone adjunctive chemotherapy. Currently, Abby continues to do well and the owners are satisfied with the cosmetic appearance of her nasal reconstruction (Fig 3C).

Discussion: Mast cell tumors (MCTs) constitute the most commonly encountered cutaneous tumor in the dog. Cutaneous MCTs can be variable in appearance ranging from hairless dermal lesions to inflamed, erythematous and ulcerated lesions. Histologic grade has been clearly established as a strong prognostic factor that is highly predictive of biologic behavior and clinical outcome. Several systems of histopathological grading have been defined. The commonly used Patnaik grading system has the following designations: grade I = low grade, grade II = intermediate grade, grade III = high grade. Grade II can further be divided into subgroups of low grade II (mitotic index ≤5) and high grade II (mitotic index >5). The other grading scheme uses a two-tiered system of simply “high” and “low” grade. The presence of a C-kit mutation has also recently been shown to correlate with higher histologic grade or more aggressive biologic behavior.

Dogs can develop clinical signs associated with the release of vasoactive products from malignant mast cell granules. Histamine released from MCTs is thought to act on parietal cells via H2 receptors resulting in increased secretion of hydrochloric acid and subsequent gastric ulceration. Mechanical manipulation of MCTs may result in degranulation and subsequent erythema and wheal formation in surrounding tissues, a phenomenon referred to as Darier's sign. Perioperative degranulation of MCTs and subsequent release of histamine, heparin and other less characterized vasoactive substances may also lead to hypotension during surgery, excessive bleeding and delayed wound healing. Treatment with H1 and H2 blockers is recommended in patients with MCT to minimize the effects of histamine release in patients where systemic signs or local signs (Darier’s sign) of degranulation are present or where the tumor is likely to be entered or manipulated at surgery.

Surgical excision and radiation therapy are the most effective treatment options known to date for treatment of MCT disease. In tumors localized to the skin in areas amenable to wide excision, surgery is the treatment of choice. Historically, wide surgical margins of 3 cm lateral margins and 1 deep facial plane are recommended as mast cells may be in the periphery of the identifiable mass. More recently, evidence has indicated that 2 cm lateral margins may be sufficient for complete excision of most MCTs. When wide surgical resection is not possible (as when on the face or distal extremities), surgical marginal excision with adjuvant radiation therapy is the treatment of choice for control of local disease. Adjunctive chemotherapy of vinblastine and prednisone were chosen for Abby because her tumor was C-kit negative and there was concern that tumor mast cells could have spread to her lymph nodes.

Historically, tumors associated with the nasal planum have posed a challenge to surgeons to allow for adequate resection of tissue while still being able to achieve a satisfactory cosmetic outcome. The recently reported technique by ter Haar et al. allowed for the resection of the minimum recommended 2 cm margins laterally and a good cosmetic outcome. The one set back of this technique is that there is not a direct cutaneous arterial blood supply associated with this flap. The flap instead relies on the local subdermal plexus making the tip of the flap potentially more prone to necrosis as seen in Abby. Further studies are needed to investigate the ideal size of the flap that must be harvested to prevent partial necrosis. Post-operatively, Abby had a good cosmetic outcome and is currently free of local disease.

References: