



Maxillofacial Surgery for Advanced Practitioners Mini Series

Session One: Oral Cancer and Mandiblectomy

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Oral tumours

Oral tumours account for approximately 6% of all canine tumours. Approximately 40% are benign including the epuli group. The epuli group have now been reclassified as odontogenic tumours. The majority of malignant tumours are non odontogenic tumours and in descending order of frequency are malignant melanoma, squameous cell carcinoma (SSC) and fibrosarcoma.

Classification of oral tumours

Odontogenic	Non Odontogenic
<ul style="list-style-type: none">• Odontoma• Periperal odontogenic fibroma• Ameloblstoma<ul style="list-style-type: none">CentralAcanthomatous	<ul style="list-style-type: none">• Malignant melanoma• Squamous cell carcinoma• Fibrosracoma• Osteosarcoma• Multilobular osteocondrosracoma• Plasmacytoma

Peripheral Odontogenic Fibroma

These arise from the periodontal ligament. They were previously classified as fibromatous and ossifying epulis. Local removal often curative although sometimes needs combining with dental extraction.

Central ameloblastoma

These arise from enamel forming cells. They are slowly growing and expansile with distortion of bone and teeth resulting. They appear cystic on radiographs Their behaviour is benign and surgery with a 0.5-1cm bone margin is curative.

Canine Acanthomatous Ameloblastoma

These were previously classified as acanthomatous epuli or basal cell carcinoma. They arise from the odontogenic epithelium of the gingiva. They are benign but generally invasive into bone. Surgery with a 0.5-1cm bone margin is curative.

Squameous Cell Carcinoma

Gingival SCC is commonly a fleshy ulcerated mass with a predeliction to the rostral mandible. Metastatic rate to region lymph nodes is low approximately 10%. With margins including bone of not less than 1 cm a cure can often been achieved. A worse prognosis is associated with caudal lesions, larger lesions >2cm and maxillary lesions.

Malignant melanoma

Malignant melanoma is typically a pigmented gingival mass however it should be noted that 50% are amelanotic and therefore not visually diagnosed as melanoma. Malignant melanoma is a highly metastatic tumour with 20% demonstrating metastasis at presentation and only 25% of cases surviving one year due to development of distant metastasis. The local disease is often controlled with margins of 1 -2cm. The size of the mass <2cm or >2cm and presence of metastatic disease has a significant effect on prognosis.

A recent development in therapy is the melanoma vaccine. This had made treatment of malignant melanoma much more successful. Dogs with Stage 2 or 3 melanoma which has been locally controlled did not reach median survival time ie 50% dead when the vaccine was given. Stage 2 is a melanoma <2cm without metastasis and stage 3 is less than 2cm with nodal metastasis.

Fibrosarcoma

Fibrosarcomas are often large flat lesions often occurring in the caudal maxilla in dogs. They have a tendency to occur in younger dogs than the other oral tumours. Particularly aggressive forms can be seen in young dogs. Achieving a cure in these dogs can be difficult in these cases with high local reoccurrence rates even with 2-3 cm margins. It is worth being aware of the histologically low grade biologically high grade fibrosarcoma seen in young Golden Retrievers.

Tumour Type	Metastatic rate	1 year survival	Reason for failure
Squamous cell carcinoma	10%	80%	Local reoccurrence
Malignant melanoma	40-70%	25%	Distant metastasis
Fibrosarcoma	20%	40%	Local reoccurrence

Osteosarcoma

Osteosarcoma of the skull accounts for approximately 7% of the total cases seen. It is generally seen in middle aged and older medium-large breed dogs. Survival time is better than for appendicular osteosarcoma. Favourable prognostic indicators include mandibular location and complete excision. Cause of death more commonly local reoccurrence rather than metastasis. A 60% 1 year survival when treated with surgery alone is reported. Role of chemotherapy unknown so its use requires careful case selection.

Multilobular Osteochondrosarcoma (MLO)

These mainly occur on skull and have a typical stippled appearance on imaging. They can be treated with surgery with 2cm bone margins. Unfortunately there is 50% local reoccurrence but median survival is still 800days. The high reoccurrence rate is partly because they tend to occur in locations where the wide bone margins are difficult to achieve.

Clean surgical margins predictive of outcome (Clean margin 1332 days 42% vs Dirty margin 320 days 76%). 50% of cases develop metastasis but time to metastasis prolonged. Grade maybe predictive of outcome with higher grades having higher local reoccurrence and metastasis.

Plasmacytoma

These are an extramedullary plasmacytoma accounting 5.2% of oral tumours. Surgery with 1cm bone margin curative. They are radio sensitive. This is generally a local disease and metastasis or development of multiple myeloma extremely rare.

Non neoplastic oral masses

Eosinophilic granuloma

Ulcerated lesion often seen on hard palate. CKCS over represented. Either spontaneously resolve or respond to corticosteroids.

Dentigerous cyst

Non painful expansile swelling of the bone associated with an unerupted tooth. Usually dogs under 2 years commonly in mandible. Treatment usually curettage of cystic lining

Assessment of oral masses

- **Biopsy of mass**

Due to high variation in biological behaviour pre surgical diagnosis is essential. Ensure tissues such as lip are not contaminated by biopsy procedure as these are used in reconstruction. Ensure biopsies are deep as ulceration and inflammation on the surface is common with oral masses.

- **Assess local extent of tumour**

Minimum of high quality intra oral radiographs. Consider advanced imaging particularly for caudal and extensive lesions. CT scanning is often the most useful modality due to better imaging of bone.

- **Assessment of regional lymph nodes**

Metastasis of oral masses occurs to submandibular, retropharyngeal and parotid nodes. Can occur both ipsilaterally and contralaterally

Palpation inaccurate high rate of false positives and negatives

FNA 80% correlation with histopathology but can only easily aspirate submandibular

Surgical excision for histopathology gold standard but rarely performed pre surgery

- **Thoracic radiographs**

Both inflated lateral views should be performed. Reported incidence of visible metastasis with oral masses at diagnosis is 7%.

Mandiblectomy Techniques

The limits of resection for mandiblectomy include the whole hemi mandible on one side or bilaterally to PM1 (this has been performed to PM4 but this should not be performed routinely. There are a number of types of mandiblectomy depending on the margin required for tumour resection.

Types of mandiblectomy

- Full hemi-mandiblectomy
- Rostral unilateral mandiblectomy
- Bilateral rostral mandiblectomy
- Segmental mandiblectomy
- Vertical mandiblectomy

Equipment required

- Basic surgical kit - blade, tissue forceps, metzumbam scissors, haemostats, needle holders
- Periosteal elevator
- Oscillating saw (if not performing total hemi-mandiblectomy)
- Osteotome and mallet
- Diathermy
- Bone wax (if not performing total hemimandiblectomy)

Preoperative patient preparation

- Broad spectrum perioperative antibiotics
- Good analgesia combination opiates, NSAIDs and local blocks (mental and mandibular)
- Well cuffed endotracheal tube and throat pack to prevent aspiration of blood
- Use of mouth gag to improve oral access

Total Hemi-Mandiblectomy technique

- Position dog in lateral recumbancy
- Incise around the mass with appropriate gingival and if appropriate lip margin.
- Elevate the mucosa from the mandible medially and laterally. Care lingually to preserve the salivary caruncles
- Separate the mandibular symphysis with osteotome and mallet or oscillating saw.
- Continue dissection caudally cutting the muscular attachments as encountered. Identify and ligate mandibular artery

- Elevate muscles from vertical ramus. This is facilitated by cutting the cheek full thickness from the commissure to the rostral aspect of the ramus. Take care to avoid the parotid duct which is usually dorsal to this incision.
- Elevate the digastricus muscles caudo ventrally, the pterygoid muscles medially and the masseter and temporalis muscles dorsally.
- Incise the tempromandibular joint capsule and dislocate tempromandibular joint
- Reappose muscles and mucosa. Suture mucosa with an short duration absorbable suture. Authors preference is Vicryl due to soft knot with good knot security
- Advance the commissure when closing the lip to reduce protrusion of the tongue.

Segmental Mandiblectomy technique

- Position in lateral recumbancy
- Incise at appropriate margin and elevate soft tissues as above to expose horizontal ramus.
- Cut ramus at cranial and caudal margins.
- Start cut dorsally as mandibular artery is located in the ventral third of the mandible and will bleed profusely.
- Once cut is complete clamp bleeding artery and stop bleeding with diathermy +/- small amount of bone wax.
- If cut in bone has damaged tooth roots extract damaged teeth.
- Close by apposition of mucosa.

Rostral Bilateral Mandiblectomy technique

- Position dog in dorsal recumbancy
- Elevate labial tissues with appropriate margins
- Cut bone with oscillating saw
- Often bone cut will leave behind part canine of canine roots which needs removing.
- There is no need to stabilise the two hemi-mandibles together.
- Excise V shaped section of redundant labial skin to improve cosmesis and function.
- Close by mucosa to mucosa simple interrupted suturing.

After care all techniques

- Continue IVFT until dog has adequate oral intake of fluids.
- Soft food for 4 weeks. Most dogs will eat within 24-48 hours post surgery. Feeding tubes rarely if ever required in dogs.
- Opiate analgesia 12-24 hours post surgery
- NSAIDs 7-10 days

- Broad spectrum antibiotics 7 days post surgery
- Collar only required if paws at face or rubs excessively
- No chews, toys and bones for 4 weeks

Complications of mandiblectomy

Haemorrhage

This can be profuse with this procedure. It can be minimised with partial thickness bone cuts initially and making cuts through the ventral third of mandible and caudally last. This is usually seen intra-operatively but can occur in the first few days after surgery if the mandibular artery begins to bleed again.

Wound Swelling

This is common in the first few days and usually resolves with time and NSAID medication. Cold packing can be used if swelling is marked.

Wound dehiscence

This is relatively common reported in up to 33% of cases. Most commonly occurs over the rostral end of the osteotomised bone. It is particularly common over rostral mandibulectomies where there is limited soft tissue to suture. In most cases this will heal by second intention but in cases of large dehiscence debridement, lavage and re suturing is required.

Infection

This is not a common problem as the oral cavity heals rapidly and is relatively resistant to infection due to its extensive blood supply.

Dental malocclusion

Mandibular drift will often occur after mandiblectomy. Generally does not cause a problem but if teeth cause trauma then canine extraction or canine shortening maybe required.

Drooling /tongue droop

This is common but can be reduced by advancing the lip commissure

Mucocele formation

Usually temporary and will resolve. Minimised with careful dissection around base of tongue