



Maxillofacial Surgery for Advanced Practitioners Mini Series

Session Two: Maxillectomy and Surgery of the Nasal Cavity

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Maxillectomy

Maxillectomy surgery can be more complex than mandiblectomy particularly with larger and more caudally located masses. Successful surgery requires a good understanding of anatomy of the bones of the skull particularly in 3 dimensions and good knowledge of vascular anatomy. A skull available at the time of surgery can be helpful.

Types of maxillectomy

- Unilateral rostral maxillectomy
- Bilateral rostral maxillectomy
- Caudal maxillectomy oral approach
- Caudal maxillectomy combined approach

Maxillectomy technique

- Incise around the mass with appropriate margins.
- Elevate mucosa to allow bone cuts to be made
- Ligate major palatine artery if encountered or control haemorrhage with pressure.
- Make partial thickness bone incisions. Bone incisions can be made with oscillating saw, osteotome and mallet or surgical bur. Complete incisions with transaction of the infraorbital canal and caudal incision last as bleeding from infraorbital and sphenopalatine arteries cannot be controlled until whole bone segment is removed.
- Ligate sphenopalatine artery as segment removed.
- Control bleeding from nasal turbinates. Placement of collagen (Lyosypt) over turbinates can help.
- Close defect with a labial flap sutured to mucoperiosteum. 2 layer simple interrupted closure preferred. Sutures can be placed through bone tunnels drilled in maxilla if further security is required. Undermining the hard palate for a few millimetres can help with suturing

Caudal maxillectomy combined approach technique

Tumours of the caudal maxilla and orbit can be particularly challenging due to the limited access and complex anatomy. Resections of the caudal maxilla can extend to include resection of the zygomatic arch, maxillary, frontal and lacrimal bones as well as the eye and other orbital structures. Resection of the infraorbital canal, nasolacrimal duct and nasal turbinates can be performed without significant long term detriment to the patient.

Resection of tumours which are not mainly located intraorally and extend dorsolaterally or caudally is greatly facilitated by a combined intra oral and dorsolateral skin incision (Lascelles et al 2003). This combined incision produces a bilateral flap which improves exposure of the dorsal structures.

With resections involving the orbit care should be taken to avoid damage to important nerves and the eye if being retained. Vision loss and strabismus are reported as complications of orbitectomy when the eye is retained. Excessive traction of the eye should be avoided even if the eye is being removed as part of the resection as the contralateral optic nerve can be damaged via the optic chiasm.

This type of more extensive caudal maxillectomy should not be performed until you are comfortable with more routine rostral maxillectomies.

- Make a skin incision along the dorsolateral muzzle extending ventral to the eye extending along the zygomatic arch. Continue down to bone.
- Preserve the facial vein if possible to help maintain drainage from the flap.
- Create a separate intraoral incision at an appropriate margin on the tumour.
- Undermine between the two incisions to create a bilateral flap.
- Elevate masseter and temporalis from the zygomatic arch as required to perform an osteotomy
- Dorsal osteotomy can be created through the dorsal skin incision.
- Create palatine osteotomy
- A final osteotomy of the orbit is required to free the bone segment. This is performed with an osteotome and mallet and is often relatively 'blind'
- Closure of the skin incision and oral incision are routine as for other maxillectomies.

Bilateral Rostral Maxillectomy

This is performed when rostrally located tumours cross the midline. It can routinely be performed up to PM2 with good results. Will result in some nasal drooping. If severe this can be improved with the cantilever suture technique.

The patient is positioned in dorsal recumbency as most of the surgery is intraoral. The majority of the procedure is as for a lateral maxillectomy. The defect is usually closed with a T shape incision.

Aftercare

As for mandibulectomy

Complications of maxillectomy

Haemorrhage

Care should be taken to monitor blood loss in patients undergoing these procedures. In my experience patients can lose 15-20% of circulating volume during these procedures. Although some of this bleeding is from transection of major vessels such as the intraorbital, maxillary or palatine arteries which can be controlled by ligation, much is from constant ooze from the soft tissues and mucosal surfaces which is more difficult to control. Most patients will require colloid support during surgery to maintain blood pressure but rarely require transfusion.

Sneezing, epistaxis, failure to mouth breath

Care should be taken to ensure patients breathe comfortably when recovering.

Subcutaneous emphysema

This is usually mild and self limiting.

Dehiscence/ Oronasal fistula closure

As for mandiblectomy but dehiscence will result in a fistula necessitating repair. This has been reported in 5-33% of cases. Most commonly occur due to tension and is more common with caudal maxillectomies.

Lip ulceration

Occurs if lip pulled too far into mouth to close defect and trauma is caused by lower canine. The problem maybe potentiated by the loss of sensation in the lip due transaction of the intraorbital nerve during tumour resection. Minimised by ensuring large enough flap created.

Epiphora

Occurs if nasolacrimal duct is disrupted by surgery. Has no significance other than cosmetics.

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.

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. A 7 day course of broad spectrum antibiotic after surgery is recommended.

Nasal discharge

Some mild nasal discharge can persist where nasal cavity is entered. Rarely requires treatment unless obviously purulent.

Mandiblectomy and Maxillectomy in Cats

These procedures can be performed in cats with the same techniques as dogs. However surgery is often more difficult as tumours are often more extensive at diagnosis relative to the size of the maxilla and there is less pendulous lip tissue to reconstruction defects compared to the dog.

Cats also tolerate these procedures less well than dogs. Following mandiblectomy 73% of cats were inappetant following surgery. This usually improves over weeks rather than days.

Approximately 10% of cats never ate voluntarily again after surgery. Grooming problems were also reported in 23% of cats.

On this basis cases should be carefully selected and owners carefully counselled. A feeding tube should be placed post surgery and maybe required for several weeks following surgery.

Surgery of the nasal cavity and planum

Surgery of the nasal planum

Tumours of the nasal planum are relatively common in cats but uncommon in dogs. The most common tumour in both species is squameous cell carcinoma. In cats this arises in the cornified external epithelium and in dogs the mucosal epithelium. If adequate margins can be achieved then surgery is usually curative as the incidence of distant metastasis is low.

Other treatment modalities include strontium plesiotherapy and photodynamic therapy. These are better suited for more superficial lesions and have limited availability. In cats 0.5cm margins are used but ideally 2 cm margins are achieved in dogs.

In dogs the squameous cell carcinoma of the nasal planum is more aggressive than in cats often extending along the nasal septum. Advanced imaging can be useful in dogs to define the extent as physical examination tends to underestimate. To achieve adequate margins a bilateral premaxillectomy is often required. The cosmetic appearance with this procedure is more altered than with nasal planum resection in the cat.

Nasal Planum Resection Technique

- Sternal recumbency with chin elevated on a sandbag. Place bilateral infra orbital nerve blocks.
- Scalpel incision around the nasal planum at measured margin. In the dog the margin may involve the lip and the premaxilla.
- Cut through cartilage of nasal septum to remove nasal planum.
- Suture skin edge to nasal mucosa/ cartilage with simple interrupted sutures to create orifice. Purse string sutures should be avoided as there is a higher risk of creating stenosis.

Sneezing and nasal discharge are common in the first few days after surgery but in most cases this has reduced by 10-14 days. A crust will initially form at surgery site which can be removed at suture removal or may fall off.

Rhinotomy

Rhinotomy is an uncommon procedure. Indications include debulking nasal tumours, foreign body removal, treatment of severe aspergillosis unresponsive to medical management and biopsy procedures. Both dorsal and ventral rhinotomy can be performed however most commonly a dorsal rhinotomy is indicated.

Surgical debulking does not improve prognosis in the majority of nasal tumours where radiation therapy is the standard of care. However it may in very slow growing low grade tumours. Good case selection is essential.

Dorsal rhinotomy technique

- Dorsal midline incision over nasal cavity
- Elevate periosteum laterally both sides to expose nasal bone. Exposure is maintained with gelpi retractors.
- Create a bone flap over nasal cavity. This would be 2-3 cm wide for bilateral rhinotomy in a medium to large breed dog. Leave the bone flap attached rostrally if flap is to be replaced after surgery. Bone can be incised either with a bone saw, burr or osteotome and mallet.
- Flap can be extended over the sinuses if required.
- Bone flap is removed if bone is diseased or radiation therapy is anticipated in the future.
- Turbinates or mass are removed as required. Significant haemorrhage is common surgery this procedure. Suction is definitely required for this procedure. This is minimised by careful technique, lavage with cold saline and packing.
- Care should be taken around the ethmoturbinates caudally due to the risk of brain penetration
- Following surgery the nasal cavity is packed with sterile bandage which is exited via the nostril. This reduces bleeding and is usually removed 24-48 hours after surgery.
- If replacing the bone flap is replaced and secured with large guage PDS sutures or stainless steel wire placed through pre drilled holes on bone.
- Subcutaneous and skin incisions are closed routinely.
- A swab stent is sutured over the incision. This is removed 2-3 days after surgery and helps prevent subcutaneous emphysema.

Complications

- Difficulty breathing post surgery as a result of bleeding and packing
- Continued nasal haemorrhage.
- Subcutaneous emphysema