Surgical Anatomy for Palate Surgery

The major palatine foramen in the dog is located halfway between the palate midline and dental arcade at the level of the distal root of the maxillary fourth premolar. This foramen in the cat is located halfway between the palate midline and dental arcade at the level of the palatal root of the maxillary fourth premolar. The major palatine artery, vein and nerve exit this foramen, course along the length of the palate in the palatine sulcus. The palatine sulcus is located halfway between the midline and dental arch making it relatively easy to find and ligate the major palatine vessels. The artery enters the nasal cavity through the palatine fissure as the rostral septal branch of the nasal septum. At the level of the palatine fissure an arterial branch originates from the major palatine artery and courses on the palate through the interdental space between the canine and third incisor teeth to terminate on the lateral aspect of the incisive bone.

Instrumentation and Suture Materials

Incisions are made with a 15 or 15C blade. Palatal mucoperiosteum is gently “subperiosteally” elevated using an appropriately sized periosteal elevator. Every effort is made to leave a portion of periosteum covering the bone. The tissue being elevated is “sandwiched” between the elevator and the operator’s fingertip. Force is transferred to the finger and minimizes the risk of tearing tissue during elevation. However, mucoperiosteal elevation is easily accomplished in the young patient as the periosteum is loosely attached to the bone. Because of this loose attachment, it is difficult to leave a tissue covering on the bony donor site. The epithelialized margin of mucoperiosteum at the rim of a palatal defect is trimmed using a 15C or 12B blade. The 12B blade is also good for making releasing incisions for soft palate closure. The blade has two cutting surfaces and can be used in a push or pull mode. Sharp iris or Goldman-Fox scissors are used to trim flap margins. Minimally traumatic thumb forceps (Ewald or Bishop-Harman) are used to handle the flap. Any “crushed” areas along the flap margin are removed with scissors. Fragile flaps can be manipulated with temporary stay sutures instead of thumb forceps.

Absorbable suture materials such as polydioxanone, poliglecaprone, and polylactin 910 are used. Polylactin 910 has considerable tissue drag, even when moistened, and may damage fragile flaps. The P3 cutting needle is good for all oral surgery. The RB-1 taper needle is acceptable. For a one-layer closure, polydioxanone in a simple interrupted pattern with knots in the oral cavity is recommended. For a two-layer closure, the deep (nasal mucosal) layer is apposed using polydioxanone in a simple interrupted pattern with knots in the nasal cavity. The oral suture layer is made using poliglecaprone in a continuous pattern. This reduces the number of knots in the oral cavity and may increase patient postoperative comfort.

Surgical Principles

Oral soft tissues are well vascularized, however, the oral cavity is a hostile environment for wound healing. The normal resident bacteria, movement of the tongue and forces from mastication, drinking and swallowing can place stress on surgical repairs. Optimal healing is promoted by observing the following surgical principles:
Preservation of local blood supply
• Atraumatic technique
• Suture lines supported by bone when possible
• Double layer closure if possible
• Avoid suture line tension
• Make the mucosal flaps larger (2-4 mm) than the defect
• Do not oppose intact epithelium
• Protect oral suture lines. Consider gastrostomy or esophagostomy in young patients with friable oral tissues

Cleft Palate
A cleft palate is a congenital oronasal fistula. It is caused by the failure of fusion of the paired palatine shelves between day 25 and 28 of gestation. The primary palate consists of the lip and incisive bone to the level of the incisive papilli. Incomplete closure of the primary palate is rare and results in a cleft lip. The secondary palate is the hard palate caudal to the incisive papilli and the soft palate. Incomplete closure of the secondary palate results in the more commonly recognized cleft hard and/or soft palate. A cleft of the primary and secondary palate may occur. Defects are usually on the midline.

Clinical signs include nasal discharge, difficulty nursing, stunted growth and reduced weight gain. Definitive diagnosis is made on physical and oral examination. Patients are fed by orogastric tube feeding until a minimum age of eight weeks at which time general anesthesia can be safely administered for surgical correction.

Thoracic radiographs are made to evaluate for aspiration pneumonia. If aspiration pneumonia is present, orogastric tube feeding is continued or, in larger animals, a gastrostomy or esophagostomy tube may be placed and all nutritional and hydration requirements and antibiotics are administered through the tube. On average, the pneumonia is resolved in approximately two weeks. Once the pneumonia is resolved, general anesthesia may be induced and the palatal defect closed.

Anesthesia concerns for pediatric patients included hypoglycemia and hypothermia. Endotracheal intubation may limit access for closure of secondary palate defects. Therefore, in certain patients, access to the caudal aspect of the secondary palate is facilitated by intubation through a temporary tracheostomy.

In smaller, younger patients the palatal mucoperiosteum is thin and friable with poor suture retention strength. Suture lines stress can occur with tongue movement, eating and drinking and chewing on foreign objects. In these patients, it may be prudent to place a gastrostomy or esophagostomy tube immediately before starting the palatal surgery. Tube placement at this time will avoid iatrogenic damage to the palatal repair and will minimize suture line stress during recovery. All food and water is administered via the tube for 3-4 postoperative weeks.

Surgical repair of the defect is preoperatively planned. The client must be told that more than one surgery may be needed, especially with larger defects. Most surgical corrections are performed between 8 and 12 weeks of age. Correction may be delayed until the patient is older (4-5 months) depending on the personal preference of the surgeon. Older patients provide easier access to the palate and the palatal tissues are thicker and may provide greater suture retention strength. The proportional width of the cleft over time may or may not narrow, and some defects widen. Before the incision is made, the nasal cavity is irrigated with sterile saline to remove
foreign bodies (food, hair, grass etc.). Closure technique depends on the size of the defect and surgeon preference. Specific flap techniques include unilateral or bilateral sliding bipedicle flaps and overlapping (hinge) flaps. Extremely large defects may require alveolar mucosal flaps combined with tooth extraction to mobilize these flaps to the palate defect area. Releasing incisions are made and flaps elevated. Flaps are made larger than needed to avoid suture line tension. Flap margins are de-epithelialized where appropriate and a tension-free closure is performed using two suture layers (nasal and oral) if possible. Soft palate closure is ideally accomplished in three layers (nasal and oral mucosa and palatal muscle) if possible. Simple interrupted sutures are placed. In spite of the ideal goal of a tension-free closure, in certain circumstances some flap tension may be present (more often with large congenital or acquired palate defects). Vertical mattress sutures are used with tension. Surgical correction of a cleft primary palate is also accomplished using local mucosal flaps.

**Acquired Oronasal Fistulae (ONF)**

Injury from trauma (gunshot, vehicular, falling), electrical shock, periodontal disease and dental extraction can result in oronasal fistulae. With recent gunshot or electrical shock injuries, the full extent of the injury may not be evident at the initial evaluation. A gastrostomy or esophagostomy tube is installed and the ONF serially evaluated over a period of several days. It is best to wait before definitive surgery is performed so that the full extent of the injury is present, otherwise, continued tissue necrosis may result in repair failure. The progression of tissue damage is usually completed by 7-10 days. CT scans are made of trauma patients to identify fracture areas.

Careful planning of the surgical closure is required. During surgery, small bone fragments and devitalized soft tissues are removed. Bone and soft tissues are debrided to grossly normal appearing tissue with a good blood supply. Defect size and location will determine the type of flap(s) needed for closure. Soft palate advancement flaps, greater palatine artery based axial pattern flaps (unilateral or bilateral) or island flaps, and alveolar buccal mucosal flaps can be used for caudal and mid hard palate defects. Mid and rostral hard palate defects may be closed with greater palatine artery rotational flaps, bipedicile alveolar mucoperiosteal flaps, double-layered flaps using palatal mucoperiosteum and labial mucosa or single layer labial mucosal flaps.

An ONF associated with periodontal disease is usually diagnosed using a periodontal probe. Although this condition may be associated with any maxillary tooth or several teeth, the palatal aspect of the canine teeth is often involved. The main clinical sign is often chronic unilateral or bilateral nasal discharge (serous, serosanguineous, mucoid, purulent). Periodontal probing is performed around the entire circumference of each maxillary tooth. A CT scan or maxillary intraoral radiographs are made. Radiographic signs that may be seen with an ONF include bone loss and tooth root resorption. Multiple radiographic views and various angles may be needed to demonstrate evidence of root resorption. Radiographs may also be normal. Occasionally these radiographic signs may be seen and periodontal probing finds no periodontal pockets. The ONF may be too small to locate using the probe or endodontic disease may be the original cause. Extraction of teeth with radiographic root resorption may resolve the nasal discharge.

Oronasal fistulae may also develop at extraction sites where teeth have been extracted due to periodontal disease that eroded the palatal aspect of the alveolus and exposed the nasal cavity. Closure of the extraction site failed resulting in a fistula. The soft tissue epithelialized
margin of the fistula is removed. Surrounding soft tissues are subperiosteally elevated and all abnormal appearing bone debridement. A large alveolar mucosal flap is used to close the defect.

Soft food is fed for 3 weeks. A therapeutic course of antibiotics is administered. Chewing on foreign objects and chew toys is eliminated. If a feeding tube was installed, all food, water and medications are given via the tube. In these patients, a basket muzzle will eliminate the possibility of chewing on foreign objects. Nasal discharge is expected until the chronic rhinitis is resolved.

Dehiscence is the most common complication. In general, additional surgery is performed about 3 weeks after the dehiscence occurred to allow for local tissue blood supply recovery and for reduction in inflammation. Rhinitis may be a life time complication for patients that have had chronic oronasal fistulae with chronic nasal cavity infection.

Selected References