CONGENITAL DEFECTS OF THE SOFT AND HARD PALATE

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The palate separates the oral and nasal cavities. Congenital defects of the hard and soft palate may be due to an inherited trait with incomplete penetrance in the Shi Tzu breed, and possibly in pointers, bulldogs and Swiss sheepdogs. As the branchial arches of fetal development start to merge, occasional disruption may result in these defects. The paired maxillary processes fuse to each other at midline, in what constitutes the secondary palate extending from the level of canine teeth caudally. Disruption in the rostral part, affecting fusion of the incisive bone (premaxilla) with the maxilla, causes defects in the primary palate affecting the maxilla and upper lip in the puppy and kitten.

Sometimes cleft palate follows a familial pattern in the Siamese cat. However, the usual cause is probably an intrauterine insult during the stage when the two palatine halves fuse and results in this sporadic finding of cleft palate in a variety of breeds. Many teratogens, most notably the antifungal agent griseofulvin in the cat, can cause cleft palate, but some other agents like steroids and nutritional factors are also involved.

Cleft palate interferes with sucking ability of the neonate and allows fluid to enter the nasal cavity and many times it leads to death by choking or aspiration pneumonia. When fluid and food enter the nasal cavity, a foreign body rhinitis results and sneezing, gagging and retching during feeding occur. Sometimes cleft palate occurs together with cleft upper lip, due a primary palate defect.

Physical examination usually shows a midline fissure extending from the incisive papilla to the caudal edge of the hard palate although it often occurs together with cleft soft palate. When it only affects to the soft palate, the fissure extends from the caudal edge of the hard palate to the caudal edge of the soft palate. Soft palate cleft alone is rarely seen. When it does appear as the lone defect, it can be either midline or unilateral. Uncommonly unilateral hypoplasia of the soft palate may occur and, rarely, a severely shortened soft palate may result from bilateral absence of the soft palate. On routine examination, the complete absence can be overlooked because the palate defect is symmetrical and does not have a midline cleft.

As usual with congenital defects, neonates should be examined for concurrent congenital defects.

Prognosis without surgical correction is grave. The patient must be maintained until growth is adequate for surgery. Tube feeding is necessary although some cases can be managed with food intake in the upright position to avoid aspiration pneumonia, which, if present, will impose a great risk during anaesthesia, and even if the puppy survives to surgery, it might not recover from the lung disease. Enough tissue for surgical manipulation is usually available at 2 to 4 months of age.

SURGICAL TECHNIQUE

Secondary palatal defects on the midline can be closed with an overlapping flap harvested from lateral to one side of the defect, keeping the edge of the defect intact. Once the flap is elevated it is flipped back over on itself to cover the defect with the palatal epithelium now facing the nasal cavity. The cut edge can be secured under the mucosa on the opposite side of the defect in a "vest-over-pants" technique.

Alternatively, two releasing incisions may be made on either side of the defect parallel to it, close to the dental arcade trying to incorporate the palatine arteries. With release at the edges of the defects as well, these flaps can be elevated to provide sufficient laxity to allow the medial edges to be apposed and sutured. The gap formed at the original releasing incision sites eventually epithelizes.

Several surgical techniques are recommended depending on the width of the cleft. For less than one third of the total palatal width, a bilateral double layer mucoperiosteal flap is best. For less than one tenth of the total width defect a unilateral flap can be fine. I find it a little difficult to perform in the form of two separate layers and sutures, as the portion of tissue to be elevated from the palatal bone is thin and easily torn. I find it much easier to perform the mucoperiosteal flap of Howard. To do this technique, incise the hard palatal mucosa parallel to the defect, a little wider that the cleft to be covered. Two incisions perpendicular to the first one are made which end at the edge of the cleft. The flap is undermined from the bone with a periosteal elevator toward the midline. The edge of the defect on the opposite side and the oral mucosa is undermined for two or three millimeters, performing a releasing incision near the dental arcade on that same side. The first flap is elevated, turned and its free edge placed under the oral mucosa on the opposite side, suturing in a "U" pattern. This technique places much less tension in the suture line than others. Places were mucoperiosteal flaps were harvested are left to heal by granulation and epithelization.

Owners have to be told that multiple surgical sessions could be needed to completely close a large hard palate defect.

Soft palate closure is much easier as its elastic nature makes suture dehiscence unlike. Again, we should try to separate the nasopharyngeal and oropharyngeal layer and suture them separately.

In a case of acquired cleft palate, most of the time it only affects the hard palate. It is very common in cats suffering high-rise falls. Surgical closure is rarely needed they usually will heal by wound contraction, granulation and epithelization.

But there are many other causes for acquired hard palate defects like dental disease, bite wounds, electrical burns, gunshot wounds, foreign body penetration, pressure necrosis or possibly iatrogenic, as in some maxillectomy procedures.
To summarize, the guidelines for successful palatal reconstructions are:

- Treat only symptomatic animals
- Choose the appropriate procedure based on location of the defect.
- Make flaps as large as possible.
- Suture cut edges together, not intact epithelial edges.
- Use two layer closure when possible.
- Do not locate an incision over the defect, if possible.
- Maintain blood supply on the flap.
- Control haemorrhage with firm pressure, avoiding electrocautery.
- Avoid tension in suture line.

**OROSNASAL FISTULA**

They are abnormal communications between oral and nasal cavity. Many times they are due to dental disease or iatrogenically after its treatment.

Even though oronasal fistula is just one part of hard palate acquired defects, I think it is worthwhile to deal with it separately because of its high incidence and particular way of presentation.

The chief complaint in many cases is that owner detects a nasal discharge, most times unilateral, but sometimes it could be bilateral.

Chronic rhinitis may happen in dogs whose teeth appear to be almost normal, but many times they show periodontal disease, including gingivitis and periodontitis or endodontic disease. Less common causes of dentally-related rhinitis include osteomyelitis, bony sequestra and intranasal tooth migration. Gingivitis progressing to periodontitis may result in deep periodontal pockets that can communicate with the nasal cavity, resulting in an oronasal fistula and secondary chronic rhinitis. Fracture of a tooth with result in pulp exposure that frequently leads to development of a periapical abscess, with lysis of the bone around the root and extension of the infection into the nasal cavity.

Animals with fractured teeth may have evidence of facial swelling or a draining tract in the skin or oral mucosa.

The palatal surface of maxillary canine teeth is a common place for oronasal fistula formation. I find it useful to percuss both upper canine teeth and often the affected one, on the side of nasal discharge, elicits a softer tone than the opposite. This different sound pitch is due to a loosened root that cannot transmit vibration to the skull bones.

It is advisable to take a radiograph to check whether there is osteolysis of the maxillae, and to rule out the possibility of neoplasia, although the final diagnosis could only be obtained by performing a biopsy.

**Surgical Technique**

Oronasal fistulas can be covered with just a single flap overriding the already debrided margins of the defect but it only applies to very small fistulas. For most fistulas, a double layer flap is used. The first layer is formed with the surrounding tissues and the second formed by a displaced mucoperiosteal flap. There is also the possibility to make a double layer rotational mucoperiosteal flap. The rotated mucoperiosteal flap is performed in a similar way as for congenital cleft palate. In this case the second layer is harvested from an oral mucosa flap overriding the mucoperiosteal one.

When a reparation has failed at first intention, three to four weeks should pass before a new attempt is made to allow healing of the harvested site and revascularization to occur.

**ELONGANTED SOFT PALATE**

A relative excess in the length of soft palate is the most important problem in airway obstructive syndrome of brachycephalic breeds, seen most commonly in English and French bulldogs, Boston terriers, Pugs, Pekingese and other alike. Other components of the brachycephalic syndrome include stenotic nares and everted laryngeal saccules. Because the maxilla is foreshortened, the caudal aspect of the soft palate extends beyond the tip or the epiglottis and interferes with laryngeal function. At rest, it creates the classical snoring noise during inspiration in affected dogs. During exercise, excitement or other increased respiratory effort, the caudal border of the soft palate may become sucked into the glottis. This condition severely reduces airway diameter, causes trauma to the palate and larynx and creates tissue oedema. The severity of the resulting inspiratory dyspnea depends on the degree of the soft palate elongation, the amount of oedema and the presence of other airway problems.

Clinical signs include gagging and coughing in addition to the common inspiratory noise.

Even if this condition is present at birth most animals are presented for diagnosis when they are about two or three years old.

In advanced cases affected dogs can be presented with severe breathing difficulty, paradoxal thoraco-abdominal respiratory movements, abducted front legs, and even fever in some cases. It is difficult to visualize the oropharynx and larynx of brachicephalic animals because they have thick tongues and exploratory maneuvers could exacerbate the respiratory afflication. An elongated soft palate may overlie the epiglottis by more than two or three millimeters, even more that one centimeter in some individuals.

Elongation of the soft palate can be overestimated when grasping the tongue, as with this pull of the tongue the larynx can move cranially and increase the amount of epiglottis being overriding by the soft palate. I find it more reliable to take a radiograph laterally of the neck with the animal very lightly sedated.

When performing surgical resection, the patient should be positioned in ventral recumbency, hung by the maxillae, using the upper canine teeth as anchoring places for a string secured to a table bridge bar. The jaw has to be secured to the table plane and fully open with the mouth facing the surgeon.
It is important to calculate where to incise the soft palate. Too much removal would result in nasal regurgitation, rhinitis or even sinusitis. If too short, respiratory disturbances would remain. The right place to start the incision is at the level of the caudal third of the tonsils.

To mark the caudal limit, director sutures have to be placed on both sides of the soft palate. With the help of an assistant pulling laterally on these sutures, transect one half of the total palatal width with Metzembaum scissors. An uninterrupted 4-0 absorbable suture (podioxanone) is started from the side to the center, then continue the incision until the excess soft palate is fully removed, and then complete the suturing.

Handling of the edge of the soft palate has to be gentle. In this way, intense oedema will not develop.

Endotracheal tube removal has to be delayed until the patient is showing deglutory movements. Corticosteroids are advisable during surgery as they can minimize swelling.

In rare cases, a tracheostomy tube may be necessary after this surgery even if proper technique has been executed, unless some other grave respiratory disorder exists in the same individual.

References