

Brachycephalic surgery -

Why surgery of nares and palate is often not enough

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Overview of the Issue

Continuous exaggerated breeding for a short head confirmation obviously worsens respiratory distress in brachycephalic breeds. New diagnostic information explains the multi-level obstructions and their impact on breathing, sleeping, feeding and temperature regulation. The well-tried surgical techniques appear to be more and more ineffective in this new type of extreme brachycephaly. Recently developed multi-level surgery involving intranasal, palatal and laryngeal procedures provide the opportunity to treat extreme brachycephaly successfully.

Key Etiologic and Pathophysiologic Points

There are important pathophysiological aspects of this man-made disease. Contrary to common beliefs, dogs do not cool primarily using the surface of their tongue, but use the large, well vascularized surface of the ventral nasal concha, moistened by the liquid of a special nasal gland, for effective cooling by evaporation. The almost complete loss of the nose in brachycephalic animals impedes thermoregulation as a vital function of the canine nose.

Key Clinical Diagnostic Points

Nares: There are well-known and previously less well-recognized anatomical constrictions in the upper airways. Behind the well described and easily visible (outer) stenosis of the nares there is a second (inner) stenosis at the level of the nasal vestibulum. In animals with extreme brachycephalia the standard wedge-resection should be replaced by an ala-vestibuloplasty. Here the outer part of the ala nasi is resected together with the obstructing vestibular part of the nasal wing.

Nasal cavity and nasal exit: Reduction of the bony framework of the nose to less than a third of its natural size inevitably has major consequences on the structures contained within it. A typical endoscopic finding of the stenosis inside the nasal cavity is the marked contact between turbinate lamellae, leaving no space between mucosal surfaces for airflow. In addition turbinates expand as so-called aberrant turbinates into the nasal meatus, obstructing their lumen. We can differentiate between rostral aberrant turbinates (RATs) and caudal aberrant turbinates (CATs), the latter obstructing the nasal exit (nasopharyngeal duct). Intranasal obstruction can be treated by resection of stenosing turbinates, for example with laser-assisted turbinectomy (LATE).

Pharynx: obstruction is characterized not only by an overlong soft palate but a complex of an overlong and overthick palatum, relative macroglossia (bulldogs) and subsequently a compressed nasopharyngeal airway.

Larynx: Endoscopically the larynx of the pug and the French bulldog can be clearly differentiated from each other by shape and appearance. In pugs, the predominant picture is one of laryngeal collapse of varying severity due to a lack of rigidity of the cartilage. If necessary, partial arytenoidectomy Laryngoceles (everted laryngeal ventricles), if obstructing the laryngeal inlet, can be resected completely with microlaryngoscopic laser surgery.

Key Therapeutic Points

Location/Level	Problem	Key Diagnostic procedure	Key Therapeutic procedure	Character of surgery
Nasal entrance	Stenotic nares and obstructed vestibulum nasi	Endoscopy of the nasal entrance	Ala-vestibuloplasty	"cold", avoid thermal energy (Laser/HF-Surgery) to prevent constrictive wound healing
Nasal cavity	Malformed and aberrant growing turbinates obstruct intranasal passageways (RAT)	Anterior rhinoscopy and computed tomography	Endoscopic laser-assisted turbinectomy (LATE) of obstructing turbinates	"hot", thermal laser energy (diode laser 980 nm) is needed to dissect intranasal tissue and coagulate blood vessels
Nasal exit	Malformed and aberrant growing turbinates obstruct intranasal passageways (CAT)	Anterior & posterior rhinoscopy and computed tomography	Endoscopic laser-assisted turbinectomy (LATE) of obstructing turbinates	"hot", thermal laser energy (diode laser 980 nm) is needed to dissect intranasal tissue and coagulate blood vessels
Pharynx	Collapse and Obstruction of the Nasopharynx	Posterior rhinoscopy	Modified palatoplasty, shortening and volume reduction of the soft palate	"cold", avoid thermal energy (Laser/HF-Surgery/Ligasure) to prevent constrictive wound healing

Larynx	Obstructing laryngoceles (everted lateral ventricles)	Laryngoscopy	Microlaryngoscopic laser-assisted laryngocel-ectomy	"hot", thermal laser energy (diode laser 980 nm) is beneficial to resect everted tissue
Larynx	Laryngeal collapse	Laryngoscopy	Partial arytenoid-ectomy	"cold" or "hot"

KEY "TAKE HOME" POINTS

1. Key point 1
Ongoing exaggerated breeding for a short head conformation still worsens respiratory distress in brachycephalic breeds
2. Key point 2
Well-tried surgical techniques appear to be more and more ineffective in this new type of extreme brachycephaly
3. Key point 3
A dog's nose is thought to be essential for effective thermoregulation; this function is compromised in many brachycephalic animals due to intranasal obstructions
4. Key point 4
Multi-level surgery involving Laser-assisted turbinectomy (LATE) and alar-vestibuloplasty may help to treat severe obstructions
5. Key point 5
A fundamental rethink in brachycephalic breeding is essential in order to save the breeds.
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Summary

The Brachycephalic Syndrome (BS) is a well-described combination of hereditary malformations in certain dog and cat breeds. Upper airway disorders dominate the broad spectrum of problems. New diagnostic information explains the multi-level obstructions and their additional impact on sleeping, feeding and temperature regulation. Ongoing exaggerated selective breeding for a short head conformation curtailed the size of the upper airway so much, that well-tried and proven surgical methods seem to fail in more and more brachycephalic dogs. Advanced multi-level surgery involving palatal, laryngeal and intranasal procedures provide the opportunity to treat extreme brachycephaly successfully.