

## **NEW ASPECTS OF BRACHYCEPHALIA IN DOGS AND CATS OPTIONS: TREATMENT MODALITIES**

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### **INTRODUCTION**

The Brachycephalic Airway Syndrome (BAS) is a well described combination of upper airway disorders in predisposed breeds. Reports on the difficulty in breathing of short-nosed breeds of dogs and therapeutic suggestions ascend into the thirties of the last century. Symptoms can vary broadly as well in intensity as in frequency of dyspnoeic episodes. Snoring is the most common manifestation. As worst expression, severe dyspnoea with life-threatening asphyxia and syncopes can be seen. Most authors focus on the same specific anatomic features if they want to characterize BAS and if they want to explain reasons for the respiratory problems: narrow nostrils, elongated soft palate and everted laryngeal ventricles (HARVEY 1982a; HARVEY 1982b; HARVEY 1982c; LORINSON et al. 1997; KOCH et al. 2003). It is remarkable, that all these anatomical structures are located either rostrally or caudally to the nasal cavity itself.

### **RECENT MODALITIES**

Present surgical therapeutic recommendations in BS are well-known and include widening of the stenotic nares, shortening of the elongated soft palate and if required the resection of everted laryngeal sacculi. This triad remained substantially unchanged for a long time (FARQUHARSON and SMITH 1942; TRADER 1949; LEONARD 1957). This is to some extent surprising, because there are several indications that the common therapeutic approach lacks of lasting improvement (LORINSON et al. 1997; TORREZ and HUNT 2006), but the discussion on evidence is controversial (PONCET et al. 2006; RIECKES et al. 2007). In the past, pathophysiologic assumptions and subsequent therapeutic considerations probably concentrated too much on structures being easily visible and accessible, like nares, elongated soft palate and laryngeal sacculi. However, the striking difference between a "normal" and a brachycephalic dog is the "missing nose". We regard the nasal cavity as the primary location where many brachycephalic airway problems predominantly arise and this is the place where our diagnostic and therapeutic efforts started.

### **NEW MODALITIES: LASER ASSISTED TURBINECTOMY (LATE)**

Stimulated by clinical experience along with endoscopic and computer-tomographic examinations, we hypothesized that partial turbinectomy would resolve intranasal obstruction and reduce elevated intranasal airway resistance. Our objectives were to develop intranasal airway stenosis in brachycephalic dogs and to introduce a surgical procedure of laser assisted turbinectomy (LATE) with the purpose of creating patent nasal airways in form of a re-established meatus nasi ventralis (MNV).

In a prospective study we examined and treated 80 brachycephalic dogs with severe respiratory insufficiency. Exclusion criteria were severe laryngeal or tracheal collapse. Three different breeds were represented: Pug, French Bulldog and English Bulldog. Endoscopic examination, CT-Scans and measurement of intranasal airflow resistance (impulse oscillometry, excluding influence of nares and palatum molle) were performed preoperatively to evaluate endonasal obstruction and as a basis for planning the surgical pathway. Endoscopically a DIODE-Laser fibre was used to remove obstructive parts (JANDA et al. 2000; SROKA et al. 2007) of the conchae thus creating a new MNV. Postoperative controls followed with endoscopy, CT-Scans including virtual CT-Endoscopy and measurement of intranasal airflow resistance.

Abnormal conchal growth, obstructing the nasal meatus, was obvious in all dogs. In 49 dogs additionally the choanae and the meatus nasopharyngeus were obstructed by parts of the concha nasalis ventralis (CNV) or the concha nasalis media (CNM). With LATE we could resect the blocking structures and succeeded in creating a patent MNV. This was proved with conventional endoscopy and with virtual CT-Endoscopy. Intranasal airflow resistance was reduced by approximately 50%.

The severe intranasal obstruction we could demonstrate in all dogs of our study allows us to reason that brachycephalic dogs suffer -additionally to the "classical" problems of BAS like stenotic nares and elongated soft palate- from a severe intranasal obstruction with consecutive impaired nasal airstreams and abnormal high airflow resistance.

### **FUTURE DEVELOPEMENT: A MULTIMODAL AND MULTISTAGE APPROACH**

LATE surgery expands and refines the spectrum of surgical techniques for brachycephalic treatment considerably, but it is definitely not the end of the further development of a multimodal and multistage approach to this disease.

#### **Volume Reduction of Soft Palate and Tongue base**

Breeders obviously had been very successful in reducing the bony structures of brachycephalic animals; however, they failed to meet the reduction of the corresponding soft tissues. This problem of redundant masses of soft tissue is well known but stays to be a surgical challenge. Shortening of the overlong soft palate does not reduce its thickness. The soft palate of 10 kg brachycephalic dogs can be three times thicker than the palate of a normocephalic dog of 40 kg BW and occupies valuable space of the upper airways. At present we develop and evaluate techniques to reduce the thickness of the soft palate and to stiffen the tissue simultaneously.

The same is true for the oversized tongue, especially in French Bulldogs. Volume reduction can be achieved with techniques causing localized thermal coagulation. We are evaluating laser assisted and radiofrequency techniques.

#### **Stiffening of a collapsed larynx**

Laryngeal collapse is well described complication of the brachycephalic syndrome. Sometimes it is described as the end stage of this disease but we see more and more very young patients with distinct collapse of the larynx. Here we started to use laser assisted stiffening techniques to stabilize flaccid tissue with so far encouraging results.

## CLOSING WORDS

At the end of a series of sophisticated treatment modalities it has to be pointed out that there is no other effective long-term solution to approach this man-made disaster than to stop exaggerated and wrong breed selection that led to dangerous overemphasis of brachycephalia and resulted in an almost complete loss of the nose and probably several other severe handicaps. At present we are not sure, whether the last possible point of turning back is not overstepped already.

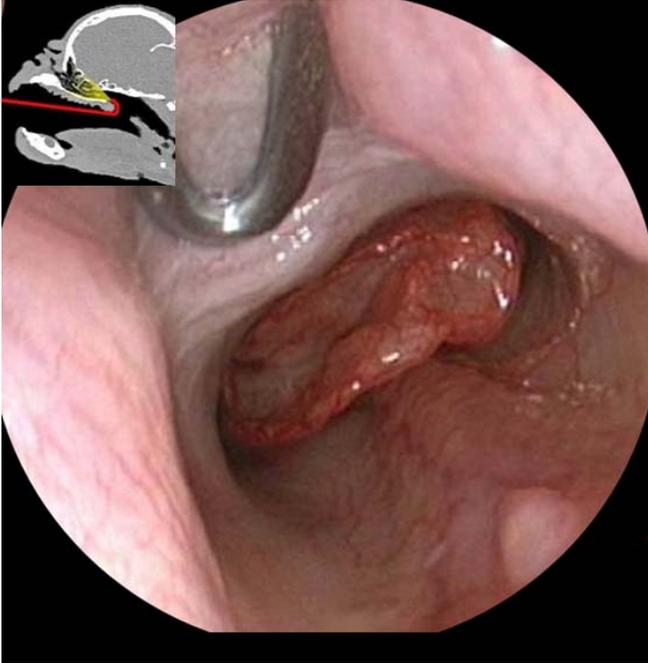


Figure 1: Postrhinoscopic view of aberrant endochoanal conchae in a Pug obstructing the meatus nasopharyngeus

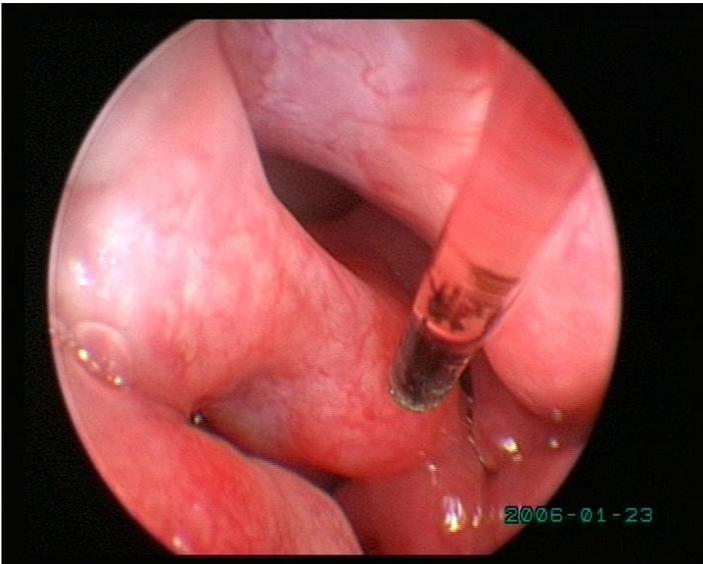


Figure 2: Beginning of LATE surgery: Endoscopic view of the diode laser fibre

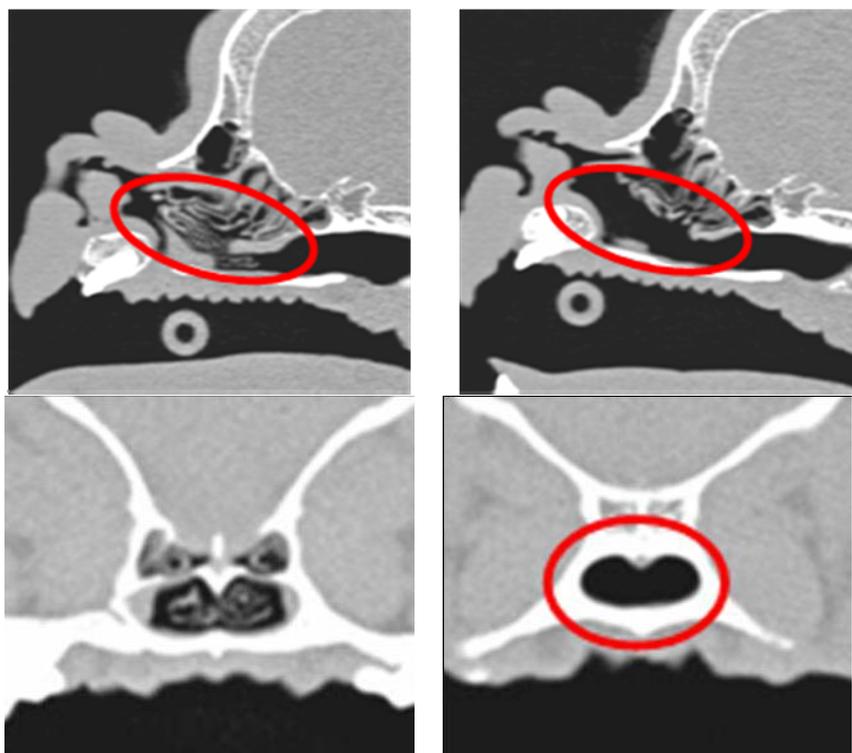


Figure 3: Sagittal and axial CT-scans before and after LATE-surgery

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