BRACHYCEPHALIC AIRWAY SYNDROME, PART 2: LASER-ASSISTED TURBINECTOMY (LATE) – A NOVEL THERAPEUTIC APPROACH

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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 date back to the 1930s. Symptoms can vary widely as well in intensity as in frequency of dyspneic episodes. Snoring is the most common manifestation. In the worst cases, severe dyspnea with life-threatening asphyxia and syncope 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 lateral ventricles. It is remarkable that all these anatomical structures are located either rostrally or caudally to the nasal cavity itself. But the fundamental eye-catching difference between brachycephalic and normocephalic dogs is the "missing" or extremely short nose.

Despite of the fact that today's treatment has remained generally unchanged over the past few decades, the results are not very satisfactory. Stimulated by clinical experience along with endoscopic and computer-tomographic examinations, we hypothesized that internal structures of the extremely reduced nasal cavity obstruct the main intranasal airways.

Our objectives were to evaluate intranasal airway stenosis in brachycephalic dogs and to introduce a surgical procedure, laser-assisted turbinectomy (LATE), with the purpose of creating patent nasal airways in form of a re-established meatus nasi ventralis (MNV).

MATERIAL AND METHODS

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 fiber was used to remove obstructive parts 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.

RESULTS

Abnormal conchal growth obstructing the nasal meatus was obvious in all dogs. In 49 dogs, the choanae and the meatus nasopharyngeus were also 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 verified with conventional endoscopy and with virtual CT-endoscopy. Intranasal airflow resistance was reduced by approximately 50%.

The beginning and end of the surgical pathway was strongly influenced by the expression of aberrant conchae. The presence of rostral aberrant branches of the middle conchae made it necessary to resect them together with the ventral parts of the concha nasalis ventralis. Intense mineralization of rostral aberrant conchae aggravated laser vaporization. Caudal aberrant conchae had to be removed regardless whether they were branches of the concha nasalis media or ventralis.

DISCUSSION/CONCLUSION

The severe intranasal obstruction we were able to demonstrate in all dogs in our study allows us to reason that brachycephalic dogs suffer—in addition to the "classic" 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.

With CT, endoscopic investigations, and measurement of intranasal airflow resistance we could clearly show that conchal tissue obstructs the nasal airway in varying manner and intensity. LATE is an appropriate technique to create a new patent and functional endonasal airway in brachycephalic breeds.

RHINOMANOMETRY

In order to evaluate surgical success objectively, intranasal airway resistance excluding influence of nostrils and soft palate was measured before and after LATE surgery. In addition, the long-term effect on airway resistance was investigated.

Nasal airway resistance of each nasal cavity was measured in anesthetized and spontaneously breathing patients both pre-operatively, one week post-LATE surgery, and 6 months after surgery. By inserting plastic tubes into the nostrils, influence of these structures on airway resistance could be eliminated. The influence of the soft palate on airway resistance was eliminated by retraction of this structure using a hook-shaped instrument or measuring after staphylectomy. The upper airways of all patients were subsequently investigated by endoscopy and CT.

A mean decrease of 69% in resistance could be shown. Pre- and postoperative intranasal airway resistance in pugs was significantly higher than in French bulldogs.

CONCLUSION

Partial turbinectomy (LATE) results in a significant decrease of intranasal airway resistance in dogs with BAS. Differences between breeds are probably due to

differences in body size or/and length of nose. LATE surgery reducing intranasal airway resistance shows an immediate short-term effect and stable long-term effects. The results of this study indicate that LATE is an effective and reliable therapy for intranasal airway obstruction.

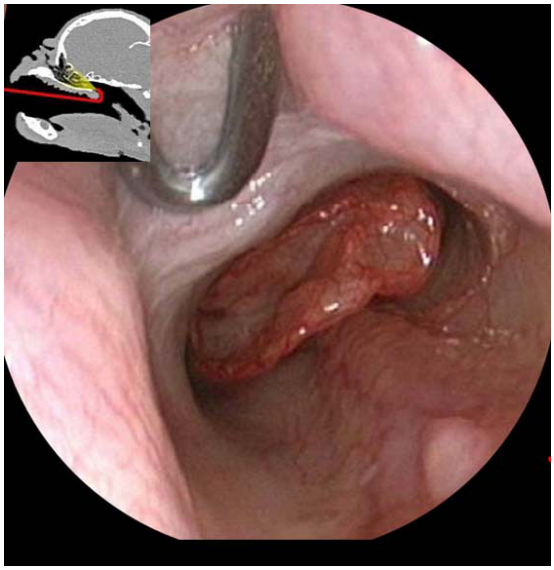

Figure 1. Post-rhinoscopic view of aberrant endochoanal conchae in a Pug obstructing the meatus nasopharyngeus

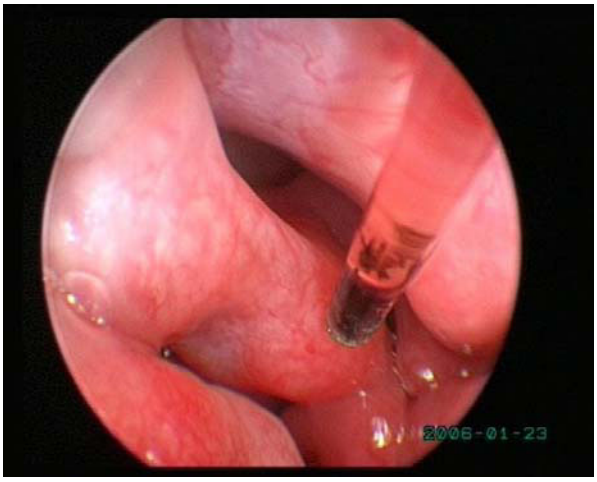

Figure 2. Beginning of LATE surgery: Endoscopic view of the diode laser fiber.

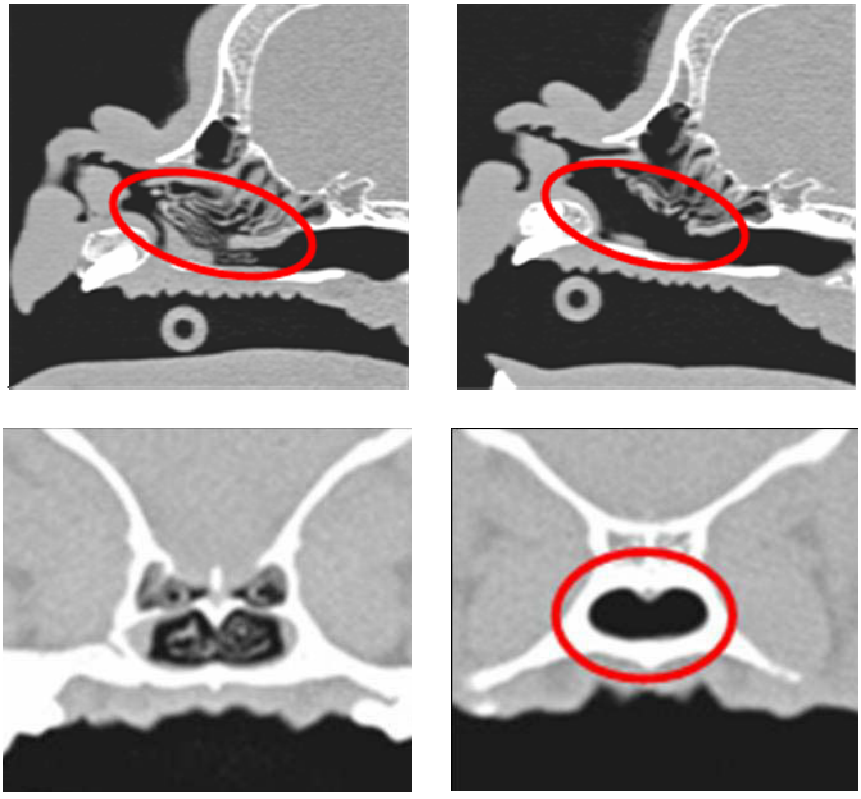

Figure 3. Sagittal and axial CT scans before and after LATE-surgery.