

Change in Minimal Cross Sectional Area Using the New Nasal Dilator, "Airplus"

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In 36 persons without nasal complaints nasal cavities were investigated using acoustic rhinometry (Rhin 2000), to study the effect of a nasal dilator (ND) named "Airplus". The minimal cross sectional area (MCA) of both the right and left side was assessed before and after application of the ND, and the total MCA was calculated as the sum of the right and left side. In 8 persons the MCA was measured before and after 2 applications of the ND. In 8 persons the MCA was measured before, immediately after and 2 hours after application of the ND. In trial one the median total MCA was 1.37 cm² before and 1.96 cm² after application of the ND. This corresponds to an increase of 43%, $p < 0.000 - 01$. In trial two the median total MCA was increased from 1.37 cm² respectively 1.35 cm² to 1.98 cm² respectively 2.01 cm², an increase of 45% respectively 49%, $p < 0.008$ in both. In trial three the median total MCA was 1.21 cm² before and 1.95 cm² immediately after application and 1.93 cm² after 2 hours. The increase was 61 and 59%, $p < 0.008$ in both. The results show that the "Airplus" nasal dilator improves significantly the MCA, it was possible to reproduce the effect and it was stable in the recorded period. *Key words: acoustic rhinometry, nasal dimension.*

INTRODUCTION

Mechanical nasal dilators (NDs) to improve nasal airflow is not a new concept. A United States Patent was issued in 1919 for a dilator conceived to alleviate, e.g., hay fever problems (1). In recent years the most investigated dilator is the Nozovent nasal splint (2–4). This device is placed with 1 end in each of the vestibuli nasi and an extra nasal part extends the alae laterally to improve the airflow. A newly developed variation of the original idea, the "Airplus" nasal dilator, has been introduced. This device is made of a plastic material with adhesive tape on both ends. It is placed on the external side of the nose over isthmus part (Fig. 1). The elastic property of the material creates a lateral pull on the alae. This force is thought to enlarge the most narrow part of the nasal cavity, hereby facilitating the breathing. The goal of the present study is to evaluate the effect of the dilator on the minimal cross sectional area (MCA) in the nose.

MATERIAL AND METHODS

In all 36 normal persons without nasal complaints participated in the study, 22 women and 14 men. Nasal dimensions are evaluated using the acoustic rhinometer Rhin 2000. At each measurement both nasal cavities were examined separately. When the values were stable 3 sets of data were collected from each cavity. The MCA was found and the average of the 3 measurements was calculated. The total MCA (tMCA) is calculated as the sum of the MCA values of the right and the left side. This value is used in the statistic calculations. The investigation is made in 3

trials. In the first trial all 36 persons, 22 women and 14 men participated. In the second and third trial 8 persons, 4 men and 4 women, participated in each trial. In the first trial all persons had both nasal cavities investigated before and after application of the ND. In the second trial the 8 persons had their tMCA measured before and after 2 repeated applications of the ND. In the last trial, the tMCA values were found before and after application of the device and finally 2 hours after application. Non-parametric statistics for paired data was used to evaluate the results and 0.05 used as significance level.

RESULTS

In the first trial the median tMCA value before application of the ND was 1.37 cm² with 25 and 75% percentile's 1.19 cm² respectively 1.51 cm² and a total range between 0.81 and 2.53 cm². After the application all of the ND investigated persons improved in tMCA values with a median of 1.96 cm² with 25 and 75% percentiles 1.57 and 2.13 cm² and range 1.11–2.80 cm² se Fig. 2 ($p < 0.00001$) (Fig. 2). This corresponds to a median increase of 43% in tMCA. In the second trial the median value of the tMCA before the first application of the dilator was 1.37 cm² and a range from 0.83 to 1.79 cm² and after application the tMCA was 1.98 cm² and range 1.42–2.66 cm². Before the second application the median tMCA was 1.35 cm² and the range from 0.83 to 1.57 cm² and after the application the tMCA was 2.01 cm² and the range from 1.12 to 2.41 cm². The increase was 45% respectively 49% ($p < 0.008$ in both cases) (Fig. 3). In the third trial the median value of the tMCA before the



Fig. 1. The ND "Airplus" placed correctly over the isthmus part of the nose. The properties of the material creates a lateral pull on the alae nasi.

application of the dilator was 1.21 cm² and the range from 0.95 to 1.50 cm² and immediately after application the tMCA was 1.95 cm² with a range from 1.27 to 2.06 cm². Two hours after the application the median tMCA value was 1.93 cm² and the range from 1.29 to 2.56 cm². The increase in tMCA immediately after application was 61% ($p < 0.008$). Two hours after the application the increase was stable at 59% ($p < 0.008$) with no difference between measurements immediately after application and 2 hours after ($p = 0.87$) (Fig. 4).

DISCUSSION

Several modalities exists to treat nasal stenosis, such as operations for structural abnormalities (5, 6) and different medications directed mainly at mucosal disease (7). It has been shown that the success of both surgical and medical treatment is intrinsic connected

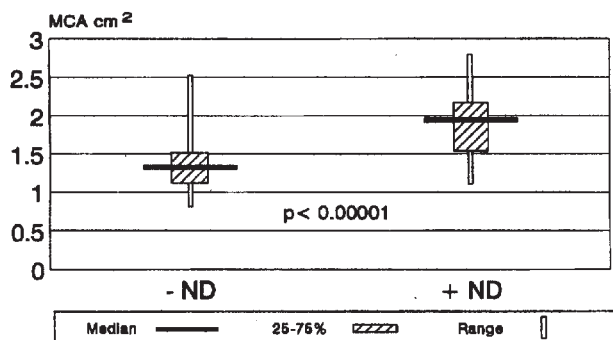


Fig. 2. The result of measurement of tMCA before (-ND) and after application of the ND (+ND) in 36 normal persons.

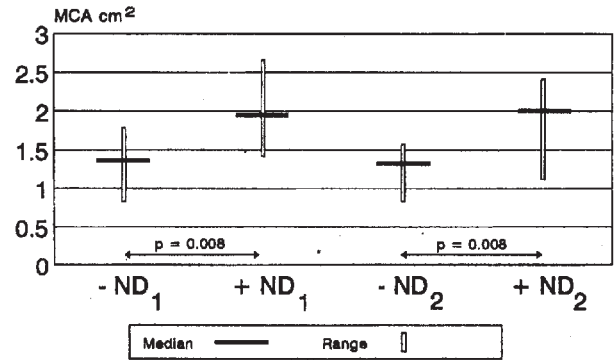


Fig. 3. Results of tMCA measurements in 8 normal persons before (-ND1, -ND2) and after 2 consecutive applications of the ND (+ND1, +ND2).

with achieving more space in the nasal cavity. Increase in nasal flow and cross sectional areas have been evaluated and correlates with effect of treatment (8, 9). The structural changes in the nose caused by the earlier dilators have not been elucidated. The segment in the nasal cavity with the MCA has been shown to account for the majority of the nasal resistance (10). In our study we have found an increase of 43% in the MCA. This increase in MCA should give a comparable decrease in the nasal resistance and facilitate airpassage through the nose. We have furthermore shown that the effect is reproducible and stable. We feel that patients with nasal stenosis due to a narrow anterior part of the nose, e.g., alar insufficiency possibly would benefit from this ND. NDs have earlier been implemented in studies with varying success trying to alleviate snoring caused by nasal stenosis (3, 4). We plan to investigate the effect of the dilator on this and related problems in the future.

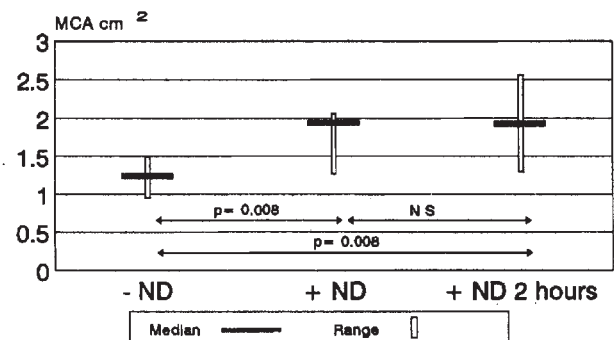


Fig. 4. Measurement of tMCA in 8 normal persons before (-ND), immediately after application of the ND (+ND) and 2 hours after application of the dilator (+ND 2 hours).

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