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The voluntary control of nasal airway resistance

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SUMMARY

The effects of flaring and constricting the alar margins upon nasal airway resistance (NAR) were measured in 24 normal subjects. The median decrease in NAR on flaring was 21% whilst constricting increased NAR by a median of 67%, there being a high inter-subject variation. We feel these movements of the alar margin an important factor in controlling NAR.

INTRODUCTION

There is a well known variability in the rhinomanometric measurement of NAR, not only between different patients but also the same patient measured on different occasions (Eccles, 1987). This variability is usually ascribed to the mucovascular changes affecting the septum and turbinates (Haight and Cole, 1983; Cole et al., 1985) and much less emphasis has been given to the effect of flaring and constricting the alar margin. Strohl (1982), however, thinks these movements of the alar margin are important. The purpose of this study was to assess the magnitude of these voluntary actions upon NAR.

METHOD

33 healthy subjects with no symptoms or signs of nasal pathology had their NAR measured by posterior rhinomanometry; the posterior method being used so the patients could flare and constrict their alar margins unimpeded. Of the 33 subjects tested, 24 were able to perform the necessary posterior method, this being 73% of the total tested. The age range was from 18 years to 48 years with a mean age of 31 years. The NAR was measured on a Mercury NR6 rhinomanometer.

Each of the subjects was allowed 20 minutes acclimatization to the test room and then had their resting NAR measured on three occasions to obtain a stable baseline reading. The subjects then had their NAR measured (1) whilst flaring their alar margins and (2) whilst constricting their alar margins, having had their

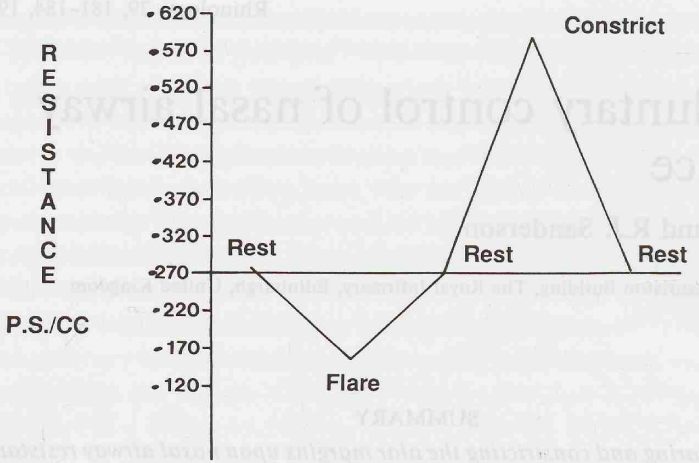

Figure 1. An example of changes in NAR produced by flaring and constricting the anterior nares.

resting NAR measured before and after each manoeuvre. An example is shown in Figure 1.

The percentage change, and absolute values of change of NAR between the resting values and the procedures of flaring and constricting were calculated. The resting value was taken as the mean of the two resting values performed before and after each manoeuvre.

RESULTS

Table 1 shows a summary of the results obtained. These results are also represented as a percentage change of NAR for each individual subject in Figure 2. From the figures it can be seen that of the 24 subjects tested, 19 could flare their nose when asked, the median decrease in NAR being 21%, the range being from 2 to 73%. Five patients constricted their nose when asked to flare, the median

Table 1. Changes in nasal airway resistance of subjects tested.

	resistance change			
	median		range	
	%	Pa s/cc	%	Pa s/c
flare (n=19)	21	0.056	2- 73	0.004–0.114*
constriction on flaring (n=5)	6	0.014	4- 37	0.010–0.086*
constrict (n=24)	67	0.214	6-497	0.137–2.349**

* Wilcoxon $p<0.002$, ** Wilcoxon $p<0.001$

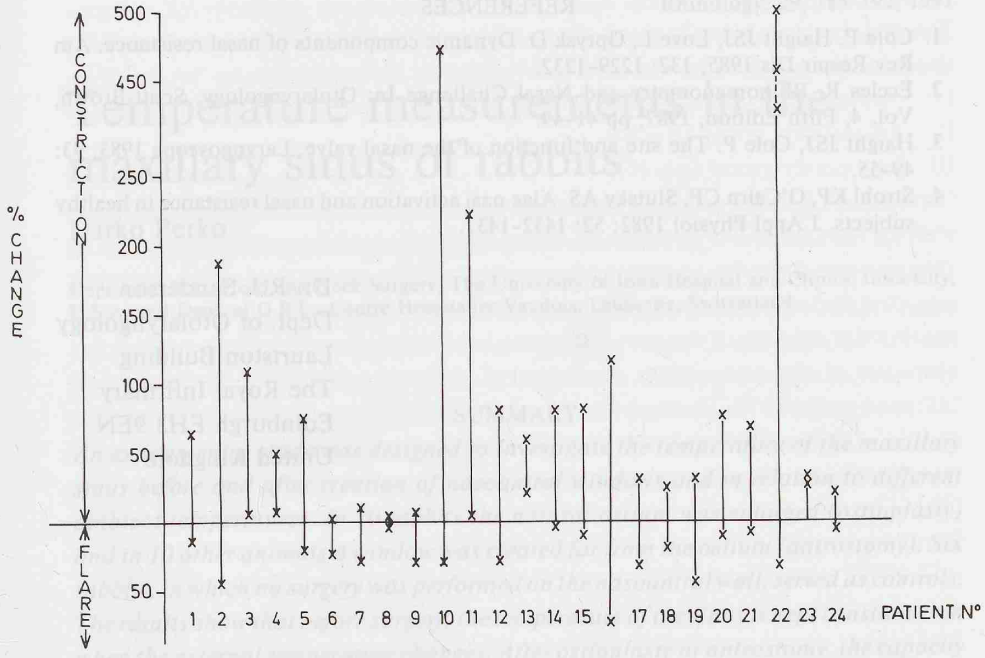

Figure 2. Percentage changes of NAR produced by flaring and constricting the anterior nares of all patients tested.

increase being small at 6%. These results were significant on Wilcoxon testing of the raw data ($p < 0.002$). All 24 patients constricted their alar margins, the median increase in NAR being 67%, the range being from 6 to 497%. These results were significant on Wilcoxon testing of the raw data ($p < 0.001$).

DISCUSSION

From the above data it can be seen that the NAR of an individual can be significantly decreased or increased by flaring or constricting the alar margins respectively but that there is also a high inter-subject variation in the ability of the individual patient to do this. We feel that some of the variability in rhinomanometry may be accounted for by these movements and suggest that alar splintage may be necessary to control this variable, much in the same way that decongestants are applied to the nose to control mucovascular changes.

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