Rhinology, 33, 7-9, 1995

Septal surgery and tubal function: Early and late results*

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SUMMARY

The influence of nasal septal deviation and its surgical correction on the opening pressure of the Eustachian tube was studied. The Tuba Compliance Manometric test by the Valsalva manoeuvre was used. On the basis of early and late post-operative measurements, it was stated that surgical correction of a nasal septal deviation in order to improve the tubal opening pressure is justified, both on the deviated side and on the non-deviated side. Late post-operative results confirmed this finding.

Key words: Eustachian tube, septum, septoplasty, tuba compliance manometric test

INTRODUCTION

The possible relation of nasal pathology as well as the onset and sustaining of middle ear pathology have been discussed before. Becker et al. (1977) and Junker et al.(1977) reported on patients with middle ear involvement and suggested the triggering factor to be handicapped nasal ventilation. Deseta et al. (1977) used external ear canal pressure changes in patients with nasal septal deviation and found a diminished tubal patency. Hulse (1978) worked on randomized case material and used also decongestant nose drops. He used middle ear pressure as a parameter. McNicoll (1979, 1982) noted the beneficial effect of submucosal resection of a septal deviation in patients with the Nose-Ear Distress Syndrome (i.e., nasal septal deviation and Eustachian tube dysfunction without any other pathologies). He put his patients in a compression chamber and used their ability to equilibrate an increase in ambient pressure of 10 m as a criterion of positive Eustachian function. Grady et al. (1983) reported on septoplasty patients with associated ear disease, in whom the ear disease improved after operation.

The present study was performed in order to assess in an objective way the influence of nasal septal deviation on the opening pressure of the Eustachian tube, and to see whether surgical correction of this deviation has any beneficial effect on the passive tubal opening pressure. Early and late post-operative measurements were made.

MATERIAL AND METHODS

The basis for the study was the Tuba Compliance Manometric test (TCM) performed in the passive way by the Valsalva manoeuvre. The test equipment consisted of an American Corporation Impedance Audiometer for measuring middle ear compliance, a Siemens Pressure Transducer 74 for measuring rhinopharynx pressure, and a Siemens Mingograph 34 for recording the individual measurements.

Inclusion criteria for the study were: (1) clear nasal septal deviation (Cottle area IV, V) with objective complaints of diminished nasal patency, documented by active anterior rhinomanometry; and (2) absence of any middle ear disease, documented by normal otoscopy and a normal tympanogram. Allergic rhinitis and a-specific vasomotor rhinitis were exclusion criteria.

A total of eight patients were included in the study. TCM was performed first under normal conditions, then 10 min after a local nasal decongestion was applied (1% xylometazoline spray). The test was performed three times. The first measurements were performed the day before undergoing a septoplasty according to Cottle (pre-operative data). The post-operative measurements were performed four months and approximately five years after surgery.

In this way a total of six values of tubal opening pressure were recorded for each Eustachian tube: with and without local nasal decongestion, and each of these conditions pre-operatively, early post-operatively and late post-operatively. Reproducibility was tested by recording all measurements three times in succession.

The different passive opening pressures recorded are shown in Tables 1-2, where the numbers stand for the mean opening pressure of three consecutive tests, expressed in decaPascals (daPa). An "x" means that the Eustachian tube failed to open at

* Received for publication August 9, 1993; accepted October 26, 1993

Table 1. Opening pressures of the deviated sides (in daPa).

	no decongestion			decongestion		
patient	pre-op	early post-op	late post-op	pre-op	early post-op	late post-op
1	x	610	740	x	500	540
2	x	x	650	x	x	x
3	x	473	790	x	412	780
4	640	673	920	646	560	990
5	510	286	410	600	146	393
6	x	270	x	626	246	930
7	500	496	400	646	523	400
8	800	780	x	746	690	680

Table 2. Opening pressures of the non-deviated sides (in daPa).

	no decongestion			decongestion		
patient	pre-op	early post-op	late post-op	pre-op	early post-op	late post-op
1	x	580	x	x	520	x
2	x	x	850	x	660	700
3	x	526	x	x	466	500
4	530	550	536	506	546	566
5	493	300	490	573	120	500
6	x	x	x	x	x	x
7	486	473	500	466	436	400
8	x	740	950	846	740	630

Table 3. Inspiratory nasal resistance at 150 Pa, mean values and standard deviations are given in Pa/cm^3/s.

	deviated side				non-deviated side			
	no decongestion		decongestion		no decongestion		decongestion	
	pre-op	post-op	pre-op	post-op	pre-op	post-op	pre-op	post-op
mean	0.587	0.398	0.506	0.292	0.491	0.357	0.347	0.289
±SD	0.257	0.162	0.388	0.071	0.263	0.133	0.109	0.109

a maximally-developed rhinopharyngeal pressure achieved by the patient.

The first relation examined was that between the deviated side and the non-deviated side, before and after surgical correction of the septal deviaton. Secondly, pre- and post-operative opening pressures were compared, with and without local nasal decongestion. Thirdly, the effect of local nasal decongestion before and after surgical correction of the deviation was evaluated. All three relations were studied with the early and late post-operative data.

A first consideration of a possible relation was made on the basis of the numerical differences in number of opening Eustachian tubes. Secondly, all data were statistically processed by means of the Friedman test (non-parametric two-way ANOVA) and by analysis of variance.

As a control of ameliorated nasal respiration, the pre- and post-operative rhinomanometric data of the patients were recorded with and without local nasal decongestion. The inspiratory values at 150 Pa were used and the means and standard deviations were noted. The results are shown in Table 3.

RESULTS

The mean opening pressures of the Eustachian tubes that effectively opened is comparable to the values given in the literature for a standard population (Bylander et al., 1983; Moon et al., 1983; Cools et al., 1990): on the deviated side it is 612.5 daPa, and 503 daPa on the non-deviated side.

A first comparison was made between the results of the deviated and the non-deviated side. Pre-operatively, on the deviated side four tubes were open versus three on the non-deviated side. In the early post-operative phase, seven tubes were open on the deviated side versus six on the non-deviated side; the late post-operative phase showed six open tubes on the deviated side versus five on the non-deviated side. Application of local nasal decongestion resulted in a pre-operative ratio of 5:4. The early post-operative ratio was 7:7, whereas the late post-operative ratio was 7:6. Statistical evaluation of the recorded opening pressures gives no statistically significant difference between the values of the deviated and non-deviated sides, neither before or after surgical correction of the septal deviation, nor after local nasal decongestion.

Secondly, a comparison was made between pre- and post-operative results, both early and late. On the deviated side four tubes were open pre-operatively, seven were open early post-operatively, and six were open late post-operatively. After local nasal decongestion, five tubes were open pre-operatively, seven were open post-operatively, and seven were open late post-operatively. On the non-deviated side, three tubes were open pre-operatively, six were open early post-operatively, and five were open late post-operatively. Local nasal decongestion resulted in four open tubes pre-operatively, seven open tubes early post-operatively, and six open tubes late post-operatively. Statistical processing of the recorded opening pressures showed no significant difference between the pre-, early post- and late post-operative values, neither on the deviated side nor on the non-deviated side. After application of local nasal decongestion the difference was significant on the deviated side ($p=0.044$), but not on the non-deviated side. The early post-operative difference was even more significant ($p=0.013$).

The early and late post-operative results showed no statistically significant difference. Considering the factor time without making difference neither in deviated and non-deviated, nor in non-decongested and decongested, there was a statistically significant difference in opening pressures ($p=0.006$).

In examining the effect of local nasal decongestion on the deviated side we found that pre-operatively four tubes were open without and five were open with local nasal decongestion. Early post-operatively seven tubes were open without and with local nasal decongestion. Late post-operatively six tubes were open without and seven were open with local nasal decongestion. On the non-deviated side, pre-operatively three tubes were open without and four tubes were open with local nasal decongestion. Early post-operatively six tubes were open without and seven tubes were open with local nasal decongestion. Late post-operatively five tubes were open without and six were open with local nasal decongestion. Statistically the difference in all these opening pressures was significant ($p=0.022$).

DISCUSSION

The data presented in this study were measured in patients with a distinct septal deviation and without any ear abnormality. TCM has been demonstrated to be an objective, reliable and fast test (Gersdorff et al., 1973; Cools et al, 1990). The recorded data confirm that there is no difference between the deviated and non-deviated sides. A septal deviation, therefore, has as much influence on the passive opening pressure of the Eustachian tube on the deviated side as on the non-deviated side.

Surgical correction of a septal deviation gives a clear increase in the number of Eustachian tubes that open, in the early post-operative phase as well as in the late post-operative phase. This quantitative increase is constant in time. The difference is made qualitative by adding local nasal decongestion.

The influence of local nasal decongestion in the presence of a nasal septal deviation is limited without surgical correction of the deviation. The combination of both surgery and local nasal decongestion is quite effective to reduce the passive opening pressure of the Eustachian tube. This finding would suggest that concomittant with the surgery, it is important to rule out any other reason for mucosal swelling of the nose (e.g., infection, allergy). These results coincide with those of the previously mentioned authors.

In summary, we feel that surgical correction of a nasal septal deviation in order to improve the passive opening pressure of the Eustachian tube is justified. Whether the nasal septal deviation is ipsi- or controlateral to the malfunctioning Eustachian tube should not interfere in taking the decision to operate. The positive effect of surgical correction is long lasting, and local nasal decongestion improves the obtained result.

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ANNOUNCEMENTS

'NOSE' DISCUSSION GROUP

A group has recently been formed to discuss research in nasal physiology, pharmacology, pathophysiology, common cold, hay fever, nasal measurements such as rhinomanometry and acoustic rhinometry, and the treatment of nasal disease, including nasal surgery. If you would like further information on this group which is linked by electronic mail and uses an electronic mail server, please send an e-mail request for 'further information on nose' to nose-1@cardiff.ac.uk.

ASEAN RHINOLOGY GROUP FOUNDED

During the 6th Asean ORL Congress held in Chiang-Rai, Thailand, in November 1994 an has been "Asean Rhinology Group" was founded. President is Dr. Chaweewan Bunnag from Bangkok (Thailand), Vice-President is Balwant Singh Gendeh from Kuala Lumpur (Malaysia), Secretary is Damayanti Soetjipto from Jakarta (Indonesia), Treasurer is Benjamin Campomanes from Manilla (Philippines). Other members are: Prof. N. Rifki (Jakarta, Indonesia), Dr. Gil M. Vicente (Manilla, Philippines), Dr. Kanit Muntarbhorn (Bangkok, Thailand), Dr. M. Hamzah (Kelantan, Malaysia), Dr. Chew Chuan-Tieh (Singapore), Dr. N. Kunaratnum (Singapore), Dr. Joseph Lim (Brunei Darussalam).