

Mucociliary function in the early weeks after nasal surgery

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SUMMARY

A prospective trial was carried out to assess whether mucociliary clearance (MCC) is either adversely affected or improved in the early weeks after nasal surgery. Three different subgroups of patients were studied: those having septoplasty, nasal polypectomy, or turbinectomy. MCC was assessed by the saccharine transport method. 40% of patients with deviated nasal septum, 59% of patients with nasal polyps, and 75% of patients with chronic rhinitis refractory to medical treatment (turbinectomy group) had abnormal MCC pre-operatively. At three weeks after operation there was no significant improvement or deterioration in MCC either in the whole patient population or in any of the three subgroups. Persisting mucociliary dysfunction may be an important factor in causing post-operative stasis of secretions, crusting, secondary infection, delayed healing, and patient discomfort.

INTRODUCTION

Nasal obstruction is associated with impaired mucociliary clearance (MCC), whether due to pathology of the nasal mucosa (Greenstone et al., 1983; Hady et al., 1983; Golhar, 1986), structural deformity (Ginzel and Illum, 1980; Barr, 1989), or simply occlusion of the nose with a clamp (Deitmer and Erwig, 1986). The operation of septoplasty has been shown to improve MCC measured at three months after operation (Ginzel and Illum, 1980; Barr, 1989). It would seem likely that any operation to restore a normal airway would also result in an improvement in pre-operative mucociliary stasis.

However, although normal MCC is likely to be re-established at the time that the nasal mucosa becomes completely healed after surgery, this healing process can take several weeks or even months to occur.

The first few weeks are a critical time for post-operative healing and restoration of function. We felt that it was important to establish whether MCC is significantly altered in the first few weeks after surgery. Persisting mucociliary

dysfunction at this time might have an effect on the degree of stasis of secretions, crusting, secondary infection, and resultant patient discomfort.

MATERIAL AND METHOD

57 consecutive patients having intranasal surgery to relieve nasal obstruction were studied. Of these, eight failed to attend their follow-up appointment at exactly three weeks, leaving 49 patients who had both pre- and 3-weeks post-operative assessments. This group consisted of 30 males and 19 females, age range 16 to 69. Twenty patients had a septoplasty, 12 had turbinectomy, and 17 had bilateral nasal polypectomy (patients having more than one procedure at operation were excluded).

In the post-operative period patients used steam inhalations if they wished, but no pharmacologically active substances which might affect ciliary function (such as ephedrine drops) were allowed. All patients had their MCC measured less than 24 hours pre-operatively by the Saccharine Transport method (Rutland and Cole, 1981). They were then seen at three weeks post-operatively to repeat the measurements. Patients who failed to taste the saccharine were recorded as "non-tasters" (after checking that they were able to taste the saccharine on the tongue), as it was impractical to keep them waiting longer. Although many of these patients would taste the saccharine within a few hours, a time of over 30 minutes is markedly delayed compared to normal, and therefore knowledge of the exact time after this was not relevant to this analysis.

As some patients failed to taste the saccharine during the time of the test, and therefore failed to give a result in terms of an exact time, it was not possible to calculate a mean or standard deviation of the times. Instead, the percentage of patients with abnormal (prolonged) time was calculated. For this purpose a time of 15 minutes or longer was taken as prolonged, in keeping with numerous previous studies of normal saccharine transport (Yergin et al., 1978; Ginzel and Illum, 1980; Sakakura et al., 1980; Golhar and Arora, 1981; Maurer et al., 1982; Greenstone et al., 1983; Passali and Ciampoli, 1985; Golhar, 1986).

To test whether there was a significant difference between pre- and post-operative results for each group, the χ^2 test was used (with Yates' correction for the turbinectomy group). The two-tailed Wilcoxon matched pairs signed rank test was also used, to assess pre- and post-operative results of individual patients directly.

RESULTS

Table 1 shows the percentage of patients with abnormal (prolonged) MCC pre-operatively and post-operatively. 55% of patients were abnormal pre-operatively. There is no significant change post-operatively, either when all patients are included together, or when different operation subgroups are considered

Table 1. Percentage of patients with abnormal MCC before and after operation. (NS = No significant difference between pre- and post-operatively).

	septoplasty n = 20	polypectomy n = 17	turbinectomy n = 12	all patients n = 49
pre-operatively	40	59	75	55
3 weeks				
post-operatively	40	59	50	49
significance	NS	NS	NS	NS

separately. ($\chi^2 = 0$ for septoplasty, 0 for polypectomy, 0.7 for turbinectomy, and 0.2 for the whole group; $p > 0.05$).

Comparing pre- and post-operative times for individual patients using the Wilcoxon signed rank test, there is again no significant change in the times either in the whole group or in any subgroup (septoplasty $T = 55$, $n = 16$; polypectomy $T = 38$, $n = 12$; turbinectomy $T = 17$, $n = 11$; whole group $T = 338$, $n = 39$; $p > 0.05$).

DISCUSSION

The results show that mucociliary clearance at three weeks after operation has neither significantly improved nor deteriorated compared with before operation. This is true for each of the operation subgroups, each of which represent different nasal pathology.

As it is known that MCC measured three months after septoplasty is significantly improved compared with pre-operatively (Ginzel and Illum, 1980; Barr, 1989), we can now assume that this improvement occurs later than three weeks.

The significance for the post-operative healing phase is that it is now established that there is a continuing impairment of MCC at this time, which may in part be responsible for stasis of secretions and potential secondary problems such as crusting and infection. It is possible that medications that can improve MCC, such as β -sympathomimetic agents (Ohashi et al., 1983; Sakethkoo et al., 1978), may have a role to play in hastening healing and reducing post-operative problems.

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