

Pre and Post Treatment Mucociliary Function in Allergic Rhinitis in Three Different Treatment Modalities

L M Lee, MS (ORL-HNS), B S Gendeh, MS (ORL-HNS)

Department of Surgery, (Otorhinolaryngology), Faculty of Medicine, Universiti Putra Malaysia, Asrama Jururawat, Jalan Masjid, Hospital Kuala Lumpur, Jalan Pahang 53000 Kuala Lumpur

Summary

Allergic rhinitis causes an impairment of the mucociliary function in the nose. It is hoped that treatment of perennial allergic rhinitis would be able to revert mucociliary function to normal. This study aims to compare pre and post treatment mucociliary transport time in 3 different treatment modalities. Ninety-two newly diagnosed patients with allergic rhinitis were randomised into 3 groups and started on different treatment regimes. At the end of 8 weeks, the group treated with only intranasal beclomethasone showed some, though not significant, improvement in the mucociliary function. There were no changes in the mucociliary function in the other two groups treated with beclomethasone and loratidine or loratidine alone.

Key Words: Mucociliary function, Allergic rhinitis

Introduction

This study aims to investigate if treatment of allergic rhinitis with intranasal topical steroid and antihistamine will change the mucociliary function in allergic rhinitis. It has been shown that mucociliary function in allergic rhinitis is impaired^{1,2}. There has been little study to document how mucociliary changes with treatment of allergic rhinitis. There has been no study to document changes in mucociliary function in patients with allergic rhinitis on antihistamine. Mucociliary function is an important primary defense mechanism of the

nose. Impairment of mucociliary function is associated with sinusitis and nasal congestion. The saccharin transport time test has been used in this study to record the mucociliary function, as it is reliable and reproducible³.

Materials and Methods

All new referrals to the ENT clinic in Hospital UKM with the diagnosis of allergic rhinitis from August 1999 to September 2000 were recruited into the study. The patients must volunteer for the saccharin transport test to measure the

This article was accepted: 10 October 2002

Corresponding Author: Lee Leong Meng, Department of Surgery, Faculty of Medicine University Putra Malaysia, Asrama Jururawat, Jalan Masjid, Hospital Kuala Lumpur 50586 Kuala Lumpur

mucociliary function. All the patients included in the study were not on intranasal steroid spray or oral antihistamine for at least one month prior to treatment. Patients who has sinusitis, polyp, deviated nasal septum and previous surgery were excluded from the study.

Mucociliary function was measured using the saccharin transport time as described by Anderson (1974)³. All the patients were seen by the main author and a complete history and clinical examination was performed. If needed nasal endoscopy was performed to exclude other pathology. A skin prick test is also performed. These patients were divided randomly into 3 groups and started on 3 different treatment regimes.

- Group 1: intranasal beclomethasone spray
- Group 2: oral loratidine 10mg daily
- Group 3: intranasal beclomethasone spray and oral loratidine 10mg daily

After 8 weeks of treatment the patients were assessed for symptomatic improvement and the saccharin transport time repeated.

Results

A total of 111 patients visited this clinic with complaints suggestive of allergic rhinitis. Ninety-two patients were included into the study. The other nineteen patients were excluded mainly because of the presence of infection, previous surgery or had other on going treatment. A total of 71 patients completed the necessary follow up. Twenty-one patients were unable to complete the study. The main reasons were not attending follow up, being unable to tolerate the saccharin test and non-compliance with the treatment regime.

For the final analysis, a total of 71 patients were included. The most common age group was 11 to 20 years. The subjects' ages range from 7 to 56 years old. The sex distribution was almost equal with 34 males and 37 females. The racial breakdown was 55% Malay, 38% Chinese, 6% Indians and 1% others.

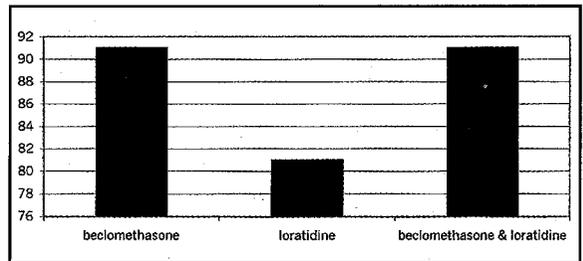


Fig. 1: Percentage of patients showing good response to treatment in each group.

These 71 patients were divided into 3 groups. Their response to treatment is shown in Figure 1. All 3 groups showed good symptomatic improvement with treatment.

Patients in group one on intranasal beclomethasone spray showed an improvement in the mucociliary function after treatment. The average saccharin transport time (STT) was 688 seconds pre treatment and 579 seconds post treatment. However, using the student t test for paired samples, there was no significant difference between the mean times (p=0.16). In group two, the patients were treated with loratidine alone. The pre and post treatment STT were 507 seconds and 502 seconds respectively. In group 3, the patients were treated with loratidine and intranasal beclomethasone spray. The pre and post STT were 603 seconds and 617 seconds respectively. In both group 2 and 3 there were no significant changes in the mean STT pre and post treatment.

Table 1: Average pre and post treatment saccharin transport time in patient on these different modalities

	Average pre treatment STT (sec)	Average post treatment STT (sec)
Beclomethasone (n=23)	688	570 (p=016)
Loratidine (n=22)	507	502
Beclomethasone & Loratidine (n=26)	603	617

Discussion

Allergic rhinitis is a common disease and affects a large population. Its treatment commonly consists of antihistamine, intranasal steroid or both. These patients usually improve but sometimes they have persistent lingering symptoms. Previous literature reports have shown patients with allergic rhinitis have impaired mucociliary function compared to the normal healthy population^{1,2}. Treatment of allergic rhinitis should ideally revert the mucociliary function besides providing symptomatic improvement, as the mucociliary function is an important component of normal nasal physiology.

Mucociliary function can be measured objectively by a few methods. The saccharin transport time (STT) as describe by Anderson *et al*³ (1974) has been shown to be reliable method to measure mucociliary function and is reproducible in the same individual. The STT may differ widely between different individuals but is rather consistent in the same individual. In this study, the STT is compared only between the same groups of individual. Mucociliary transport time measured using the saccharin test is the most relevant clinical parameter assessing the mucociliary function of the nose⁴. Other factors that may affect the STT were carefully excluded; these include environmental temperature, posture, presence of infection, previous surgery and other on going treatment.

In the group treated with intranasal beclomethasone alone, an improvement of the

mucociliary time was noted. This was not significant using the student t test. In a recent study performed using intranasal mometasone furoate in patients with seasonal allergic rhinitis, it was shown that this intranasal steroid spray produces a significant improvement in the mucociliary function compared to the placebo group⁵. This suggests that the mucociliary dysfunction in allergic rhinitis is reversible with topical corticosteroid. However, this study⁵ was performed on patients with seasonal allergic rhinitis. In our study all the patients have perennial allergic rhinitis and the improvement in STT was not statistically demonstrable. This may also be due to different potency and effectiveness of the topical steroid used. In perennial allergic rhinitis the mucociliary dysfunction may be more resistant to treatment than in seasonal allergic rhinitis. There has been a suggestion that the preservative used in our intranasal spray, benzalkonium chloride, may have an adverse effect on the nasal mucosa by impairing the STT⁶. Treatment of allergic rhinitis should aim to reverse the mucociliary dysfunction besides providing good symptomatic improvement. Impaired mucociliary function in allergic rhinitis may contribute to the development of sinusitis and nasal congestion due to poor clearance of mucus from the nose. Topical intranasal steroid may be able to achieve this and require further studies.

Treatment of allergic rhinitis with oral loratidine alone or loratidine with intranasal beclomethasone provides good symptomatic control of the disease with little change in the mucociliary function. This may be due to persistent minimal inflammation in the nasal

mucosa although the patients are asymptomatic. Oral antihistamines do not improve the mucociliary dysfunction, as they do not affect many other inflammatory mediators involved in allergic rhinitis besides histamine. Prolong

continuous usage of oral antihistamine may also further impair the STT. This may have neutralized any improvement of the STT attributed to intranasal beclomethasone spray.

References

1. Schuhl JF. Nasal mucociliary clearance in perennial rhinitis. *Journal in investigation of allergy and clinical immunology*. 1995; 5: 333-36.
2. Mahakit P, Pumhirun P. A preliminary study of nasal mucociliary clearance in smoker, sinusitis and allergic rhinitis patients. *Asian Pacific Journal of Allergy and Immunology*. 1995; 13(2): 119-21.
3. Anderson I, Cammer P, Jenson PL, Philipson P, Procter D. Nasal clearance in monozygotic twins. *American review of respiratory disease* 1974; 110: 301-5.
4. Jorissen M. Correlations among mucociliary transport, ciliary function and ciliary structure. *American Journal of Rhinology* 1998; 12: 53-8.
5. Meltzer EO, Jalowayski AA, Orgel HA, Harris AG. Subjective and objective assessment in patients with seasonal allergic rhinitis; effects of therapy with memethasone furoate nasal spray. *Journal of clinical immunology* 1998; 102: 39-49.
6. Breg O.H, Lie K, Stienvag SK. The effect of topical corticosteroid on rat respiratory mucosa in vivo, with special reference to benzalkonium chloride. *Allergy* 1997; 52: 627-32.