Acta Medica Okayama

Volume 37, *Issue* 2 1983 *Article* 10

APRIL 1983

Maximal expiratory flow-volume patterns in airway allergy.

Tadamichi Meguro* Masana Ogata† Keiko Nishioka‡

Mayu Yamanaka** Yoshiro Ogura††

*Okayama University,

†Okayama University,

‡Okayama University,

**Okayama University,

††Okayama University,

Maximal expiratory flow-volume patterns in airway allergy.*

Tadamichi Meguro, Masana Ogata, Keiko Nishioka, Mayu Yamanaka, and Yoshiro Ogura

Abstract

We considered upper and lower airway allergies as different phases of airway allergy and MEFV patterns to vary according to the intensity of airway obstruction in maximal expiratory flow-volume and volume-time tests on fourteen patients with nasal allergy, two with allergic bronchitis, two with bronchial asthma, and sixteen nonsmoking healthy subjects. In nasal allergy, flow changes during high lung volumes were different from those in allergic bronchitis and bronchial asthma, and MEFV patterns in nasal allergy were more widely varied than those in allergic bronchitis and bronchial asthma. We classified MEFV patterns into five ones.

KEYWORDS: MEFV pattern, airway allergy, nasal allergy, bronchial asthma, type of MEFV pattern

*PMID: 6869066 [PubMed - indexed for MEDLINE]

Acta Med. Okayama **37**, (2), 163−166 (1983)

—— **BRIEF NOTE** ——

MAXIMAL EXPIRATORY FLOW-VOLUME PATTERNS IN AIRWAY ALLERGY

Tadamichi MEGURO, Masana OGATA, Keiko NISHIOKA*, Mayu YAMANAKA* and Yoshiro OGURA*

*Department of Public Health, and *Department of Otorhinolaryngology, Okayama University Medical School, Okayama 700, Japan*

Received November 30, 1982

Abstract. We considered upper and lower airway allergies as different phases of airway allergy and MEFV patterns to vary according to the intensity of airway obstruction in maximal expiratory flow-volume and volume-time tests on fourteen patients with nasal allergy, two with allergic bronchitis, two with bronchial asthma, and sixteen nonsmoking healthy subjects. In nasal allergy, flow changes during high lung volumes were different from those in allergic bronchitis and bronchial asthma, and MEFV patterns in nasal allergy were more widely varied than those in allergic bronchitis and bronchial asthma. We classified MEFV patterns into five ones.

Key words: MEFV pattern, airway allergy, nasal allergy, bronchial asthma, type of MEFV pattern.

Spirometric procedures are used routiney in examinations of lower airway allergies, including bronchial asthma, but not so often in the field of otorhinolaryngology. Grossman *et al.* (1) and Yajima *et al.* (2) have reported on small airway obstruction in allergic rhinitis, but did not mention flow changes during high lung volumes (from the PFR to about 50 % of vital capacity) of the MEFV curve.

The purpose of this study is to determine specific MEFV patterns during high lung volumes and classify MEFV patterns according to various airway allergies including nasal allergy, allergic bronchitis and bronchial asthma.

Materials and Methods

Eighteen patients, fourteen with nasal allergy, two with nasal allergy accompanied with bronchitis, and two with nasal allergy accompanied with bronchial asthma, were chosen while they were under medical supervision at the Nasal-allergy Outpatient Clinic of the Department of Otorhinolaryngology of Okayama University Hospital and at the Respiratory-allergy Outpatient Clinic of the Department of Internal Medicine of the same hospital. All the patients took anterior rhinoscopic, hematological, and allergic immunological (intracutaneous test, nasal provocation test, total serum IgE and specific IgE antibody [RAST]) examinations. Allergens of all the patients were determined. Likewise, sixteen healthy subjects, all of whom had no symptoms of airway allergy (nasal, bronchial and asthmatic symptoms), no family histories of allergy, had no smoking habits, underwent similar tests.

A flow-volume curve recorder (AS-4500, Minato Medical Science Co. Ltd.) was used to measure expiratory V-T and F-V simultaneously from which data MEVT and MEFV curves were drawn also simultaneously. The measurements were made in the sitting position, and the chart from the first measurement was not used in this study.

Results

Maximal expiratory flow-volume patterns in airway allergies. Maximal expiratory flow-volume patterns (MEFV patterns) are shown in Fig. 1. Chart A is the MEFV pattern of a healthy subject. Charts B and C are of patients with nasal allergy. Chart D and Chart E1 are of patients with nasal allergy accompanied with bronchitis. Charts E2 and E3 are of two patients with nasal allergy accompanied with bronchial asthma. In Chart A, the MEFV patterns are similar to the dotted straight line (arrow 0). In Charts B, C and D the MEFV patterns are basically similar to each other, but flow changes near arrow 2 are different between them. In Chart C, double concave flow changes are shown (arrows 1 and 2). In Chart D, the MEFV

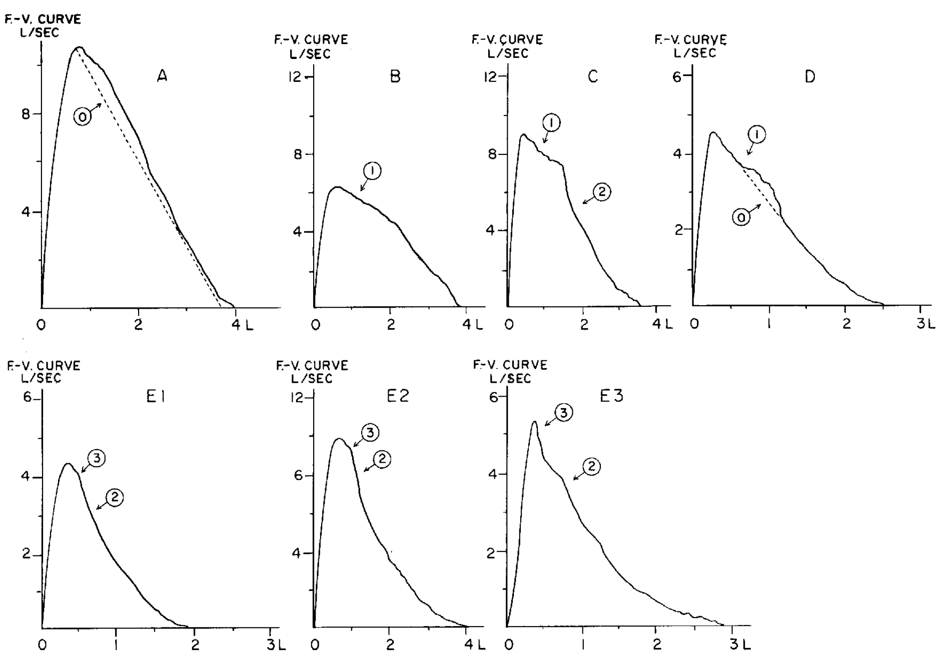

Fig. 1. Maximal expiratory flow-volume (MEFV) patterns in airway allergy A; Healthy male, 24 yrs, nonsmoker. B; Nasal allergy, female, 16 yrs. C; Nasal allergy, male 44 yrs, smoker (20 cigarettes/day, 24 yrs). D; Nasal allergy with bronchitis, female, 51 yrs. E1; Nasal allergy with bronchitis, female, 56 yrs. E2; Nasal allergy with bronchial asthma, female, 63 yrs. E3; Nasal allergy with bronchial asthma, female, 59 yrs.

pattern is transitional between those of Charts B-C and E1-E3. The MEFV patterns of Charts E1, E2 and E3 have similar flow changes (arrow 2), but they have differentflow changes near the peak flow rate (PFR, arrow 3). The flow changes at arrow 3 in E1 and E2 are obtuse, but those in E3 are acute.

Schemata of MEFV patterns in airway allergy. Schemata of MEFV patterns are shown in Fig. 2. We classified the MEFV patterns into five types from the results of Fig. 1. We further classified the E type MEFV patterns into three subtypes according to the flow changes near the PFR (arrow 3).

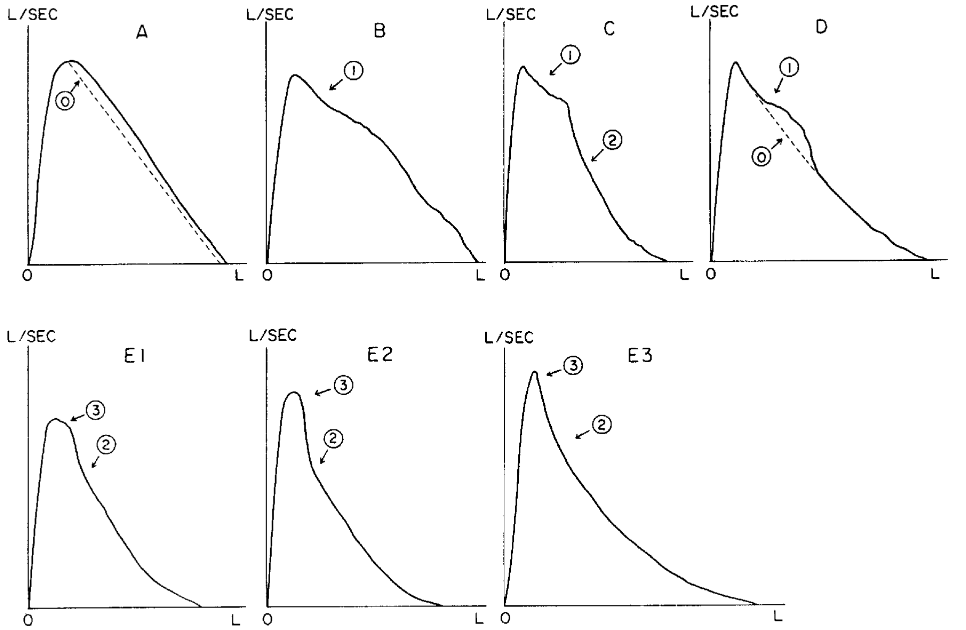

Fig. 2. Schemata of MEFV patterns in airway allergy

TABLE 1. MEFV PATTERNS IN AIRWAY ALLERGY

Type of MEFV pattern / Subjects treated	A	B	C	D	E1	E2	E3	Total
Healthy nonsmokers	7	2	2	1	4	0	0	16
Patients with:								
Airway allergy	0	5	2	6	2	2	1	18
Nasal allergy	0	5	2	5	1	1	0	14
Nasal allergy with allergic bronchitis	0	0	0	1	1	0	0	2
Nasal allergy with bronchial asthma	0	0	0	0	0	1	1	2

Frequency of MEFV patterns among various airway allergies. The results are shown in Table 1. Of healthy subjects, there were seven with the A type MEFV pattern, two with the B type, two with the C type, one with the D type, and four with the E1 type. In patients with nasal allergy with bronchitis, MEFV patterns were of the D and E type. In patients with nasal allergy with bronchial asthma, both were of the E type. In patients with nasal allergy, MEFV patterns were widely distributed five of type B, two of type C, five of type D, one of E1, and one of type E2.

Discussion

Maximal expiratory procedures are used regularly in examinations of lower airway allergies including bronchial asthma, but not so often in nasal allergy. Grossman *et al.* (1) and Yajima *et al.* (2) have reported on small airway obstruction in nasal allergy, but did not mention flow changes near the PFR or during high lung volumes. We have reported that MEFV patterns in bronchial asthma vary according to the intensity of the airway obstruction (3, 4). Okuda considered the upper and lower airway allergies as components of general airway allergy (5).

In this study, we considered these allergies as different phases of airway allergy and MEFV patterns of airway allergy to vary according to the intensity of the obstruction in MEFV measurements of patients with such allergies.

There were MEFV patterns among patients with nasal allergy, which were somewhat distinct in those with nasal allergy complicated with bronchitis or with bronchial asthma. Though we classified MEFV patterns into five types, they may be basically classified into three types, A, B (B, C and D in this paper), and C (E1, E2 and E3 in this paper).

In the future, we intend to use the MEFV measurement as the primary screening test for airway allergy.

Acknowledgment. The authors wish to thank Mr. Hasegawa, Part-time Instructor of the Faculty of Science of Industrial Science, Ritsumeikan University, for help in preparing the manuscript.

REFERENCES

1. Grossman, J., M.D. and Putnam, J.S., M.D.: Small airway obstruction in allergic rhinitis. *J. Allergy Clin. Immunol.* **55,** 49-55, 1975.
2. Yajima, H., M.D. and Unno, T., M.D.: The lower airway of patients with nasal allergy. *J. Jpn. Bronchoesophagol. Soc.* **29,** 239-246, 1978 (in Japanese).
3. Meguro, T., Tsubota, N., Jitsunari, H., Tanizaki, K., Hosokawa, M. and Ogata, M.: The relation between symptoms and maximal expiratory flow-volume curves (MEFVC). Part I. The relation between mild asthmatic symptoms and MEFVC. *Okayama Igakkai Zasshi* **90,** 1479-1483, 1978 (in Japanese).
4. Meguro, T., Tsubota, N., Jitsunari, H., Tanizaki, K., Hosokawa, M. and Ogata, M.: The relation betweeh symptoms and maximal expiratory flow-volume curves (MEFVC). Part II. The relation between asthmatic attacks and MEFVC. *Okayama Igakkai Zasshi* **90,** 1485-1489, 1978 (in Japanese).
5. Okuda, M.: Mechanisms in airway allergy. *J. Jpn. Bronchoesophagol. Soc.* **27,** 385-392, 1976 (in Japanese).