

## „Midcycle rest” and myocardial infarction

Charles E. Heinberg and Eugene B. Kern, Rochester, Minn., U.S.A.

### SUMMARY

*A group of 27 male patients who had ECG evidence of previous myocardial infarction were studied for evidence of "midcycle rest," as noted by active anterior rhinomanometric methods described by Cottle. None of the 27 patients had midcycle rest. Although such a finding may reflect the select nature of the population, the group did have a high incidence of nasal structural abnormalities and an increased uninasal resistance. A prospective study is needed to determine if patients with midcycle rest develop an increased incidence of myocardial infarction. The mechanism by which midcycle rest occurs should also be investigated.*

THE development of rhinomanometry as a method of evaluating nasal respiratory function has a history that spans almost a century. With rhinomanometry, the investigator can measure the amount of air pressure and the rate of airflow in the nasal airway during respiration. Nasal resistance can be calculated, and the degree of nasal airway obstruction can be estimated. Not only can nasal resistance be studied during the nasal respiratory cycle but the forms and patterns of individual breaths seen on the rhinomanometric tracings also can be evaluated. After studying more than 3000 patients, Cottle (1968) has described five aberrations of form. One aberration, that of "midcycle rest" (Figure 1) has been of particular interest because it frequently has been associated with severe cardiac disease (Cottle, 1968). Cottle (1968) writes that midcycle rest "... is also often encountered in people with recent or old heart disease, with or without discernible nasal pathology."

Cottle (1972) also has reported seeing patients who had no history of myocardial disease but who manifested midcycle rest on active anterior uninasal rhinomanometry and then subsequently suffered myocardial infarction. To our knowledge, Cottle did not report the incidence of these findings. Thus, we reasoned that if midcycle rest was a frequent finding in patients with potential myocardial disease, then patients who have had myocardial infarctions likely would have a higher incidence of midcycle rest than would patients who were free of myocardial infarction.

To test this hypothesis, we performed clinical nasal examinations and rhinomanometry using Cottle's technique (1968, 1972) on a group of male patients who had electrocardiographic proof of myocardial infarction. Accordingly, 27 men, whose ages ranged from 41 to 86 years, with definite electrocardiographic evidence

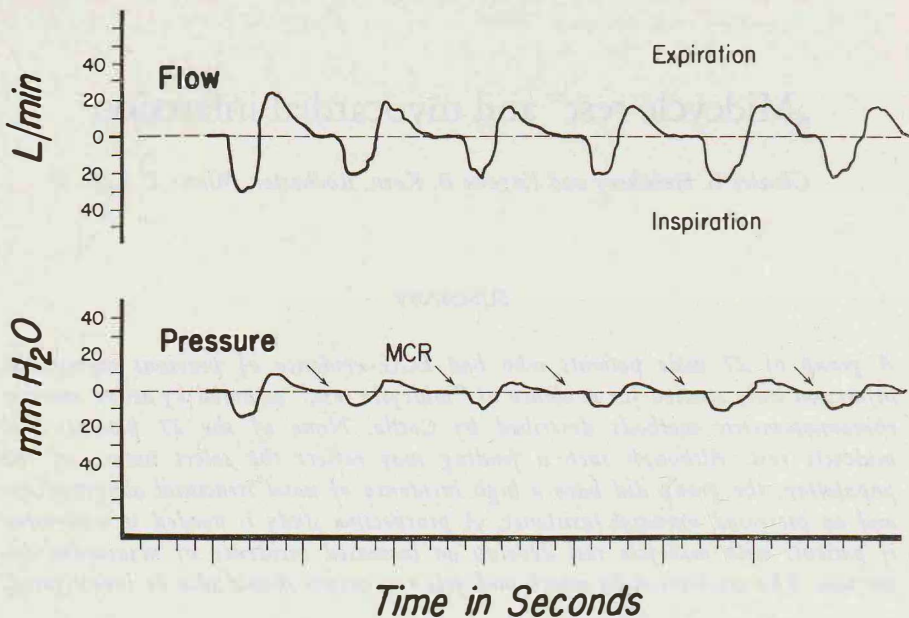


Figure 1. "Midcycle rest" (MCR), an apneic interval of at least 1-second duration between end of expiration and beginning of inspiration. Arrows point to portion of pressure tracing during which apneic period is noted. In this tracing, duration in each instance is longer than 1 second.

of previous myocardial infarction were examined to determine the incidence of midcycle rest and the prevalence of nasal disease.

#### FINDINGS

None of the 27 patients demonstrated midcycle rest on active anterior uninasal rhinomanometry, and no apneic periods were observed (Table 1). This is a significant finding; the probability of not finding midcycle rest in a sample of 27 patients is less than 0.05 if the actual incidence is greater than 10.5%.

Surprisingly, a large percentage of the group had definite nasal structural abnormalities (60%) and increased uninasal resistance (40%) on rhinomanometric examination, findings consistent with significant uninasal obstruction (Table 2). Eleven of 16 patients with nasal structural abnormalities had increased uninasal resistance after decongestion. One patient whose nose was normal on clinical examination had an elevated uninasal resistance; this patient complained of subjective nasal obstruction.

#### DISCUSSION

There are several possible explanations for the absence of midcycle rest in our study population. Because at least 50% of patients with acute myocardial infarcts do not

Table 1. "Midcycle rest"<sup>1\*</sup> in male patients with previous myocardial infarctions.

Finding	Patients	
	No.	%
ECG evidence of myocardial infarction	27	100
"Midcycle rest"	0	0

<sup>1\*</sup>) An apneic interval of at least 1-second duration between the end of expiration and the beginning of inspiration seen on the pressure tracing during active anterior rhinomanometry.

survive the acute episode, our study group represents only the survivors of a larger group. Patients who had midcycle rest prior to myocardial infarction may have had severe infarcts and died, thus biasing our study population to the group with less severe infarction. The actual myocardial infarction in a patient who shows midcycle rest may remove the stimulus that causes the midcycle rest. Although, in our study, midcycle rest was not observed in any of 27 patients with electrocardiographic evidence of myocardial infarction, the possible association of midcycle rest with eventual myocardial infarction cannot be dismissed. We do know that midcycle rest exists on tracings in patients who have had active anterior rhinomanometric examination. The mechanism that results in this apneic period between inspiration and expiration has yet to be uncovered. Some patients who had midcycle rest in active anterior rhinomanometric examination eventually may have myocardial infarctions. The answer to this question requires a long-term prospective study in which patients who had midcycle rest on routine examination can be followed to determine whether they have more myocardial infarctions than do patients in a matched control group. The high incidence (60%) of nasal structural abnormalities in patients who have had myocardial infarctions and the

Table 2. Nasal findings in 27 male patients with previous myocardial infarctions.

Finding	Patients	
	No.	%
Nasal structural abnormality <sup>1)</sup>	16	60
Increased uninasal resistance on anterior rhinomanometry <sup>2)</sup>	11	40
Symptomatic nasal obstruction <sup>3)</sup>	10	37

<sup>1)</sup> Nasal septal or lateral wall structural abnormalities in areas 1, 2, 4, or 5 (Cottle classification as described by Hinderer (1971).

<sup>2)</sup> Normal uninasal resistance after decongestion is probably equal to or less than 4.0 cm H<sub>2</sub>O/liter/s.

<sup>3)</sup> Standard nasal questionnaire (Kern, 1972) revealed positive response to: "Do you have obstruction to nasal breathing?"

altered cardiopulmonary physiology known to be produced by upper airway obstruction suggest the possibility of a relationship between nasal disease and myocardial infarction.

#### RÉSUMÉ

On a étudié un groupe de 27 patients hommes qui témoignaient d'un status post-infarctus myocardique à l'électrocardiogramme, afin de démontrer le "repos du milieu du cycle" par la méthode de rhinomanométrie antérieure active décrite par Cottle. Aucun de ces 27 patients n'a montré ce "repos du milieu du cycle". Bien qu'un tel résultat ne démontre peut-être qu'une nature sélective de la population, le groupe avait néanmoins une haute incidence d'anomalies des structures nasales et une augmentation de la résistance uninasale. Il serait nécessaire de conduire une étude prospective afin de déterminer si des patients démontrant le "repos du milieu du cycle" développent une incidence accrue d'infarctus du myocarde. On devrait aussi investiguer les mécanismes gouvernant le repos du milieu du cycle.

#### REFERENCES

1. Cottle, M. H., 1968: Rhino-sphygmo-manometry: an aid in physical diagnosis. *Int. Rhinol.*, 6, 7-26.
2. Cottle, M. H., 1972: Nasal breathing pressures and cardio-pulmonary illness. *Eye, Ear, Nose Throat Mon.*, 51, 331-340.
3. Hinderer, K. H., 1971: *Fundamentals of anatomy and surgery of the nose*. Birmingham, Alabama, Aesculapius Publishing Company.
4. Kern, E. B., 1972: Use of a questionnaire for patients with nasal symptoms. *Rhinol.*, 10, 133-137.

Reprints requests to  
Eugene B. Kern, M.D.,  
Mayo Clinic and Mayo Foundation,  
Rochester, Minnesota 55901,  
U.S.A.

E. Büsser and R. A. Schibli, (1973):

Rhinomanometrie: Methodik und Normalwerte. *Dtsch. Med. Wschr.* 98, 719-723.

In the last ten years quite a lot of research has been done in the field of rhinomanometry. In spite of many efforts there is still no generally accepted method for routine application.

In a recent article Büsser and Schibli (1973) describe their method and the results obtained with healthy subjects. The authors conducted their experiments using anterior rhinomanometry, whereby the pressure was measured with the help of a plastic tube, 5 cm of which was inserted in the contralateral nasal passage while the nose opening on this side was closed with a foam rubber plug. The subject breathed, via an anaesthetic mask, through the other nasal passage. The flow on this side was measured with a pneumotachograph. Pressure and flow were measured and recorded electronically on a pressure versus flow diagram. The method was first tested on younger subjects with a normally functioning nose, whereby the flow was always measured first in the left passage and thereafter in the right. A higher resistance was found slightly more often on the right side. The authors rightly point to the traumatic swelling of the mucosae as the cause, due to the tube which was inserted into the right passage for measurement on the left side. It is because of this possibility that other workers rejected this method.

The authors developed a formula, based on their results, whereby they could calculate the total resistance in the nose from the resistance of the two sides (the pressure-flow relationship was recorded in a double logarithmic diagram). The method clearly demonstrates that, when the two sides of the nose have an unequal resistance, a change in the widest side immediately has a great effect on the total resistance.

Büsser and Schibli refer in this respect to practical experience whereby the subjective nasal resistance can increase after septum correction, while the resistance on the formerly narrowed side is greatly lowered. The reason for this is that at the same time the resistance on the properly functioning side was increased somewhat.

The authors also determined the total nasal resistance by a different method. The difference between the airway resistance when the subject breathed via the nose and via the mouth was determined using a body plethysmograph. The results showed that the resistance when breathing through the nose is about twice as high as when the subject breathed through the mouth. In the article the last method is mentioned as the most accurate when the total nasal resistance is to be determined.

E. H. Huizing

## ANNOUNCEMENTS

### VI. CONGRESS OF THE EUROPEAN RHINOLOGIC SOCIETY

Erlangen (West-Germany), September 8-10, 1975

followed by a Postgraduate Course in functional surgery of the septum and the nasal pyramid. September 11-13, 1975.

#### *Main topics of the Congress:*

1. Function tests of the nose and sinuses.
2. Surgical problems of the lateral nasal wall.
3. Diagnosis and treatment of the vasomotoric rhinitis.

#### *Free papers.*

*Information:* Prof. Dr. H. Masing  
D-8520 Erlangen West-Germany  
Waldstr. 1  
or  
Dr. med. F. Langraf-Favre  
CH-8001 Zürich/Switzerland  
Talstr. 41.

### COURSE IN RHINOPLASTY AND INTERNATIONAL MEETING OF RHINOLOGY

Odense, August 18-25, 1974

#### *Course*

A Course in Rhinoplasty directed by P. Stoksted, M.D., Odense and K. Hinderer, M.D., Pittsburgh, will be held from the 18th to the 23rd of August 1974 and will cover all aspects of rhinoplasty.

The course will be given in the Department of Oto-Rhino-Laryngology, Odense University Hospital and Institute of Anatomy, University of Odense, Denmark. It is mainly intended as a preliminary course and emphasis will be laid upon surgical demonstrations and practical training. For this reason the number of pupils will be limited to 40, so early application is advisable. Lectures will be given by a number of internationally known rhinologists on most subjects of interest to the student rhinologist.

*Fee* \$ 400.—.

#### *Teachers:*

Kenneth Hinderer, M.D. Pittsburgh, U.S.A.  
Charles Tucker, M.D. Hartford, Conn., U.S.A.  
Vernon Gray, M.D. Los Angeles, U.S.A.  
F. Reyes, M.D. Mexico.

- J. Carrillo, M.D. Mexico.  
 D. J. Brain, F.R.C.S. Birmingham, England.  
 P. Golding-Wood, B.Sc., F.R.C.S., D.L.O. Maidstone, England.  
 E. H. Huizing, Lector University of Leiden, Holland.  
 H. Masing, Prof. Dr. med. Erlangen, Germany.  
 W. Pirsig, Dr. med. Hamburg, Germany.  
 P. Stoksted, Dr. med. Odense, Denmark.

### *Meeting*

The Meeting will be held as a continuation of the course from the 23rd to the 25th of August 1974 and will cover all aspects of rhinology. Lectures will be delivered by invited guests and papers can be presented by participants as far as is possible. Fee \$ 70.—.

For information write to: P. Stoksted, M.D., E.N.T. Department, Odense University Hospital, DK-5000 Odense, Denmark.

## ARGENTINE RHINOLOGIC SOCIETY FIRST ARGENTINE CONGRESS OF RHINOLOGY

Buenos Aires, August 15th-17th, 1974

The First Argentine Congress of Rhinology will be held in Buenos Aires from 15th-17th of August 1974.

### *Round Tables*

1. Impaired nasal respiration - clinic and surgery  
 Coordinator: Prof. Julip Zubizarreta.
2. Tumors of the nasopharynx  
 Coordinator: Dr. Luis Samengo.
3. Chronic sinusitis, present status of therapy  
 Coordinator: Dr. Eugenio Romero Diaz.

### *Free contributions*

#### *Place:*

Hospital Escuela "Gral. San. Martin" Avda. Córdoba 2370 - Buenos Aires.

*Fee:* \$ 150.—, Residents \$ 50.—.

#### *Executive Committee:*

President: Dr. Leonardo Deluca  
 Vice-President: Dr. Francisco Ameriso

Secretary General: Dr. Félix Benenti and Dr. Isaac Kamincsick

Course Secretary: Dr. Carlos Salvatori

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*Inscription*

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