

Rhinomanometry in myocardial infarction

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SUMMARY

In the curves obtained from rhinomanometry a mid-cycle rest (M.C.R.) is sometimes found to occur.

The aim of this study was then to analyse the frequency of the M.C.R. both in normal subjects and in subjects who had had a myocardial infarction. Rhinomanometry was therefore performed on 3 different groups of people, viz.

- 1. 32 normal subjects without any respiratory, cardiac or any pathological problems.*
- 2. 44 subjects who had had a myocardial infarction.*
- 3. 34 subjects without any cardiac problems.*

Rhinomanometry revealed that 50-60% of the second and third group had a poor nasal respiration.

In the first group no M.C.R. was found in any of the subjects. In the second group over 50% of the subjects had a M.C.R.

In the third group less than 50% of the subjects had a M.C.R.

The χ^2 test was used to analyse these results as to their statistical significance.

The χ^2 parameter was 3,84 with a significance of 95%, and 6,64 with a significance of 99%.

Our result was $\chi^2 = 5,34$ which seems to justify further study.

INTRODUCTION

In rhinomanometry the parameters used are:

1. The difference in pressure between two points in the nose at any moment of respiration;
2. The nasal air-flow;
3. The nasal air-volume;
4. The respiration frequency.

The measurements obtained from rhinomanometry are graphically recorded. The curve of a normal subject has a particular shape. It consists of a descending line during inspiration and of an ascending line during expiration.

Thus the respiratory curves of any normal subject form non-stop cycles (Figure 1). Sometimes, however, an interruption is seen to occur between the end of expiration

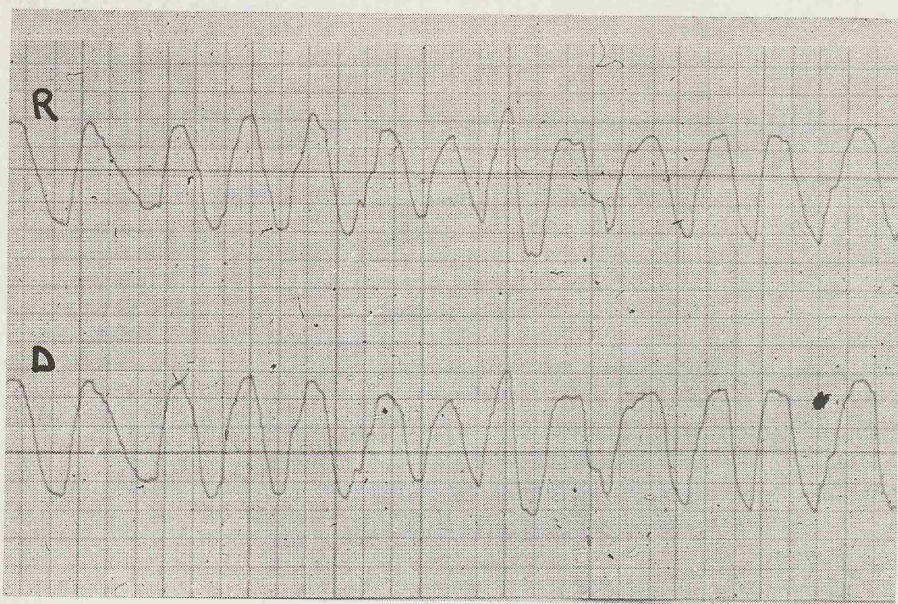
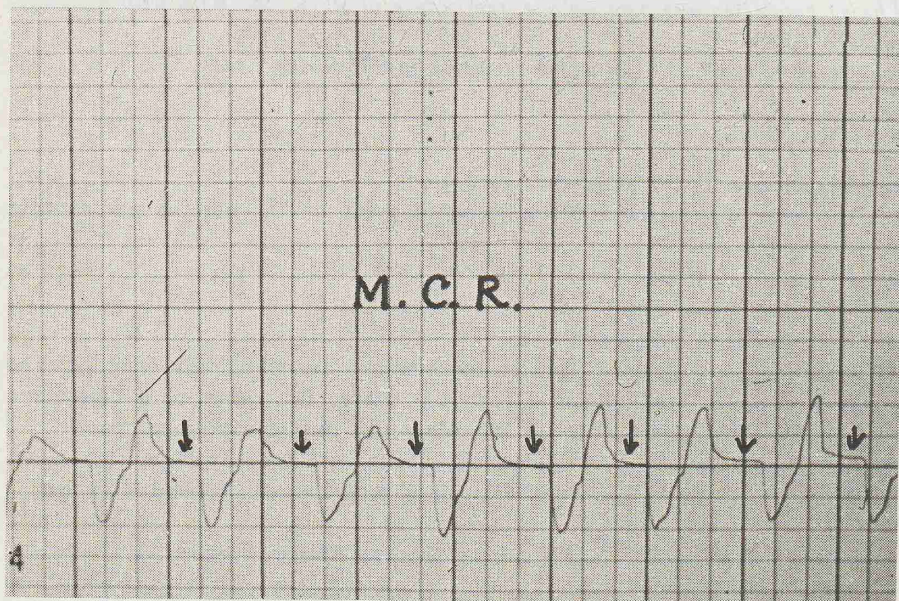


Figure 1. Curves obtained from rhinomanometry. The upper curves show the rhinomanometry, the lower ones show the air flow.

Figure 2. The arrows indicate a M.C.R.



and the beginning of inspiration. This interruption between two respiratory cycles is called a "mid-cycle rest" (M.C.R.) by Cottle. This interruption may be as long as several seconds (Figure 2). In a very few cases an interruption occurs in the very middle of a respiratory cycle, i.e. between the end of inspiration and the beginning of expiration. This interruption is called an "inter-cycle rest" (I.C.R.) by Cottle (Figure 3).

One should bear in mind that a mid-cycle rest is in fact a short apnoea and an inter-cycle rest an apnoeic. In Cottle's opinion the M.C.R. and the I.C.R. are of great diagnostic value in that they may indicate a risk of a myocardial infarction. To our knowledge Cottle has not given any statistical evidence of this. Heinberg and Kern (1974), however, have performed rhinomanometry in 27 cases of a myocardial infarction. Nevertheless, they have not found a M.C.R. in any of their patients.

PRESENT STUDY

In our study we have examined three different groups of people. The first group consisted of 32 normal subjects, male and female, without any respiratory, cardiac or any pathological problems.

The second group consisted of 44 men who had had a myocardial infarction. Their ages ranged from 40 to 79. Rhinomanometry was performed between one and three weeks after their heart-attack, i.e. in the acute or sub-acute phase. Rhinomanometry revealed that the nasal respiration of 52% of this second group was poor.

The third group consisted of 34 men, their ages ranging from 40 to 64. They had not any cardiac problems. Rhinomanometry revealed that 56% had a poor nasal respiration.

RESULTS

In the first group neither a M.C.R. nor an I.C.R. was found. In some cases, however, a short interruption, never longer than a quarter of a second, was found. This never occurred more than once per minute.

It should be taken into account that an interruption in the curve may occur as a result of a human or technical error in the registering process. This can be seen in Figure 4, in which the interruption is caused by a leak while measuring the difference in pressure in the nose. Here the nozzle may have been moved from its correct position causing the curve to slide downwards to the base line, the atmospheric pressure level. In Figure 5 an interruption like an I.C.R. can be seen as well. That this has also been caused by an error in the registering process can be seen in the vertical line which is normally a curve.

In the three groups examined only once an I.C.R. was found, viz. in the second group. Neither in the first nor in the third group an I.C.R. was found. It was noticed that these two groups, the second and third group, showed a similarity as to age-group and quality of nasal respiration. For this reason we have looked

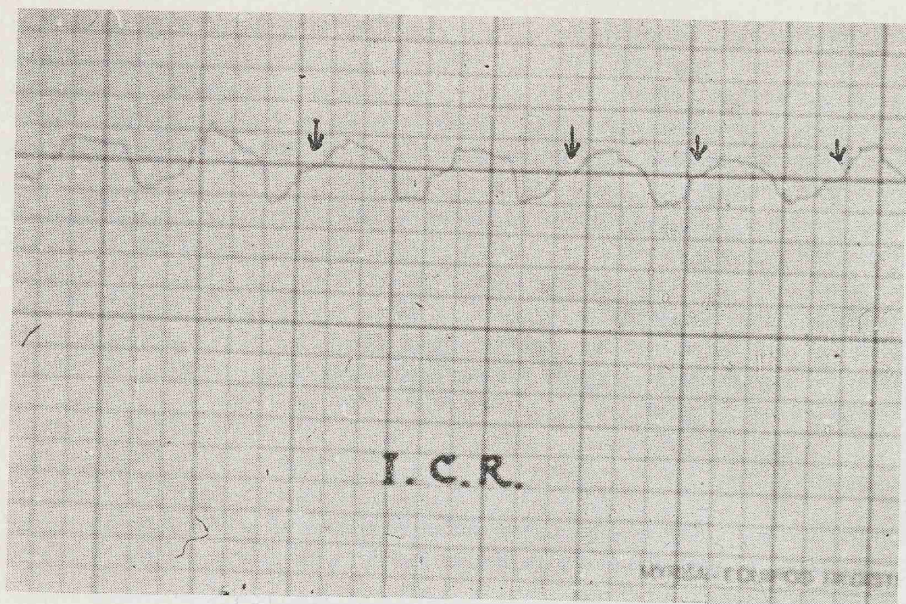
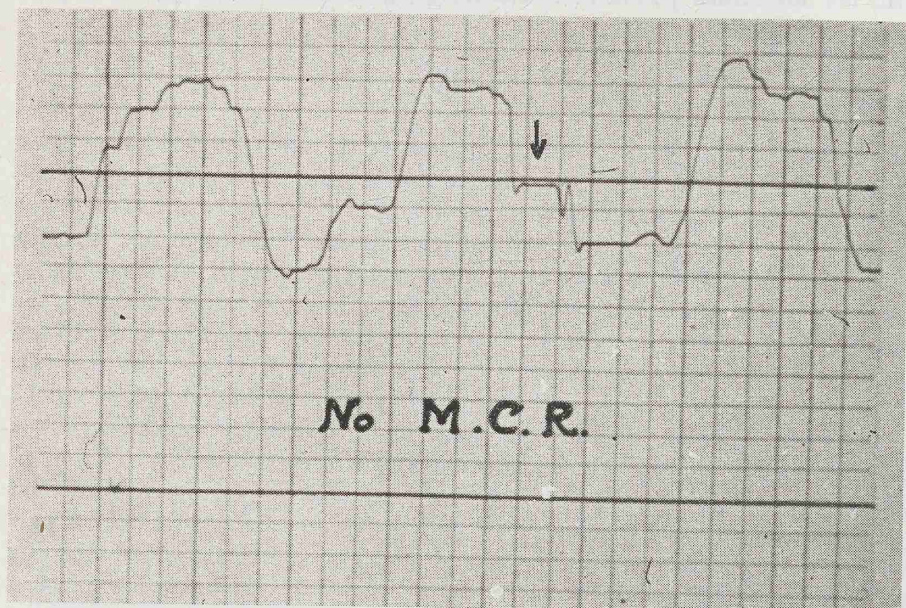


Figure 3. The arrows indicate an I.C.R.

Figure 4. The arrow indicates a M.C.R. due to an error in the registering process.



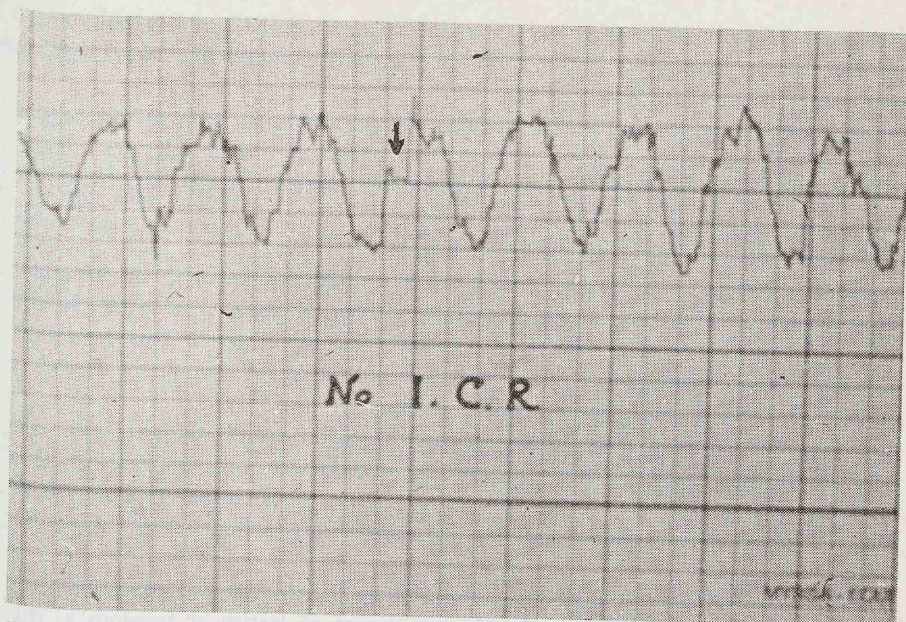


Figure 5. The arrow indicates an I.C.R. due to an error in the registering process.

Figure 6. See text.

RELACION ENTRE CARACTERES CUALITATIVOS DE
SUJETOS DE MAS DE 40 AÑOS

		CARACTERES CARDIACOS		
		CARD.	NO CARD.	
CARACT.	NO M.C.R.	20	25	45
		35	30	
RINO.	M.C.R.	34	9	33
		19	14	
		44	34	78

$$\chi^2 = \frac{(20-25)^2}{25} + \frac{(25-20)^2}{20} + \frac{(34-19)^2}{19} + \frac{(9-14)^2}{14} = 1 + 1,25 + 1,31 + 1,78 = 5,34 = \chi^2$$

$$3,84 < 5,34 < 6,64$$

for a correlation between these two groups as regards cardial problems and interruptions of the respiratory cycles. From a statistical point-of-view the I.C.R. is comparable to the M.C.R.

As was said above, the interruption of the curves of normal subjects were never longer than a quarter of a second and occurred never more than once per minute. For this reason interruptions of half a second or more and occurring twice per minute were accepted as significant.

The results of our study are shown in Figure 6.

In the four rectangles in the centre two kinds of numbers are used. In the upper left-hand corner of the rectangle the actual number of subjects is given. In the lower right-hand corner the theoretical number of subjects is given. This theoretical number refers to the number of subjects in whom a M.C.R. would be found if the M.C.R. were independent of cardial damage.

Figure 6 also shows a difference as to the M.C.R. between subjects with and without cardial problems. Over 50% of the subjects with cardial problems have a M.C.R. whereas less than 50% of the subjects without cardial problems have a M.C.R. These results should therefore be analysed as to their statistical significance.

For this statistical analysis the χ^2 test has been used. This test was chosen because there were only two variables and only one degree of statistical freedom in this study. For the conditions in our study the χ^2 parameter is 3,84 with a significance of 95%, and 6,64 with a significance of 99%.

Our result being $\chi^2 = 5,34$ we take this to be very significant (Figure 6).

We cannot, however, give a hypothesis explaining why in rhinomanometry interruptions in curves occur more frequently in subjects with cardial problems than in subjects without cardial problems. All the same, the results obtained seem, in our opinion, to justify further study.

RÉSUMÉ

L'auteur commence à décrire le "Middle Cicle Rest" (M.C.R.) comme une altération particulière dans les graphiques de la rhinomanométrie. Le bout de ce travail est de comparer la fréquence du M.C.R. dans des sujets atteints de infarctus de myocarde par rapport aux sujets normaux.

L'auteur étudie trois différentes séries de sujets.

1. 32 sujets normaux sans aucun problème de circulation ni de respiration.
2. 44 sujets avec infarctus de myocarde.
3. 34 sujets sans aucun problème cardiaque.

Dans la seconde et troisième série il y avait un 50-60% de malades avec une mauvaise respiration nasale, vérifiée par rhinomanométrie. Dans la première série il n'y avait pas de sujets avec M.C.R.; dans la seconde série il en avait plus de la moitié et dans la troisième moins de la moitié.

Pour vérifier si les différences entre les chiffres de la deuxième et troisième série sont statistiquement significants, l'auteur a utilisé le test de χ^2 . χ^2 est égal à 5,34, cette chiffre se trouve entre 3,84 (coefficient de sécurité du 95%) et

6,64 (coefficient de sécurité dus 99%). L'auteur croit que les résultats de cette statistique justifient une plus profonde recherche.

REFERENCES

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2. Heinberg, C. E. and Kern, E. B., 1974: Midcycle rest and myocardial infarction. *Rhinology*, 12, 39-42.
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