

- Kayser, R.**, 1895: Die exacte Messung der Luftdurchgängigkeit der Nase. Archiv f. Laryng., 3, 101.
- Lampson, R. S.**, 1935: A quantitative study of the vasoconstriction induced by smoking. J. Amer. Med. Ass., 104, 1963.
- Naumann, H. H.**, 1961: Die Mikrozirkulation in der Nasenschleimhaut. Stuttgart.
- Stoksted, P.**, 1953: Rhinometric measurements for determination of the nasal cycle. Acta Otolaryng., Suppl. 109, 159.
- Tatum, A. L.**, 1923: The effect of deficient and excessive pulmonary ventilation on nasal volume. Amer. J. Physiol., 65, 159.
- Wolf, S.**, 1954: Reactions in the nasal mucosae. Relation of life stress to chronic rhinitis and "sinus" headache. Arch. Otolaryng., 59, 461.

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THE SMALL BLOOD VESSELS OF THE CONJUNCTIVA AND NAILFOLD IN VASOMOTOR RHINOPATHY

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The synonyms of vasomotor rhinitis are many, indicating the diversity of views as to its etiology (anatomical and functional background). The term "Rhinopathia vasomotoria" was introduced by Adlersberg and Forschner in 1928 (1, 2). The name of "Vasomotor Rhinopathy Syndrome" (2) would more properly fit the nature of this illness, in which the nasal manifestations seem to be but a local expression of a general, systemic symptom complex.

Indeed these patients often suffer from headache, peripheral vascular disturbances such as acrocyanosis, angiospasm and cold extremities (3, 4), indicating that "the phenomenon should be studied in the capillaries" (4).

Recent developments in microcirculatory researches as well as in clinical in-vivo observations of the capillary bed or of the "terminal circulation" (5, 6) gave the stimulus to investigate the conjunctival and nailfold blood vessels, by slit lamp and capillary microscopy, in an attempt to collect information on the vascular background of vasomotor rhinopathy (VMR).

Material and Methods

We investigated 50 patients of both sexes, of whom the youngest was 15 years old, and the oldest 71. The diagnosis of VMR was established by history, by the characteristic objective findings of the nasal mucosa, both before and after shrinking, by X-Ray studies of their sinuses, and by referring the patients to the allergy clinic for exclusion of an atopic allergic rhinitis. In these patients the conjunctival and nailfold vessels were examined by methods previously described (7), and compared with those of 150 patients

* = "die terminale Strombahn" (Ricker).

with representative common diseases seen in a general medical clinic and 40 healthy persons of the same ages. The conjunctival vessels were examined by slit-lamp at a magnification of 25 or 40, and the nailfold capillaries at 100 x. Special attention was paid to the diameter and the patterns of the vessels. Vascular patterns known to be abnormal were recorded such as the pattern of the rheumatic fever diathesis (8), of acrocyanosis (9), as were significant deviations from the normal. Identical studies were made on controls. Characteristic findings were photographed. Many patients were seen repeatedly, some for up to two years.

Results

Of the 50 patients with VMR, the conjunctival vessels (Table I) were normal (Fig. 1) in 8 only. In 5 the conjunctiva showed the pattern of the rheumatic diathesis (without clinical evidence of rheumatic fever or rheumatic heart disease), and in 8 the features of acrocyanotic small vessels (Fig. 2) (mostly with clinical evidence too). In 29 patients the whole conjunctival vascular network was markedly dilated (Fig. 3), with capillaries 11 to 14 μ diameter instead of 7 μ , while the arterioles showed a diameter of 15—20 μ instead of 12—15 μ . In 10 of the 29 the dilatation exceeded these limits. (Fig. 4).

Fig. 1

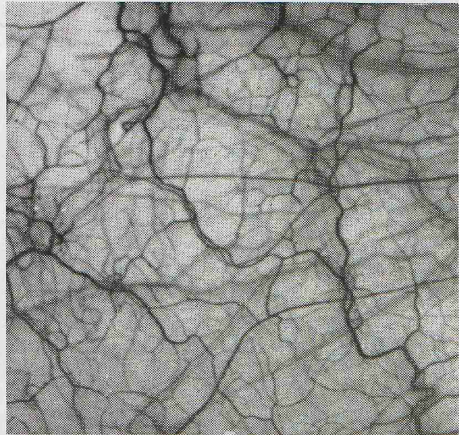
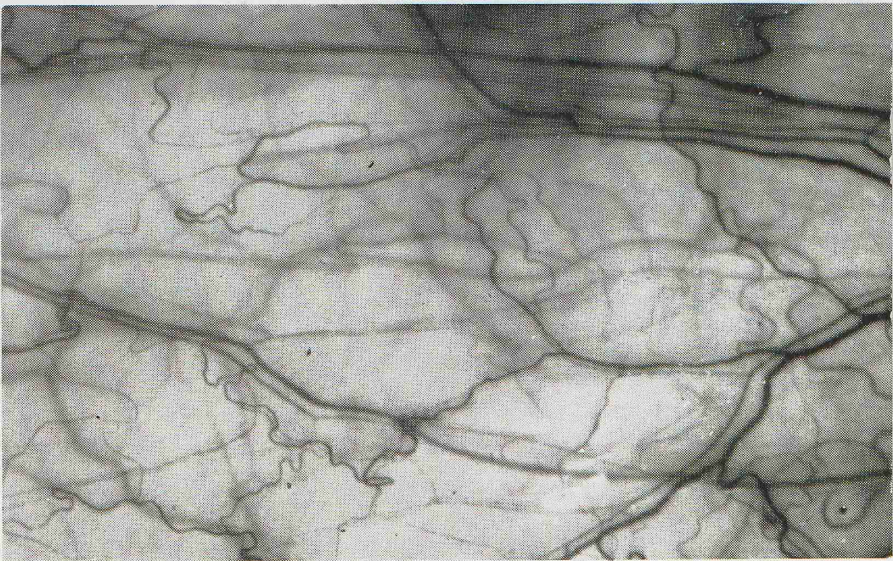


Fig. 1. Normal conjunctival vessels (14 x)
Vaisseaux conjonctivaux normaux

Fig. 2. Conjunctival vessels in acrocyanosis (28 x)
Vaisseaux conjonctivaux dans l'acrocyanose

Fig. 2



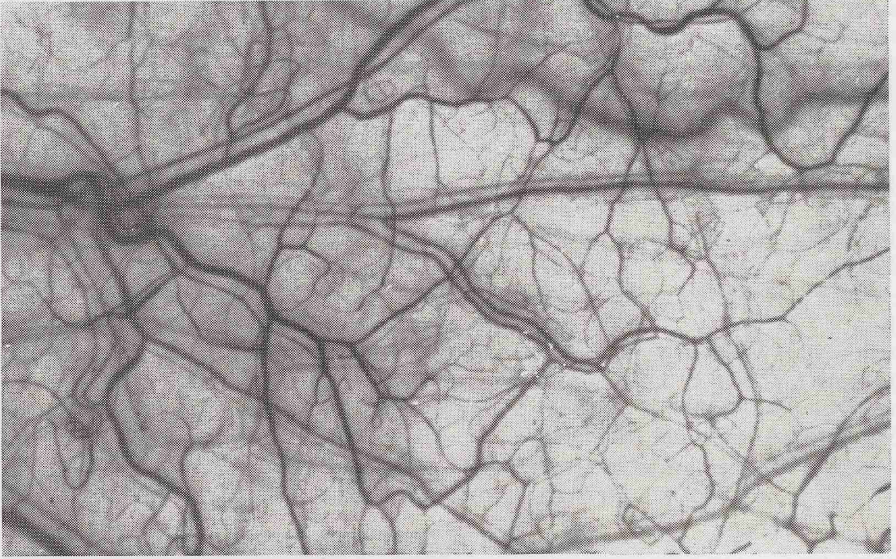


Fig. 3

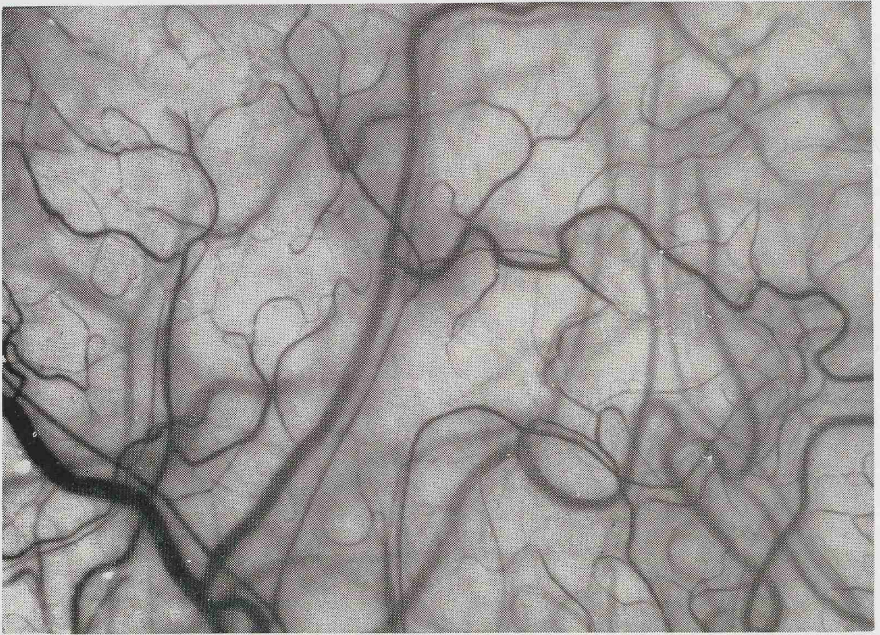


Fig. 4

Fig. 3. Congested conjunctival vessels (28 x)
Vaisseaux conjonctivaux dilatés

Fig. 4. Markedly congested conjunctival vessels (28 x)
Vaisseaux conjonctivaux dilatés d'une façon prononcée

The nailfold capillaries (Table I) were of normal diameter (7—9 μ) in 28 of the 50 patients with VMR. One patient showed the rheumatic diathesis nailfold pattern, 5 that of acrocyanosis, (in which the capillary diameter was 10—12 μ), and in 16 others the capillary congestion was marked, the diameter being 12 μ and above.

In the controls (Table I), the rheumatic pattern was found to about the same extent, the acrocyanotic small vessels rather less frequently (but the groups are small) and marked dilatation was much less common.

Table 1

Incidence per cent of small blood vessel findings in conjunctiva (C) and nailfold (NF) in 50 patients with vasomotor rhinopathy, 150 with medical diseases, and 40 healthy.

Small vessel changes	Vasomotor rhinopathy		Medical diseases		Healthy	
	C	NF	C	NF	C	NF
Very marked congestion	58	32	9	12	2.5	5
Acrocyanosis	16	10	5	3	5	5
Rheumatic diathesis	10	2	7	3	5	2.5
Normal ¹⁾	16	56			77.5	82.5

¹⁾ Normal findings are not given for medical diseases because in many patients other abnormalities were present not here relevant. In the healthy group there was a small percentage with other abnormalities.

Discussion

It is now generally agreed that the underlying mechanism of the attack in VMR: — engorgement of the nasal mucosa, rhinorrhoea, sneezing — is the result of a change of permeability of the capillaries (1, 3, 4, 10, 11, 12). The study of the microcirculation in the last three decades has thrown light on the capillaries and their behaviour in normal and pathological conditions. Experience has shown that certain systemic diseases have characteristic (although not pathognomonic) changes in these vessels. Application of these in-vivo examinations in otorhinolaryngology has thrown light on the microcirculation of the stria vascularis of the inner ear (13), and on the terminal circulation of the nasal mucosa in rabbits (6). Naumann himself admits, however, that for obvious reasons he was unable to perform similar in-vivo experiments on the nasal mucosa of human beings (6). To us too, a technique for observation of the small blood vessels of the nasal mucosa without trauma or anaesthesia was not available.

It has been stated that though the capillary bed differs from area to area and follows different rules and orders, nevertheless microcirculation studies have been used as a test in order to observe the "state of response" of the body as a whole (14). This "terminal circulation — total body" relationship can best be studied on two vascular networks, to which an easy, atraumatic, (with no anaesthetic), approach is available: — the bulbar conjunctiva and the nailfold (5, 14). Peculiarly interesting is that it was Herman Boerhaave who at the end of the 17th Century used first the Vitalmicroscopy of the

bulbar conjunctiva (5). It has been further shown (15) that conjunctival small vessels are more prone to show abnormalities in systemic diseases than nailfold capillaries.

In our series of patients with VMR, more than half showed considerable dilatation of all conjunctival vessels, and about 40% congestion of nailfold capillaries. Of the remainder an appreciable number had vessels characteristic of acrocyanosis. When these findings of dilatation are compared with those in controls, they are seen to be significant. They apparently increased incidence of acrocyanosis in VMR may be significant.

The distended small vessels may have a tendency to greater permeability than vessels of normal calibre. Patients with acrocyanosis have a marked tendency to excessive sweating. The general small vessel dilatation seen in VMR is not common in medical diseases. The dilatation in diabetes affects the venules, but not arterioles (15). In acrocyanosis the venules are dilated but also blue while the conjunctival capillaries are very narrow.

In VMR the characteristic finding is that all the conjunctival vessels, and to a lesser extent also the nailfold capillaries, are very dilated. We have observed similar findings in patients with marked allergic states. In connection with our findings, it is of interest that Godin states that oedema of the mucosa and abnormal transudation, due to an increase in the capillary permeability, are the fundamental elements in allergy and in VMR, but this hyperpermeability results from various mechanisms. In allergies it is due to an arteriolar and capillary dilatation with inhibition of the precapillary sphincters, while in spasmodic coryza it is the result of an arteriolar angiospasm, followed by a secondary passive dilatation. There results an accumulation of blood in the venules, leading to a reflux of blood in the metarterioles, and later to a retrograde capillary swelling. This anoxic state of the capillary increases its permeability and provokes an increased loss of fluid (4).

In conclusion, vasomotor rhinopathy may represent one aspect of a general tendency to small vessel dilatation.

SUMMARY

The small blood vessels of the conjunctiva and nailbed have been studied in 50 patients with vasomotor rhinopathy and compared with those of 150 patients with common medical diseases and 40 healthy persons.

Marked dilatation of all conjunctival vessels was found in more than half of the patients, while 40% showed congestion of nailfold capillaries. An appreciable number of patients had vessels characteristic of acrocyanosis.

These findings of dilatation and congestion seem to be significant and characteristic for vasomotor rhinopathy, and may throw light on the vascular background in the etiology of this disease.

Vasomotor rhinopathy may represent one aspect of a general tendency to small vessel dilatation, which may be followed by an increased capillary permeability.

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LES PETITS VAISSEAUX SANGUINS DE LA CONJONCTIVE ET DU LIT DE L'ONGLE EN RHINOPATHIE VASOMOTRICE

Les petits vaisseaux sanguins de la conjonctive et du lit de l'ongle ont été étudiés chez 50 malades présentant une rhinopathie vasomotrice et ont été comparés à ceux de 150 malades souffrant de maladies communes et à 40 personnes bien portantes.

Une dilatation considérable de tous les vaisseaux de la conjonctive bulbaire a été observée chez plus de la moitié des malades, tandis que plus de 40% d'entre eux présentaient une congestion des capillaires du lit de l'ongle. Un nombre appréciable de malades avaient des vaisseaux caractéristiques d'acrocyanose.

Ces phénomènes de vasodilatation et congestion semblent être significatifs et caractéristiques de la rhinopathie vasomotrice et peuvent fournir une explication du facteur vasculaire dans l'étiologie de cette maladie.

La rhinopathie vasomotrice peut représenter un aspect de la tendance générale à la vasodilatation dans les petits vaisseaux, qui peut être associée à une augmentation de la perméabilité capillaire.

BIBLIOGRAPHY

1. **Beickert, P.** Allergie im Hals-, Nasen-, Ohrenbereich. *Archiv. Ohren- usw. Heilk. u. Z. Hals- usw. Heilk.* 176, 82—236, 1960.
2. **Weder, A.** Diagnostic und Therapie der allergischen und extra allergischen vasomotorischen Rhinopathie. *Pract. oto-rhino-laryng. Supplementum* Vol. 24, 1962.
3. **van Dishoeck, H. A. E.** Allergy and Infection of the Paranasal Sinuses. *Adv. Oto-Rhino-Laryng.*, vol. 10, pp. 1—29, Karger, Basel, 1961.
4. **Godin, O.** Mécanisme neuro-circulatoire de la pituitaire. *Progr. Oto-Rhino-Laryng.*, vol. 10, pp. 179—188, Karger, Basel/New York, 1961.
5. **Illig, L.** Die Entwicklung der Lebendbeobachtung der Mikrozirkulation. *Bibl. anat.* vol. 1, pp. 6—20, Karger, Basel/New York, 1961.
6. **Naumann, H. H.** Die Mikrozirkulation in der Nasenschleimhaut. Georg Thieme Verlag., Stuttgart, 1961.
7. **Landau, J., and Davis, E.** The small blood vessels in hypertension. *Lancet* 1, 1957.
8. **Davis, E., and Landau, J.** The capillaries in rheumatic fever. *Arch. Int. Med.* 97, 51, 1956.
9. **Landau, J., and Davis, E.** The Small Blood Vessels in Acrocyanosis and Raynaud's Disease. *Bibl. anat.* vol. 1, pp. 198—202, 1961. Karger, Basel/New York.
10. **Clerici, E. and Teatini, G. P.** Specific and Non-Specific Nasal Allergy and its Relationship to Infection. *Adv. Oto-Rhino-Laryng.*, vol. 10, pp. 30—64, Karger, Basel/New York, 1961.
11. **Cottle, M. and Hinderer, K. H.** Trauma, Infection, Allergy in Corrective Nasal Surgery. *Adv. Oto-Rhino-Laryng.*, vol. 10, 196—205, Karger, Basel/New York, 1961.
12. **Messerklinger, W.** Die Schleimhaut der oberen Luftwege im Blickfeld neuerer Forschung. *Archiv. Ohren usw. Heilk. u. Z. Hals. usw. Heilk.*, S. 1 — 104, 1958.
13. **Naumann, H. H., Günther, H., Schicker, S.** Intravitalbeobachtungen an den Gefäßen des Innenohres. *Arch. Ohr.-Nas.-Kehlkopfheilk.* 171, 354, 1958.
14. **Nordmann, M.** Die Grenzen der Erkenntnismöglichkeiten bei der Vitalmikroskopie des Kreislaufes. *Bibl. anat.* vol. 1, pp. 21—37, Karger, Basel /New York, 1961.
15. **Landau, J. and Davis, E.** The small blood vessels in diabetes mellitus. *Lancet* II, 731, 1960.

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