

From the Division of Experimental Pathology of the Department  
of Histology and Embryology (Director: Prof. Dr. L. C. Junqueira)  
and the Department of Surgery (Director: Prof. Dr. A. Corrêa Netto),  
Faculty of Medicine, University of São Paulo, Brazil

## Histopathology of the Telangiectasia Associated with Varicose Veins

By J. L. de FARIA and I. N. MORAES

According to *Miescher* (1919), the telangiectases associated with varicose veins in the lower extremities have their origin in the elevated venous pressure and some ill-defined local factors. On histological examination *Bean* (1953) observed only dilatation of the veins in the telangiectatic areas. *Gans and Steigleder* (1957), however, thought that



*Fig. 1.* E. M., 42 years old. Notice the non-diffuse feature of the telangiectases associated with varicose veins.

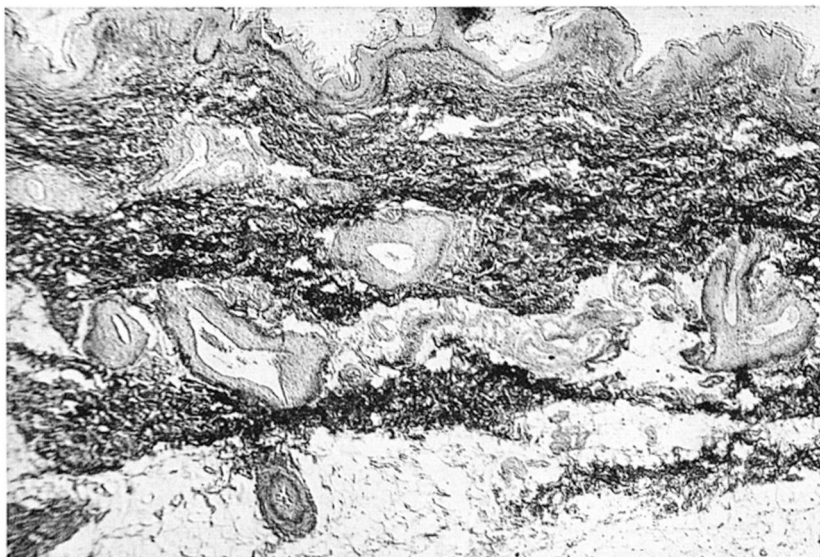


*Fig. 2*

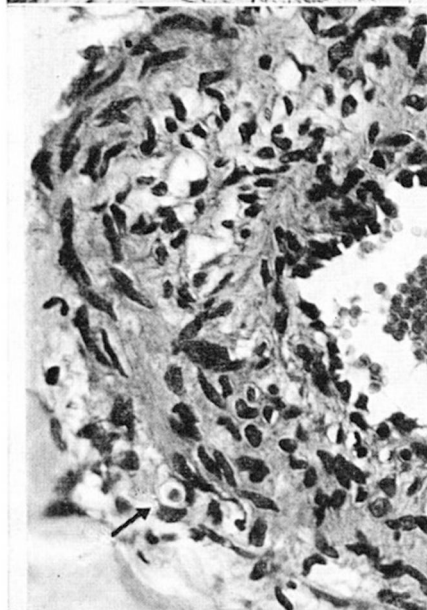


*Fig. 3*

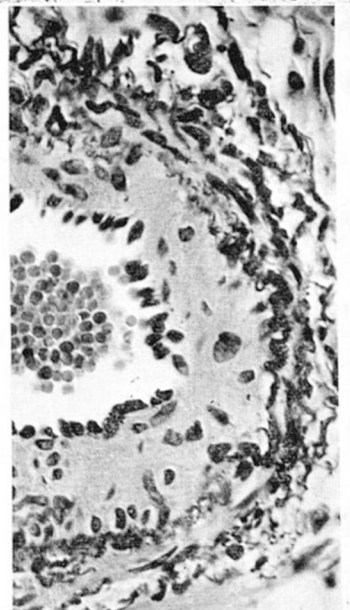


*Fig. 4*

*Fig. 2.* M. G. C., 22 years old. All the highly thickened vessels are veins. At the bottom, severe intimal thickening of a hypodermic vein with conspicuous internal elastic membrane. Elastin- van Gieson.  $\times 37$

*Fig. 3.* Same case as Fig. 2. Thickened vein recalling an artery. Vasa vasorum with one erythrocyte pointed out by the arrow to the left, near the bottom. Hematoxylin-eosin.  $\times 496$ .

*Fig. 4.* Same artery as in Fig. 3 in a subsequent section. Right segment showing the intimal thickening, lighter in appearance. Elastin- van Gieson.  $\times 480$ .

the pathological changes occurring in the varicose veins may involve to a lesser degree the skin vessels also. Since, as far as we know, no special histopathological studies of such telangiectases have been published, it seemed to us worth reporting the microscopical observations we have made on this subject. A microangiographic study of the cases to be presented now has been reported (*Moraes et al.*)

### *Material and Methods*

Skin pieces, about 1–2.5 cm in length, were taken out from the telangiectatic areas at the thigh or leg of 16 patients (Fig. 1). In ten cases one biopsy and in six cases from 2 to 4 biopsies were performed, 26 biopsies being done altogether. All patients but one were females, ranging in age from 22 to 60 years. In all cases but two (C. F. J. and A. D.) the telangiectases were associated with visible varicose veins. The specimens were fixated in ten per cent formalin and embedded in paraffin. In 9 cases serial sections were made. Staining methods used were hematoxylin and eosin, Weigert's elastic tissue and van Gieson's stains, Gomori's reticulin stain, Möllendorff's modification of Heidenhain's iron hematoxylin, Mallory's phosphotungstic acid hematoxylin and Masson's trichrome stain.

### *Results*

In all cases the histopathological observations were essentially the same, as follows:

(1) Frequent veins in the reticular layer of corium and more rarely in the hypodermis presented thickened walls (Fig. 2). This thickening was generally moderate or severe in degree, causing moderate or severe narrowing of the lumen. Most of the vessels were small, measuring between 26 and 225  $\mu$  in diameter, being the layers of the wall poorly delineated. The endothelial layer, however, was conspicuous, showing in its cells rounded nuclei. In a few larger vessels of the hypodermis the layers could be better distinguished. These vessels showed hypertrophic muscular cells and conspicuous elastic fibers in the media, and less frequently intimal thickening (Fig. 3 and 4). The intimal thickening consisted of a few muscular cells, fibroblasts, reticular fibers, and rare elastic and collagenous elements. In the smaller vessels the hypertrophic and hyperplastic changes were of the same type, it being common to find a conspicuous condensation of hyperplastic elastic fibers beneath the thin adventitia (Fig. 5). The intimal thickening, however, was poorly delimited from the media. This thickening involved the whole circumference or more rarely a part of the intima of these vessels. In the first instance the thickening was regular, or less frequently irregular in shape with thinner and thicker parts. It could be more cellular, or more fibrous in appearance. Its muscular cells were longitudinal, circular, or irregularly placed. These cells had the tendency to be more numerous and circular beneath the endothelium (Fig. 6 to 8).

The thickened walls of the larger vessels presented a few new capillaries, and in a few instances valves (Fig. 9).

The thickened veins became progressively thin-walled toward the surface of the reticular layer of corium, in which they ran not rarely parallel to the epidermis (Fig. 10). The superficial thin veins presented widely dilated lumen, surrounded by endothelium, a yellow stained layer (elastin-van Gieson) with fibroblast-like nuclei and

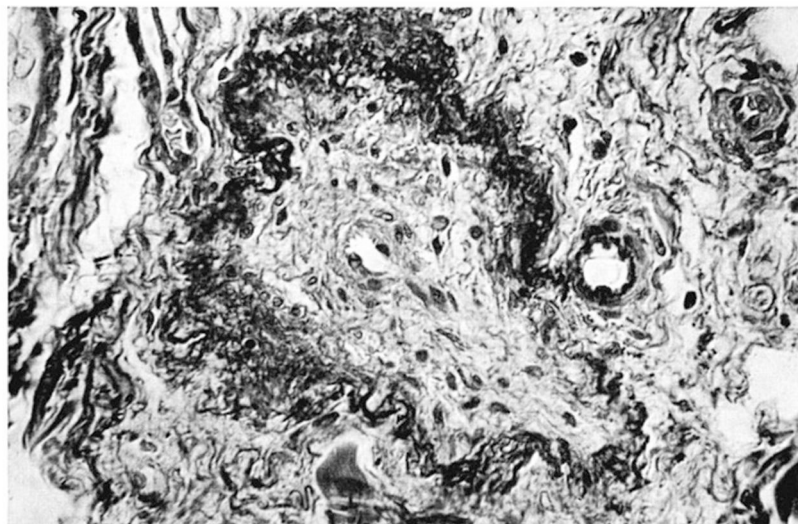


Fig. 5

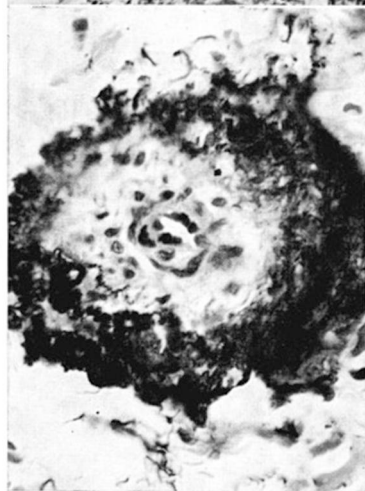


Fig. 6

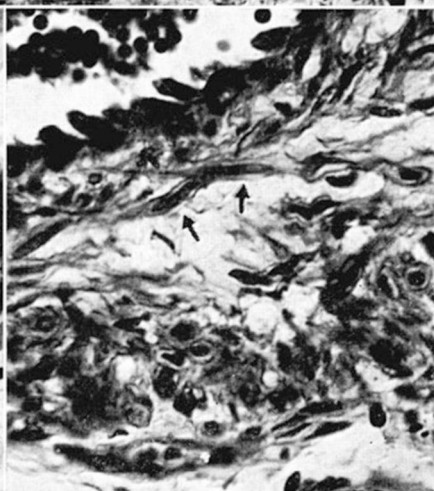


Fig. 7



Fig. 8

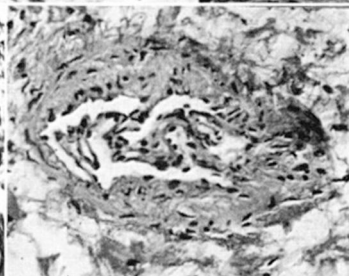


Fig. 9

rare or lacking collagen fibrils, and inconspicuous adventitia. In the serial sections anastomoses of the thickened veins with arteries failed to be observed, except for one single vein located in the external part of the reticular layer of the corium. The communicating vessel was an arteriole, 15  $\mu$  in diameter, with conspicuous internal elastic membrane, a single row of muscular cells in the media and thin adventitia (Fig. 11).

(2) In 3 cases rare thickened dermic veins were occluded by a dense collagenous tissue with new vessels and hemosiderin (Fig. 12). In one case (C. F. J.) the occluded vessel was longitudinally sectioned to an extent of 1400  $\mu$ . Two cases presented respectively acute and subacute thrombosis, related to injection of contrast medium for microangiography.

(3) In 7 cases frequent dilated thin-walled veins, located in the external and middle third of the reticular layer of corium and rarely in the papillary layer were found. In comparison to the thickened vessels, the walls of these veins presented no or only scarce elastic and muscular tissues, while there was an increase of collagenous elements. Endothelial nuclei were generally flat.

(4). In 4 cases small hypodermic and chiefly dermic arteries presented rare cushions, at the mouth of branches or not. These cushions involved a part or the entire circumference of the intima. They consisted mainly of longitudinal muscle cells with collagenous (rare) and elastic fibers (more abundant) interposed between the internal elastic membrane and the endothelial layer. One cushion also revealed myo-epithelioid cells (Fig. 13). In 2 of these cases and in 2 further patients there were also rare polypoid or pedunculated cushions having their origin in the media. These cushions were covered with endothelium and internal elastic membrane, both continuous with the same elements of the wall (Fig. 14).

(5) The epidermis, corium and hypodermis themselves did not show changes, except for two cases. One of these revealed edema and slight infiltration by neutrophil leukocytes in the corium, related to the injection of the contrast medium for microangiography. The other case presented round cell infiltration, chiefly around dermic and hypodermic vessels, as well as new collagen fibrils diffusely scattered in the hypodermis and in a few dermic areas. Thinning of the epidermis was present in 2 cases.

---

*Fig. 5.* B. M. O., 32 years old. Severe narrowing of the vein lumen; elastic tissue condensed at the external surface. Near the right upper corner notice the thickened venule, to be compared with the lower arteriole with conspicuous internal elastic membrane. Elastin- van Gieson.  $\times 496$ .

*Fig. 6.* C. F. J., 37 years old, with no apparent varices. Vein showing severe, less cellular, intimal thickening, and condensation of elastic fibers at the external surface. Elastin- van Gieson.  $\times 536$ .

*Fig. 7.* Same case as Fig. 2. The arrows indicate muscle cells in the intimal thickening of a vein. The lower part shows cross sectioned muscle cells in the media. Möllendorff's modification of Heidenhain's iron hematoxylin.  $\times 528$ .

*Fig. 8.* T. M. R., 26 years old. Vein showing an irregular, valvelike appearance, intimal thickening. Condensation of elastic fibers at the external surface. Elastin- van Gieson.  $\times 134$ .

*Fig. 9.* N. A. N., 34 years old. Thickened vein showing valves. Hematoxylin-eosin.  $\times 192$ .

Fig. 10

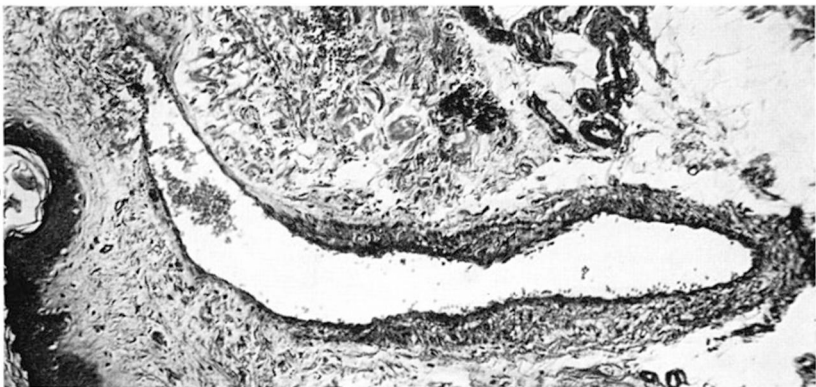


Fig. 11

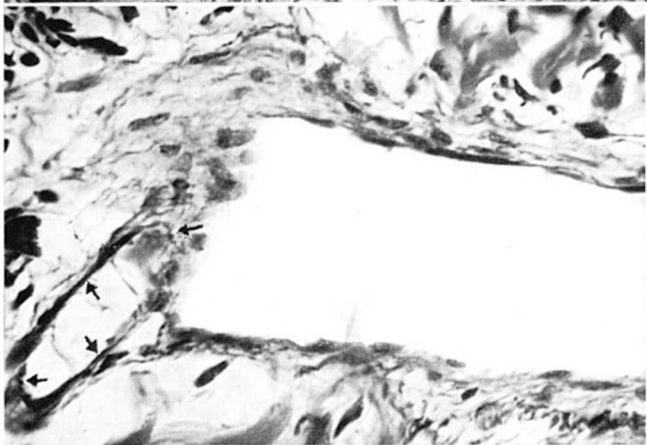


Fig. 13



Fig. 12

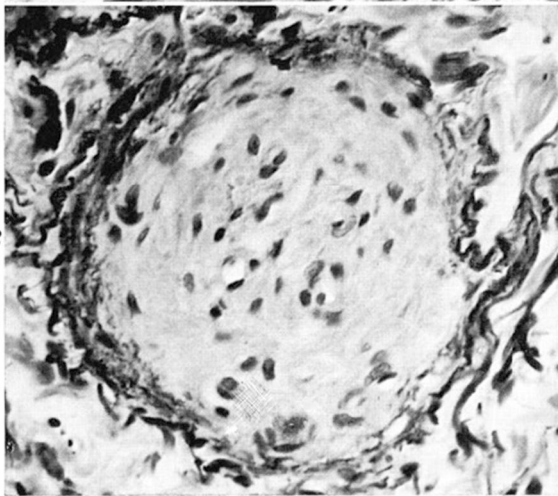
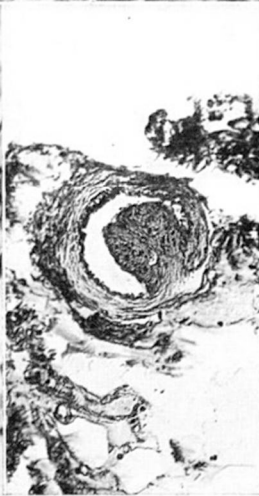


Fig. 14



### Discussion

There was evidence that the telangiectases associated with varicose veins were dilatations of veins, and not of capillaries (*Biegel-eisen*), located in the papillary layer and mainly in the subjacent reticular layer of the corium. The same was reported by others (*Miescher, Bean*) and it is known for telangiectases of other origins (*Wertheim*).

The pathogenesis of the telangiectases is not well known (*Miescher, Sellei*). The vein changes, that we have described, were essentially similar to those found in varicose veins (*Mucha and Mras; Gans and Steigleder*). This supports *Miescher's* view that these telangiectases are related to high venous blood pressure. However, their irregular distribution is not well understood. It is possible that the lumen narrowings and thrombotic occlusions of veins are responsible, at least in part, for the appearance of these telangiectases, as well as their distribution in areas (Fig. 1). Another factor would be arteriovenous anastomoses, which, despite the careful examination of serial sections, were found in only one instance. However, it must be taken into account that these anastomoses may be situated more deeply. There are indications that arteriovenous shunts are one of the various factors responsible for the varicose veins in the lower limbs (*Schroth, 1962*).

The thickened veins could be easily confused with arteries (Fig. 3 and 4). The difficulty in distinguishing the layers of the wall, the conspicuousness of vasa vasorum and the presence of valves were, however, the characteristics of veins.

The arteriovenous anastomosis (Fig. 11) was of the direct type (type I in *Clara's* classification), with no structurally special anastomotic segment. Myo-epithelioid cells in intimal cushions of arteries,

---

*Fig. 10.* Same case as Fig. 9. Progressive thinning of the vein walls toward the epidermis, seen at left. Hematoxylin-eosin.  $\times 124$ .

*Fig. 11.* Same case as Fig. 9. At the left corner, notice the arteriole in communication with the dilated vein. The internal elastic membrane is conspicuous (arrows). Elastin- van Gieson.  $\times 628$ .

*Fig. 12.* Same case as Fig. 1. Picture of fibrous organized thrombus occluding the vein; elastic fibers at the external surface of the wall. Elastin- van Gieson.  $\times 528$ .

*Fig. 13.* V. M. Arteriole showing conspicuous internal elastic membrane and intimal cushion with myo-epithelioid cells. Elastin- van Gieson.  $\times 648$ .

*Fig. 14.* T. M. R., 26 years old. Hypodermic small artery showing polypoid cushion coming from the media. Elastin- van Gieson.  $\times 134$ .

as observed here, are not peculiar to the arteriovenous shunts and may be seen in vessels without shunt (*Clara*).

Both intimal and medial cushions, observed in small arteries of 6 patients, regulate the blood flow in these vessels (*Bucciante*). It seems to us that the venous intimal thickenings with longitudinal muscle cells, cushion-like in appearance, may, as *Bucher* admitted for the heart veins, prevent the return of the venous blood (Fig. 8).

### *Summary and Conclusions*

Histopathological study on 26 skin biopsies of telangiectases associated with varicose veins in 16 patients was carried out.

Thickening of the walls of veins in the reticular layer of the corium and hypodermis with moderate or intense lumen narrowing was the more frequent and conspicuous change. Organized thrombi were present in 3 cases.

It is suggested that these venous obstructive changes may be a factor for the appearance of these telangiectases. Another factor would be arteriovenous anastomoses, which were present in only one case.

Cushions for the regulation of blood flow were rarely found in small arteries of 6 cases.

We are indebted to Miss *Maria Cândida de Faria* for the technical assistance.

### *Zusammenfassung*

Es wurden histologische Untersuchungen von 26 Hautbiopsien bei 16 Patienten mit Teleangiektasien und Varizen ausgeführt. Am häufigsten wurde eine Verdickung der Venenwand im Stratum reticulare des Coriums mit verschieden starker Verengung des Lumens gesehen. In 3 Fällen fanden sich organisierte Thromben. Es wird vermutet, daß diese die Venen verengenden Veränderungen die Ursache für die Teleangiektasien seien. Ein anderer Faktor könnten arteriovenöse Anastomosen sein, die in einem Fall vorhanden waren. In 6 Fällen wurden vereinzelt in den kleinen Arterien Polster für die Regulation des Blutstromes gefunden.

### *Résumé*

Les auteurs ont effectué l'étude histopathologique de 26 biopsies cutanées de télangiectasies associées à des veines variqueuses chez 16 patients. L'altération la plus fréquente et la plus remarquable,

consistait en un épaississement des parois veineuses dans la couche réticulaire du derme et de l'hypoderme, associé à un rétrécissement modéré ou intense du diamètre. Des thrombus organisés étaient présents dans 3 cas.

Les auteurs ont suggéré l'idée que ces lésions oblitérantes des veines, pouvaient être un facteur dans l'apparition de ces télangiectasies. Un autre facteur pourrait consister en anastomoses artérioveineuses, qui étaient présentes dans un seul cas.

Des coussinets régulateurs du courant sanguin, n'ont été que rarement observés dans les petites artères.

### References

- Bean, W. B.*: The natural history and significance of certain vascular changes in the skin and mucous surfaces. *Quart. Bull. Northw. Univ. med. Sch.* 27: 89-98 (1953).
- Biegeleisen, H. I.*: Telangiectasia associated with varicose veins. Treatment by a micro-injection technic. *J. amer. med. Ass.* 102: 2092-2094 (1934).
- Bucciante, L.*: Sui fondamenti angio-architeturali e strutturali della regolazione del circolo sanguineo. *Arch. Anat. path.* 32: 117-239 (1960).
- Bucher, O.*: Über den Bau der Blutgefäße des menschlichen Herzens. *Acta anat.* 3: 162-189 (1947).
- Clara, M.*: Die arterio-venösen Anastomosen. *Anatomie, Biologie, Pathologie*; 2. Aufl. (Springer, Wien 1956).
- Gans, O. und Steigleder, G.-K.*: *Histologie der Hautkrankheiten*; vol. 2 (Springer, Berlin 1957).
- Miescher, G.*: Über essentielle Teleangiectasien nebst einigen Bemerkungen zur Pathogenese der Teleangiectasien. *Arch. Derm. Syph., Berlin* 127: 791-832 (1919-1920).
- von Möllendorff, W. und M.*: Das Fibrocytennetz im lockeren Bindegewebe; seine Wandlungsfähigkeit und Anteilnahme am Stoffwechsel. *Z. Zellforsch.* 3: 503-601 (1926).
- Moraes, I. N., Puech-Leão, L. E. and de Toledo, O. M.*: Varicose veins and telangiectasies. Utility of microangiography for therapeutic orientation. *Rev. Ass. med. bras.* 8: 5-9 (1962).
- Moraes, I. N., Puech-Leão, L. E., Simões, J. C., de Toledo, O. M. and Corrêa Neto, A.*: Microangiographic study of telangiectasis. *J. Cardiovasc. Surg., Torino* (in press).
- Mucha, V. and Mraz, Fr.*: Der variköse Symptomenkomplex; in *Jadassohns Hb. der Haut- und Geschlechtskrankheiten*; vol. 6, part 2 (Springer, Berlin 1928).
- Schroth, R.*: Über die Verkürzung der arterio-venösen Zirkulationszeit bei Varicenträgern. *Arch. klin. Chir.* 300: 280-286 (1962).
- Sellei, J.*: Die Teleangiectasien. *Acta dermat.-vener.* 5: 205-228 (1930).
- Wertheimer, L.*: Die Teleangiectasien; in *Jadassohns Hb. d. Haut- und Geschlechtskrankheiten* vol. 12, part 2/I (Springer, Berlin 1932).