دراســات مورفولوجية مجهرية للمدد الشريانى
للخصيــة والبرابخ فى الجمل الدروميديرى

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تبين من البحث أن الغشاء المرن الداخلى فى نهاية الجزء البطنى وكذلك فى بداية الجزء الملتف من الشريان المنوى الداخلى ينقسم الى غشائين يحتويان بينهما نسيج ليفى مرن فى الجزء البطنى وخلايا عضلية ملساء مرتبة طوليا فى الجزء الملتف . كذلك لوحظ وجود بروزات فى البطانة الداخلية للجزء الملتف من الشريان وأن هذه البروزات تختلف فى الحجم والشكل بطول هذا الجزء . أما الشرايين الخصوية الأصلية فبعضها من النوع ذات الجدار الرفيع وبعضها يحتوى على بوليستيرات عضلية فى البطانة الداخلية ، أما البعض الاخر فيتميز بأن الخلايا العضلية للطبقة الوسطى تكون مرتبة طوليا فى الداخل ودائرية فى الخارج .

كذلك وجد أن البطانة الداخلية لفروع الشرايين البربخية فى جسم وذيل البربخ تزداد فى السمك وأن هذه الزيادة تحتوى على خلايا عضلية ملساء مرتبة طوليا .

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MICROMORPHOLOGICAL STUDIES OF THE ARTERIAL SUPPLY OF THE TESTIS AND EPIDIDYMIS OF THE DROMEDARY CAMEL

By

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SUMMARY

The abdominal part of the internal spermatic artery is similar in structure to a distributing artery of the same size. At the end of this abdominal part and the beginning of the funicular part, the lamina elastica interna is spilt into two membranes enclosing between them fibro-elastic tissue, and longitudinal smooth muscle cells respectively, Along the course of the funicular part, the artery possesses intimal cushions of variable size and form. Some of the proper testicular arteries are of the thin-walled type. Other vessels posses elastic muscular intimal polsters and still others show an inner longitudinal and outer circular mediae. Typical and atypical glomus vessels are well demonstrated in the stroma of the testis. The arteries of the body and tail of epididymis show an intimal thickening formed of longitudinally arranged smooth muscle cells.

INTRODUCTION

It is well evident from previous studies in other animals that the scrotal tunics and its associated muscular elements as well as its vascular bed have an important effect on the regulation of the temperature of the testis.

Many investigators study the course, distribution and ramifications of the internal spermatic artery in different animals. In the camel LISBRE (1903) and TAYEB (1945) gave a brief account on the blood supply of the testis. EL-GAAFARY and ALI (1975) described in detail the arterial supply of the testis and epididymis of the dromedary camel and correlated their results with the thermoregulatory mechanism. HARRISON (1948) in a large number of wild and domestic animals, and OUSAL and HARASZTI (1962) in the bull discussed the relation between the testicular angioarchitecture and the thermoregulation mechanism that takes place in the testis. HOFMANN (1960) in the bull and EL-ETREBY (1969) in buffaloes described the histological structure of the arterial blood supply of the testis. The present study on the histological structure of the arteries that supply the testis and epididymis of the camel is an attempt to define the part played in the thermoregulatory mechanism of the testis.

MATERIALS AND METHODS

The specimens used in this work were collected from the internal spermatic artery of 10 adult male camels. Segments, not more than 0.5 cm. thick, were taken from the abdominal and funicular parts of the artery, and from the peripheral parts of the testis and epididymis. The selected parts were immediately fixed in Bouin's fluid and, by the usual histological technique, sections 4-6 microns in thickness were obtained. The prepared sections were stained by : Harris heamatoxylin and eosin, Crossmon's trichrome stain, a combination of Van-Gieson's stain and Weigert's elastic stain, and Gomori's reticulin method. These methods were used as outlined by CARLETON *et al.* (1967) and PEARSE (1968).

RESULTS AND DISCUSSION

The description of the abdominal part of the internal spermatic artery as being similar to that of a distributing artery of a similar size seems to be in accordance with that described by HOFMANN (1960) in the bull (Fig. 1).

Split lamina elastica interna was observed in the abdominal part of the internal spermatic artery at its termination. In this location the elastic lamina is represented by two scalloped membranes with fine fibro-elastic tissue in-between (Fig. 2). Few radiating muscle fibers extending from the innermost part of the media were seen attached with the splitted part of the lamina elastica interna. It is that by the contraction or relaxation of these muscle fibers and those of the media, narrowing or widening of the lumen is affected. So a partial control of the amount of blood flow to the arterial bed of the testis and epididymis is experienced by this part of the artery.

The funicular part of the artery, at its beginning, shows a lumen that is strongly compressed. The intima is bounded by highly scalloped lamina elastica interna which is frequently split into two membranes enclosing between them longitudinally disposed smooth muscle fibers. The contraction of these smooth muscle fibers causes shortening of the artery accompanied by narrowing of its lumen. By this, the intima plays a part in the regulation of the rate of blood flow and also the amount of blood conducted to the testis through the contraction and relaxation of its muscular elements. Similar findings were noticed by NAWAR (1972) in the buffalo uterine arteries. The tunica media presents, in its outer-most part, small bundles of longitudinally disposed smooth muscle cells. Contraction of these muscle bundles are responsible for the convolutions presented by this part of the artery. EL-GAAFARY and ALI (1975) stated that such convolutions cause a slower flow of blood to the testis which allows for the preheating and precooling mechanisms to be effectively performed. NAWAR (1972) stated the presence of longitudinally arranged smooth muscle bundles in the adventitia of buffalo ovarian arteries which may be the cause of their serpentine course described by MOBARAK (1968).

Along the course of the funicular part of the artery, there is a gradual increase in the thickness of its three tunics. In addition the lumen become less compressed and regular at the terminal part. In some parts, the tunica intima projects into the lumen forming intimal cushions of different form and size (Fig. 3). These cushions possess a thin less scalloped internal elastic membrane and are bounded externally by a second interrupted one. Between the inner and outer membranes, additional interrupted membranes were noticed (Fig. 4). The innermost part of the intima is formed mainly of circularly arranged smooth muscle cells surrounded by few collageonous fibers. The outermost part is fibroelastic and contains radiating and longitudinally directed smooth muscle cells (Fig. 5). The radiating muscle fibers extend between the outer and inner membranes and are attached with them. The media, where the intimal cushions are found, is relatively thin and presents also the longitudinal muscle bundles in its outer part. The intima of the buffalo uterine arteries shows similar structural arrangement (NAWAR, 1972). This arrangement may exert an active effect on the blood flow and blood pressure.

The marginal part of the internal spermatic artery shows a relative decrease in the thickness of its tunics and in the diameter of its lumen than in the preceeding parts. In spite of its similarity to a small muscular artery its lamina elastica interna splits in some parts into two membranes enclosing between them radiating and longitudinally directed smooth muscle fibers (Fig. 6).

The medial and lateral testicular arteries as well as the accessory testicular arteries are placed in the tunica albuginea. They show the usual structure of the marginal part of the internal spermatic artery, though they are smaller in size (Fig. 7).

The proper testicular arteries, lying in the deeper part of the tunica albuginea, in the septula testis, and in the mediastinum, possess some structural peculiarities. Some vessels are thin-walled with clear lamina elastica interna and show media formed from 2-4 layers of circularly directed smooth muscle fibers (Fig. 8).

Other vessels have elastic muscular intimal polsters where the muscle fibers are longitudinally arranged (Fig. 9) These intimal polsters either form a continuous layer surrounding the lumen or only occupy a part of the intima. In both cases they are bounded by an internal elastic membrane, which may be interrupted in some parts. Still other vessels possess a muscular media which consists of an outer circular layer and an inner longitudinal one (Fig. 10). Typical and atypical glomus vessels are well demonstrated (Fig. 11, 12 and 13). The atypical glomus vessel show an intimal glomus polsters which may be bounded by internal elastic membrane or enclosed between two membranes. Other atypical glomus vessels possess glomus cells in their mediae especially in the inner part. EL-ETREBY (1969) described similar vessels in his work on the testis of the buffalo and he regarded them as special regulatory devices playing a role in regulation of the blood circulation in this organ.. Corresponding vessels were demonstrated in the ovary of buffaloes (EL-SHAFEY, 1972) and in the lung and nasal mucosa of the camel (FATH EL-BAB, 1970).

The epididymal arteries supplying the body and tail show wider lumina and thicker tunics than those found in the head of the epididymis. The internal elastic membrane is slightly scalloped in the artery of the head while those in the arteries of the body and tail split into 2-4 membranes.

The intimal thickening in the arteries of the body and tail consists chiefly of longitudinally disposed smooth muscle cells surrounded by abundant collagenous and few elastic fibers (Fig. 14). The tunica media and adventitia are the same as in the muscular arteries. So it is evident that the intimal thickening in the arteries of the body and tail of the epididymis cooperate in regulation of the amount of blood conducted to these parts of the epididymis. This is carried out by the contraction and relaxation of the intimal muscular elements.

Conclusively, the camel as a desert animal is usually subjected to flactuating atmospheric conditions, thus a stabilization of both testicular and epididymal temperature is strongly needed. This could be achieved by the regulation of arterial blood circulation and the amount of blood conducted to these organs. The main factor in this regulation to withstand the atmospheric alteration seems to be strongly linked with the structural modifications in the arteries supplying these organs.

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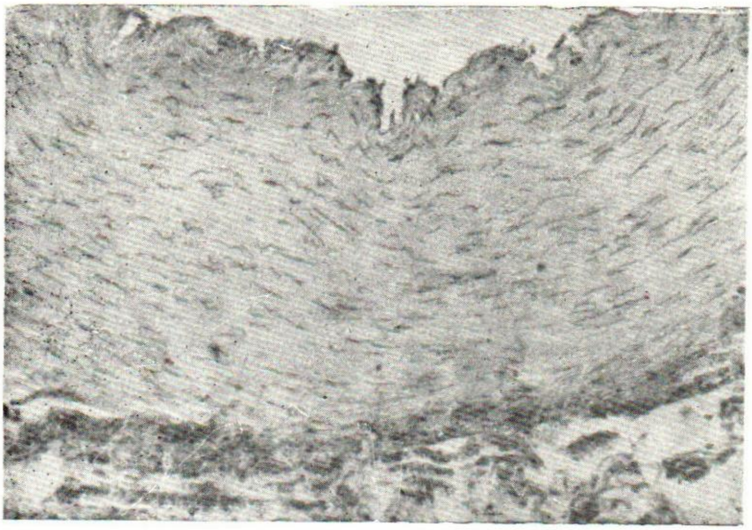

Fig. 1.—The abdominal part of the internal spermatic artery (H. and E. stain, Oc. 10, Obj 10).

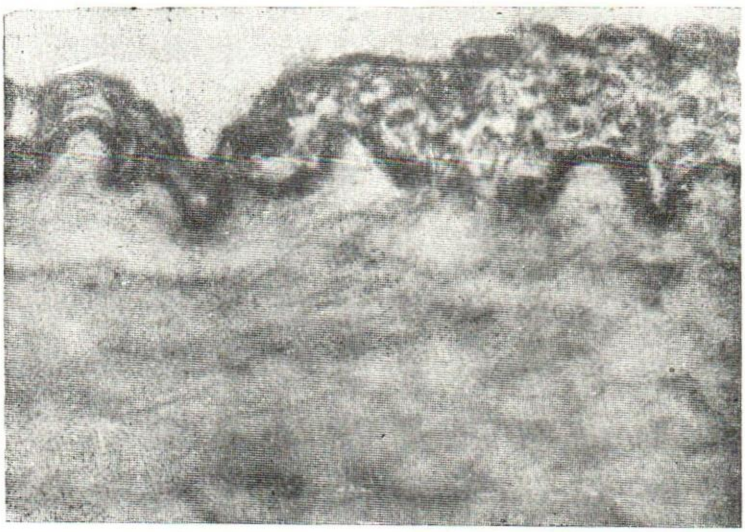

Fig. 2.—The termination of the abdominal part of the internal spermatic artery showing split internal elastic membrane.
(Weigert,s elastic stain and Van Gieson., Oc. 10, Obj. 25)

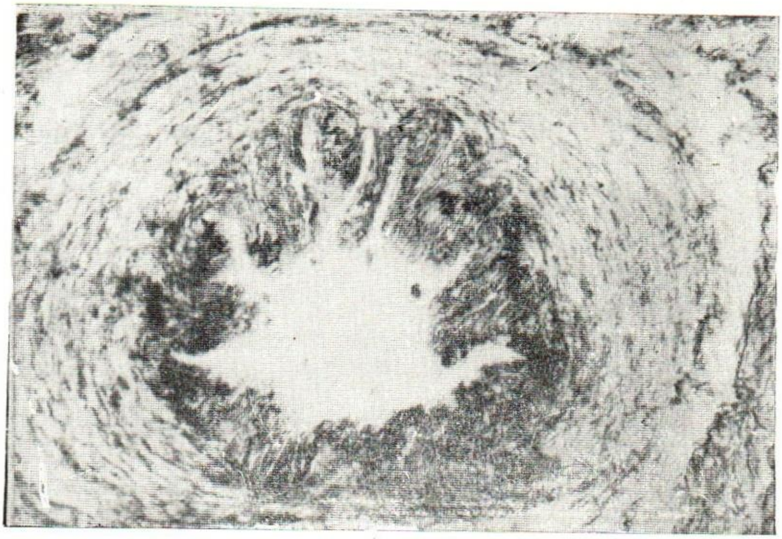

Fig. 3.—The funicular part of the interanl spermatic artery at its termination showing intimal cashions progecting in the lumen.

(Weigert's elastic stain and Van Gieson., Oc, 10, Obj. 3.5)

Fig. 4.—The termination of the funicular part of the internal spermatic artery showing interrupted elastic membranes in the intima.

(Weigert's elastic stain and Van Gieson., 0c. 10 Obj. 25).

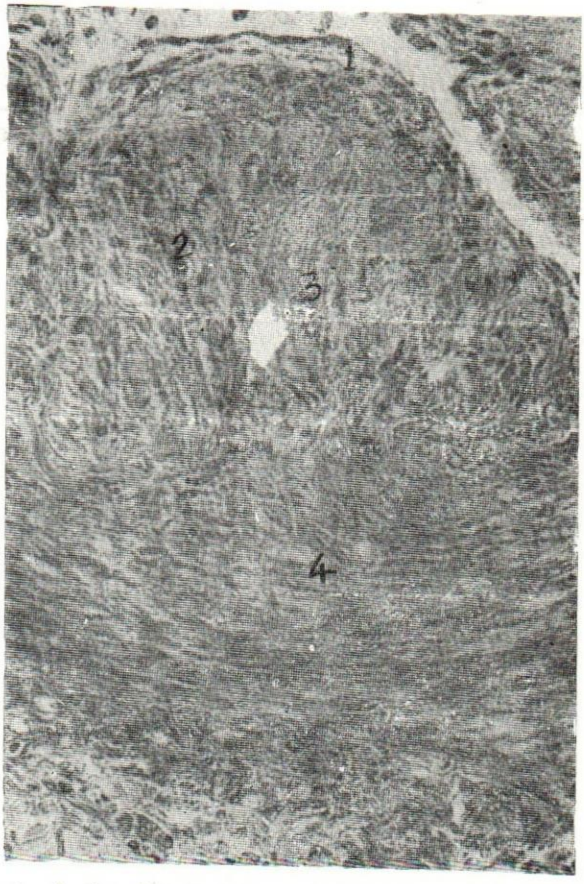

Fig. 5.—The termination of the funicular part of the internal spermatic artery showing the structural arrangement of an intimal cushion.

1. Inner circularly arranged smooth muscle cells. 2. Longitudinally directed smooth muscle cells. 3. Radiating muscle fibers. 4. Media. (Crossmon's trichrome stain, Oc, 10, Obj 25)

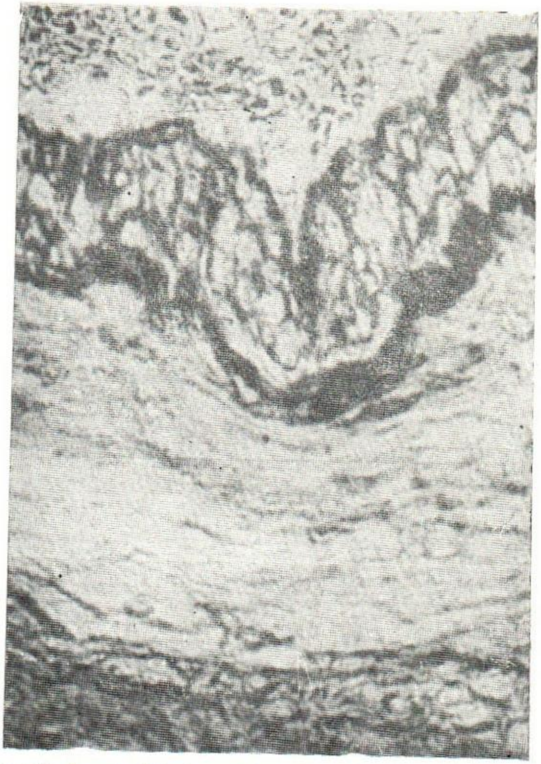

Fig. 6.—The marginal part of the internal spermatic artery showing intimal thickening of longitudinally disposed smooth muscle cells, enclosed between two elastic membranes. (Weigert's elastic stain and Van Gieson., Oc 10, Obj. 40)

Fig. 7.—Accessory testicular artery stained with Weigert's elastic stain and Van Gieson., (Oc. 10, Obj. 40)

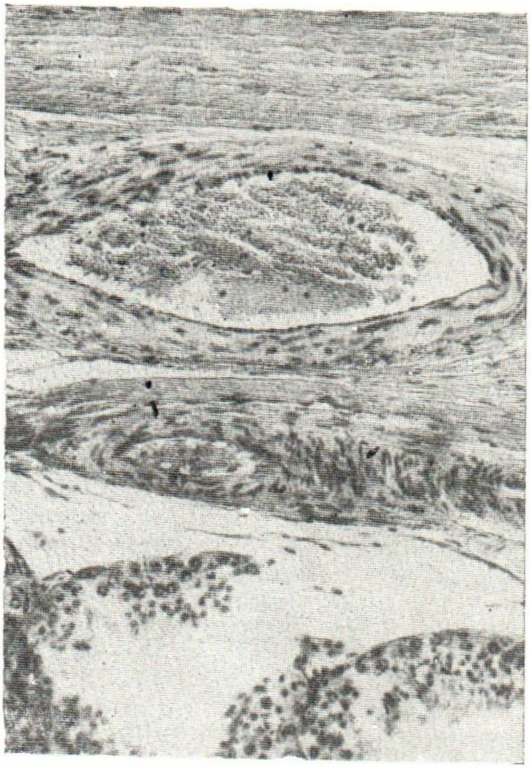

Fig. 8.—Proper testicular artery of the thin-walled type lying in the deeperpart of the tunica albuginea. (H. and E. Stain., Oc. 10, Obj. 25).

Fig. 9.—Proper testicular artery showing elastic muscular intimal polster. (Weigert's elastic stain and Van Gieson., Oc. 10, obj. 40)

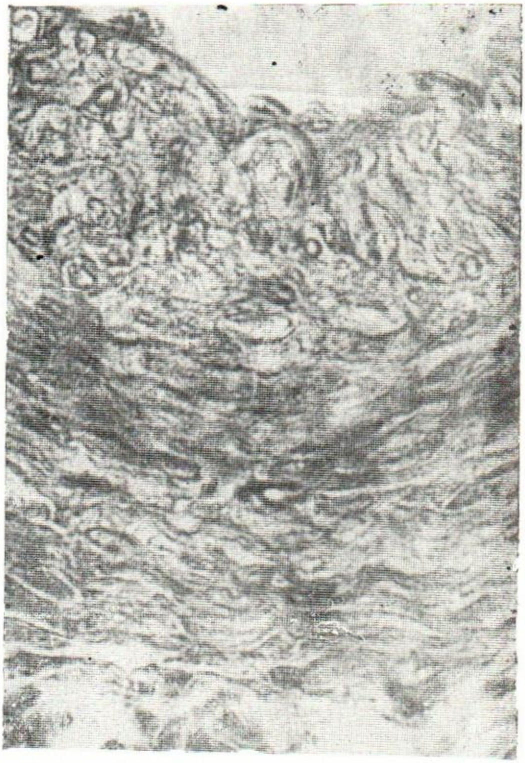

Fig. 10.—Proper testicular artery showing a media formed from inner longitudinal muscular layer and an outer circular one.
(Crossmon's trichrome stain., Oc. 10, Obj. 40)

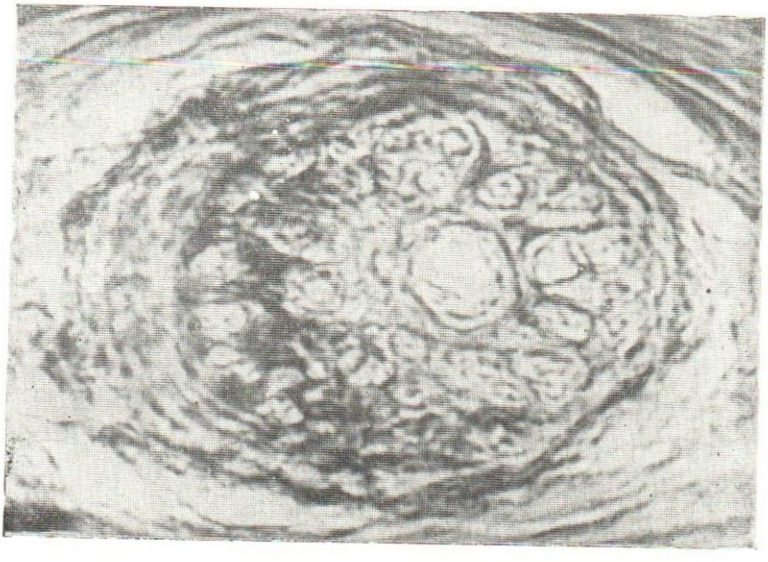

Fig. 11.—Typical glomus vessel found in the tunica albuginea.
(Weigert's elastic stain and Van Gieson · Oc. 10, Obj 40)

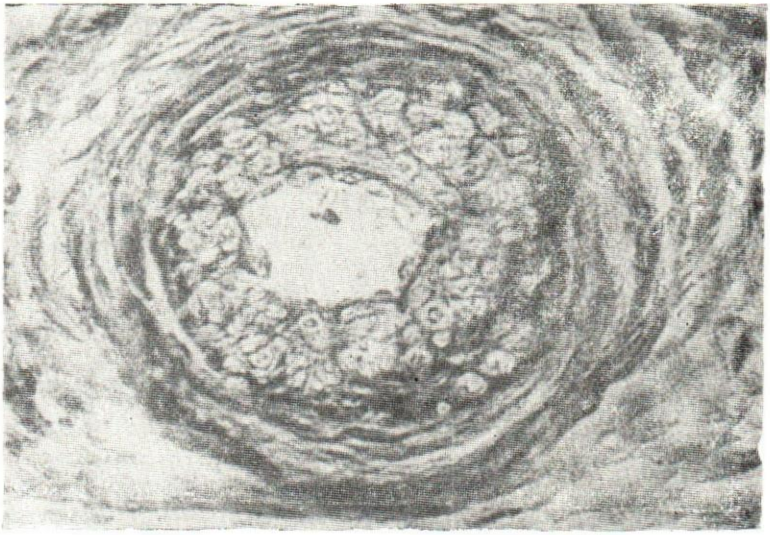

Fig. 12.—Atypical glomus vessel showing intimal glomus polster and circular muscular media.

(Crossmon's trichrome stain., Oc. 10, Obj. 40)

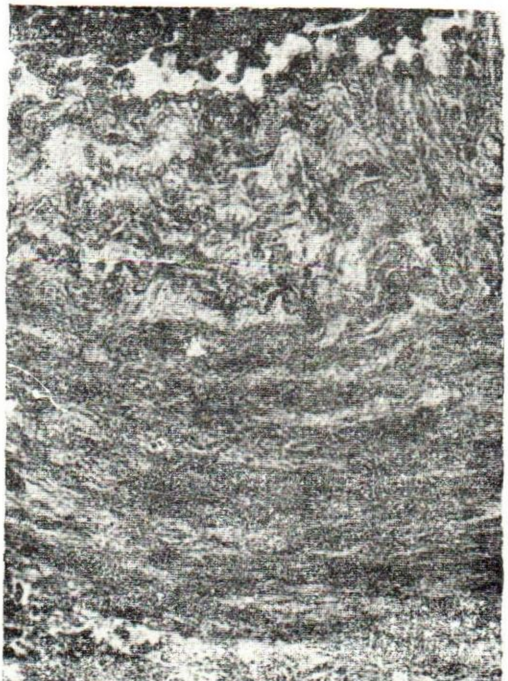

Fig. 13.—Atypical glomus vessel showing glomus cells in the inner part of the media and smooth muscles in its outer part.

(Weigert's elastic stain and Van Gieson., Oc. 10' Obj. 40)

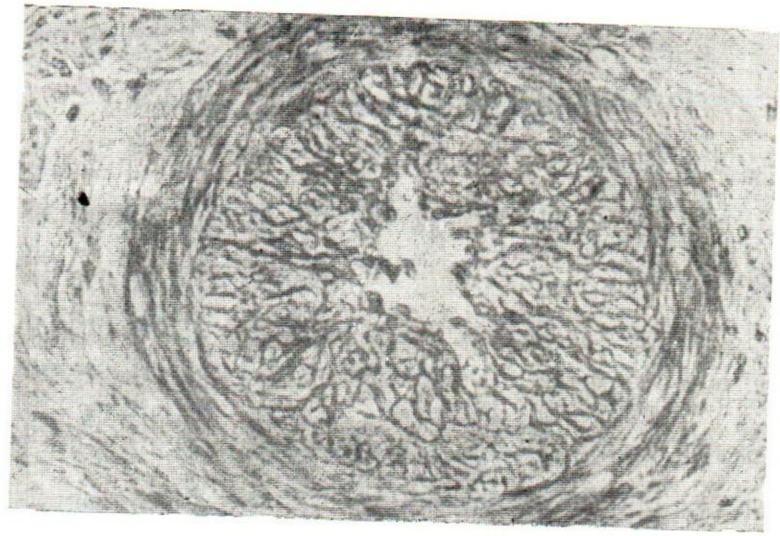

Fig. 14.—The artery of the body of epididymis showing intimal thickening formed from longitudinally disposed smooth muscle cells.

(Crossmon's trichrome stain. Oc. 10' Obj. 25).