

## PERIPHERAL VASCULAR DISEASE IN JOHANNESBURG

## AN ANALYSIS OF 269 PERIPHERAL ARTERIOGRAMS PERFORMED AT THE JOHANNESBURG GENERAL HOSPITAL

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The purpose of this paper is to review the experience obtained by the angiographic unit at the Johannesburg General Hospital. Particular reference will be made to the age and sex incidence, the technique of examination, and the technical complications which were encountered. The nature and distribution of lesions are analysed.

## Case Material

All the cases were referred to us by the surgeons and physicians at the Johannesburg Hospital. There was no selection of cases. All examinations of the abdominal aorta and lower-limb vessels during the period under review (1957-1961) were included. A total of 269 cases were examined. Renal, carotid and upper-limb arteriograms were not included.

## Age Incidence

This is demonstrated graphically in Fig. 1. It will be noted that the majority of patients were in the age groups

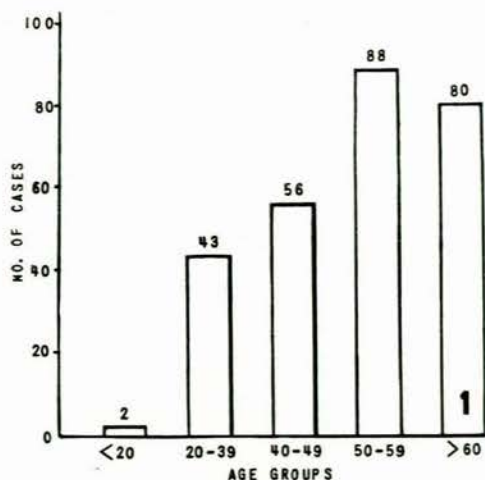


Fig. 1. The age incidence. The numerals on top of each block indicate the total number of cases in each age group.

in which atherosclerosis occurs. Degenerative arterial disease was the major indication for the examinations performed by our unit.

## Sex Incidence

227 patients were males and 42 females — a ratio of 5.4:1. The ratio of males to females according to age is shown in Table I. Fig. 2 is a further analysis of the male to female ratio.

Although in all age groups there were more male than female cases, it is interesting to observe that although there is a relative drop in the number of males over the

TABLE I. THE RATIO OF MALES TO FEMALES ACCORDING TO AGE

Age	Male to female ratios
Under 20	0 to 2
20-39	4.5 to 1
40-49	7 to 1
50-59	7 to 1
Over 60	4.7 to 1

age of 60, the female incidence appears to rise in a linear fashion. Statistically, this observation is false, since the number of female cases is too small. Using the formula

$$\sigma = \sqrt{\frac{m_1 + m_2}{n_1 + n_2} \left(1 - \frac{m_1 + m_2}{n_1 + n_2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$$= 0.0517$$

i.e.  $\Delta = 0.036 \pm 0.13$

it is found that no significant difference is present in this small number of cases. However, we intend watching this

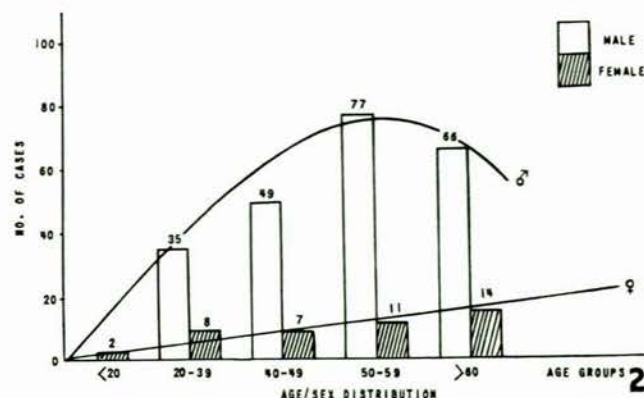


Fig. 2. A further analysis of the male and female ratio.

trend and reassessing it in a larger series. It does, nevertheless, appear to indicate an increasing incidence of peripheral vascular disease in women after the menopause

## TECHNIQUE

Table II demonstrates the techniques employed for aortograms and femoral arteriograms and gives the number of examinations performed in the series by each method.

TABLE II. TECHNIQUES EMPLOYED

Aortograms	{ Seldinger .. .. .	85 cases
	{ Translumbar .. .. .	86 cases
Femoral arteriograms	{ Seldinger .. .. .	70 cases
	{ Percutaneous .. .. .	28 cases

The relatively high proportion of aortograms performed by the translumbar route is not an accurate reflection of

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current practice, since the Seldinger technique is now used as a routine where possible. This is discussed below.

The contrast medium employed in all cases was 'urografin', 76%, for aortograms and urografin, 60%, for femoral arteriograms. In the case of aortograms, the maximum amount used per injection was 35 ml., frequently less. In the case of femoral arteriograms, the maximum amount per injection was 20 ml. In many of the cases in which the catheter technique was employed, the injection was made with a pressure-injection apparatus, although adequate films are usually obtainable by rapid manual injection.

Local anaesthesia was employed wherever possible, general anaesthesia being reserved for apprehensive patients who were likely to be uncooperative or those who had rest pain. In order to avoid false interpretations, some form of rapid film-changing device was used for all examinations.

#### ANALYSIS OF LESIONS

##### 1. Occluded Arteries

In the 269 cases, a total of 707 arterial occlusions were encountered. The distal abdominal aorta (Le Riche syndrome) was occluded in 8 cases. The remainder of the occlusions were in the iliac, femoral, popliteal or tibial arteries — 339 on the left side and 360 on the right side. The regional incidence was:

- Lower abdominal aorta — 8.
- Common iliac artery — left 23, right 19.
- External iliac artery — left 32, right 36.
- Internal iliac artery — left 26, right 25.
- Superficial femoral artery — left 50, right 62.
- Profunda femoris artery — left 15, right 14.
- Femoral artery (adductor region) — left 65, right 59.
- Popliteal artery — left 45, right 57.
- Anterior tibial artery — left 40, right 42.
- Posterior tibial artery — left 43, right 46.

As will be observed, there was no significant difference between the two sides. Occlusions were found in 86% of cases referred for examination.

##### 2. Atheromatous Changes

These were diagnosed when the arteries showed irregularity of lumen, tortuosity, attenuation, or ectasia. 668 vessels were affected without occlusion. The regional incidence was:

- Lower abdominal aorta — 61.
- Common iliac artery — left 69, right 70.
- External iliac artery — left 52, right 51.
- Internal iliac artery — left 26, right 21.
- Superficial femoral artery — left 50, right 44.
- Profunda femoris artery — left 17, right 23.
- Femoral artery (adductor region) — left 42, right 38.
- Popliteal artery — left 28, right 40.
- Anterior tibial artery — left 10, right 8.
- Posterior tibial artery — left 8, right 10.

Once again, the symmetry between the two sides is observed. It is interesting to note the decrease in the

incidence of atheroma, as one proceeds distally, as opposed to the increasing incidence of occlusions in the distal arteries.

These findings are illustrated in Fig. 3. The letter 'A'

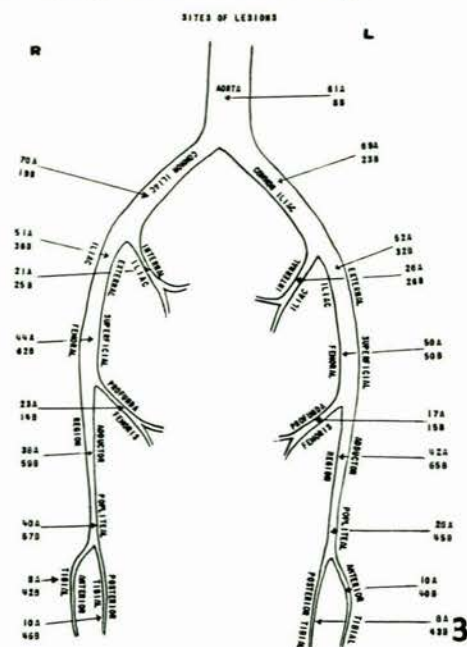


Fig. 3. Summary of arteriographic findings in the series. 'A' denotes atheroma; 'B' denotes occlusion.

denotes atheromatous changes, while the letter 'B' denotes occlusion.

It is noteworthy that atheromatous changes were found in the profunda femoris artery in 40 cases (6%) and occlusions were seen in 29 cases (4.3%). These figures are in agreement with other reported series where it was found that the profunda femoris artery was less involved by arterial degenerative disease than other arteries. Atheromatous changes were seen in 61.2% of cases.

##### 3. Arterial Calcification

Arterial calcification was noted on plain films in 13.4% of cases. This was noted more often in the larger arteries, but was more likely to be associated with an occlusion when seen in the more distal arteries.

##### 4. Aneurysm

Aneurysms were found in just under 5% of cases. Half of them involved the abdominal aorta. With the exception of one patient who had aneurysmal dilatation of both common iliac arteries, the remainder occurred in the popliteal arteries. In some cases, both popliteal arteries were aneurysmal.

##### 5. Attenuation

Excluding localized attenuations associated with atheromatous changes, and 2 patients who had attenuation of vessels on the side of an amputated limb, we encountered 3 patients, all females, who showed a generalized attenuation or 'hypoplasia' of the arteries. All had symptoms of intermittent claudication, but 2 had no evidence of arterial occlusion, and 1 had occlusions of the tibial arteries only.

(Byvoegsel — Suid-Afrikaanse Tydskrif vir Radiologie)

We are not yet aware of the significance of this finding, but it is interesting to note that all the cases occurred in females.

#### 6. Other

Seven cases have not been classified. One showed a displacement of the abdominal aorta by an undiagnosed abdominal mass; 1 had a mural thrombus of the right common iliac artery without any other arterial lesion; 2 were associated with femoral fractures and showed occluded mid-superficial femoral arteries; and the remainder were normal.

### TECHNICAL DIFFICULTIES

#### 1. Translumbar Aortograms

In 6 cases extravasation of the opaque medium occurred, and in a further 6 there was some dissection of the lumen. No ill-effects resulted. In 4 cases the aorta was punctured at the wrong level, e.g. at the level of the renal arteries. In 1 case the needle entered a renal artery, and in 1 the left renal vein was entered. These difficulties will of course be revealed by a small test injection, and the needle can then be withdrawn and the aorta repunctured. As indicated previously, however, unless Seldinger catheterization is impossible, as a result of a thrombus in the distal aorta or iliac arteries or for one of the reasons discussed below, it is always preferred to the translumbar technique.

#### 2. Seldinger Arteriograms

Of 155 cases, technical snags occurred in 19. In the case of aortography, this was due to failure to pass the catheter proximally, owing to extreme tortuosity of the iliac arteries in 8 cases, an iliac occlusion (despite the presence of a good femoral pulse) in 4, atheromatous plaques in

the iliac arteries in 2, and the catheter entering a circumflex iliac artery in 1 case.

In examinations of the arteries of the lower limb, the only snag encountered was when attempts were made to pass the catheter distally. In 4 such cases, the catheter entered the profunda femoris artery. This difficulty is more likely to occur in fat patients.

Apart from the technical complications, no serious complications occurred in the group, as far as we have been informed, except for haematoma formation at the puncture site. This should never be serious and in any case is usually preventable by commencing compression during the withdrawal of the needle or catheter, and continuing for several minutes after all signs of bleeding have stopped. At no time was there any difficulty from sensitivity to the contrast medium.

### SUMMARY

269 patients who underwent abdominal-aorta arteriograms and lower-limb arteriograms are reviewed. The age and sex incidence of the patients are mentioned. Reference is made to the techniques employed and the technical difficulties that were encountered. At no time during this series could the examination be shown to be hazardous to patients, and no difficulty occurred with the contrast medium employed.

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