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SPONTANEOUS AORTIC LESIONS IN REINDEER (RANGIFER TARANDUS L)

By

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GUPTA, PREM P. and CLAES REHBINDER: *Spontaneous aortic lesions in reindeer (Rangifer tarandus L).* Acta vet. scand. 1981, 22, 60—66. — Aortas of 20 reindeer, aged from 1.5 to 8.5 years, were studied. Fatty streaks were seen in 9, a fibrous plaque in 1, and elastic tissue degeneration in the tunica media in 4 of the aortas.

reindeer; atherosclerosis; fatty streaks; fibrous plaque.

Spontaneous atherosclerotic lesions of the aorta have been reported in several species of ruminants as goats (*Prasad et al.* 1972), buffaloes (*Gupta & Singh* 1978), sheep (*Gupta & Nagpal* 1979), and cattle (*Gupta* 1980). Such lesions have not been reported in reindeer.

MATERIAL AND METHODS

Aortas of 20 male forest reindeer, 1.5 to 8.5 years old, were collected at the September slaughter. After removal of adventitial fat, the aortas were opened longitudinally, fixed in 10 % buffered formalin for 3—4 days and stained with Sudan IV to delineate the fatty lesions. The lesions were graded according to the criteria recommended by the *WHO Study Group on Atherosclerosis* (1958).

For microscopy, longitudinal pieces of tissues were taken through the sudanophilic and other lesions in the aorta. Sections were stained with haematoxylin and eosin, Verhoeff's van Gieson, von Kossa and alcian blue. For determination of neutral lipids, frozen sections were stained with Sudan IV.

RESULTS

Lesions were found in the tunica intima as well as in tunica media. The intimal lesions were of 2 types and were designated as fatty streaks and fibrous plaque (*WHO Study Group on Atherosclerosis* 1958). Medial lesions were of one type and consisted of elastic tissue degeneration. Lesions were found, independant of age, in young and old animals.

Fatty streaks were not visible in unstained specimens and became apparent only after staining with Sudan IV. They were present in 9 of the aortas and always occurred in the abdominal aorta, most frequently at the dorsal mid-line and the iliac bifurcation (Fig. 1). These lesions mostly appeared as longitudinal sudanophilic streaks, 1.0—8.0 cm, parallel to the long axis of the aorta.

Histologically, fatty streaks showed distinct focal intimal thickening, with vacuoles due to removal of fat. There was an increase in alcian blue positive acid mucopolysaccharides in the ground substance. The main cells in the fatty streaks were smooth muscle cells oriented parallel to the long axis of the aorta. At places, the internal elastic lamina below the fatty streaks was fragmented. There was no evidence of fibrin, vascularization or haemorrhage in any of the fatty streaks.

Frozen sections showed deposition of extra-cellular neutral lipid, mainly in the deeper layers of the tunica intima (Fig. 2). Fat was not seen in the tunica media.

A fibrious plaque was seen in 1 specimen as a non-sudanophilic, white, firm and nodular lesion, about 1.0 cm in diameter and situated at the ventral curvature of the arch of the aorta (Fig. 3).

Microscopically, this lesion consisted of fibrous tissue (Fig. 4) with calcification in its deeper layers. The thickness of the intima was markedly increased and broader than that of the tunica media.

Medial lesions were observed in 4 aortas. They were confined to the abdominal aorta. In 3 specimens, these were seen as rough, firm longitudinal streaks, about 5.0 cm in length and lying parallel to the longitudinal axis of the aorta (Fig. 5). In 1 specimen they appeared as rough, irregular, puckered areas, about 2.5 cm in diameter and of a "moth-eaten" appearance. These lesions were non-sudanophilic.

Histologically, the medial lesions revealed a marked degene-

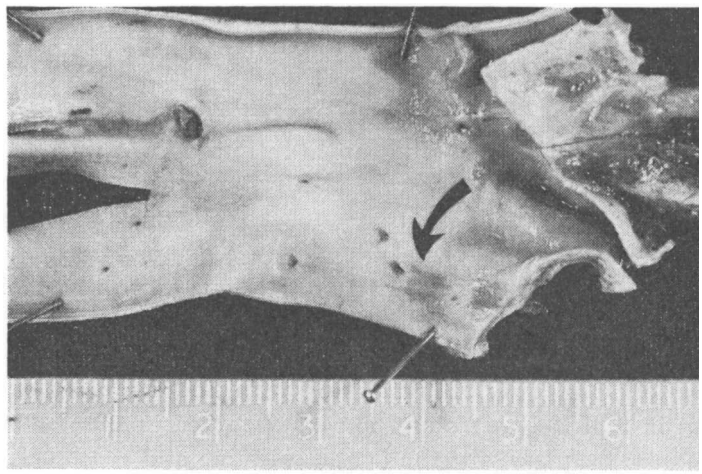

Figure 1. Abdominal aorta of reindeer, showing fatty streaks above the iliac bifurcation (arrow). (Sudan IV)

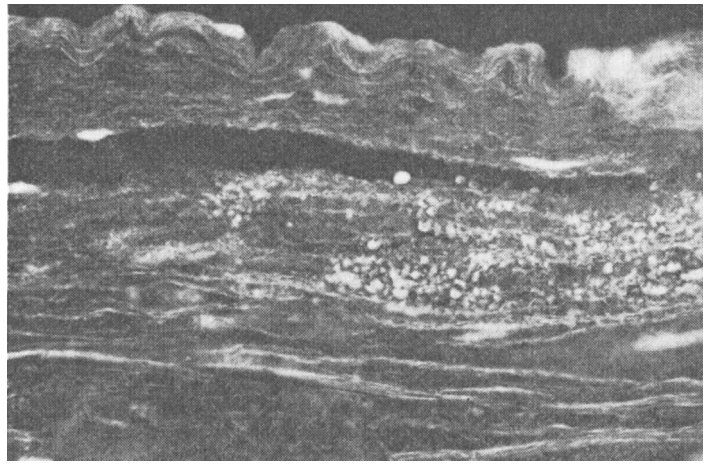

Figure 2. Frozen section through a fatty streak, showing deposition of neutral lipid in the tunica intima. (Sudan IV, × 380)

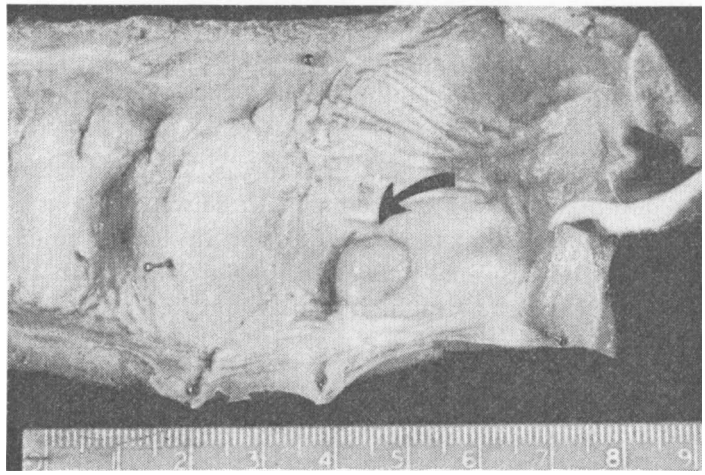

Figure 3. Fibrous plaque (arrow) in the arch of the aorta. (Sudan IV)

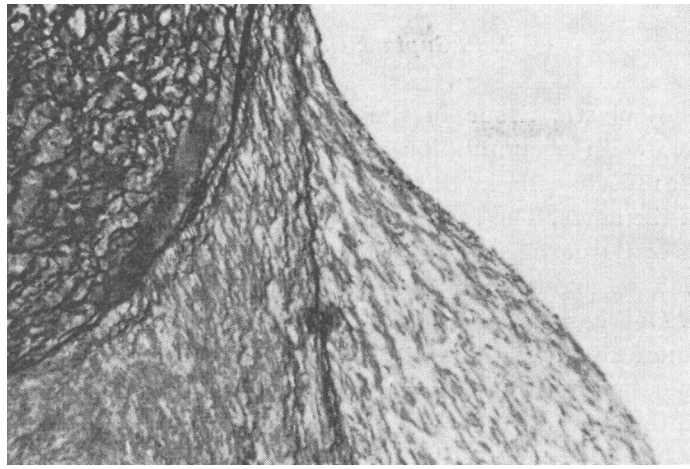

Figure 4. Section through the fibrous plaque, showing marked intimal thickening due to fibrous tissue. (Verhoeff's van Gieson × 20)

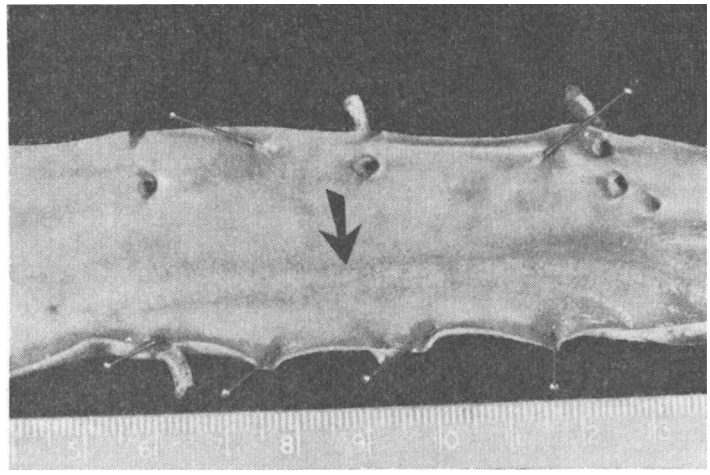

Figure 5. Abdominal aorta, showing medial lesion (arrow). (Sudan IV)

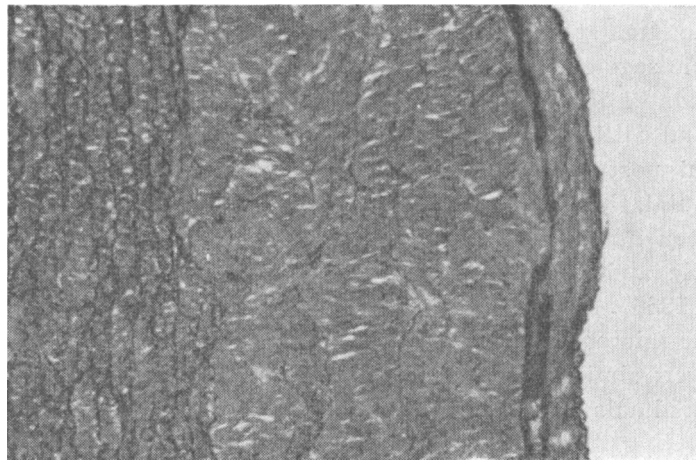

Figure 6. Section through the medial lesion, showing marked elastic tissue degeneration in the inner half of the tunica media. (Verhoeff's van Gieson, × 64)

ration of elastic tissue in the inner half of the tunica media (Fig. 6) with accumulation of acid mucopolysaccharides. The smooth muscle cells in this area were perpendicular to the long axis of the aorta. The tunica intima was thickened over the areas of elastic tissue degeneration. In 1 case, mild calcification was observed in areas of elastic tissue degeneration in the tunica media. One case revealed infiltration of lymphocytes, epitheloid cells and a few eosinophils in the outer media and tunica adventitia, particularly in relation to blood vessels. No lipid was present in these lesions.

DISCUSSION

Fatty streaks that develop in the aorta of reindeer resemble those in the aorta of man (*WHO Study Group on Atherosclerosis* 1958) and other animals (*Gupta et al.* 1969, *Gupta & Singh* 1978, *Gupta & Nagpal* 1979, *Gupta* 1980).

Advanced atherosclerotic lesions such as ulceration, haemorrhages and thrombotic lesions were not found. This is in accordance with reports on other animals (*Gupta et al., Gupta & Singh, Gupta & Nagpal, Gupta*), indicating that animals usually do not naturally develop advanced atherosclerotic lesions.

The sudanophilic lesions in the aorta of reindeer appeared less severe and extensive than those found in pigs (*Gupta et al.*), buffaloes (*Gupta & Singh*), sheep (*Gupta & Nagpal*) and cattle (*Gupta*). This may be because of differences in diet and activity.

The localisation of fatty streaks in the aorta of reindeer was similar to that seen in other animals and man. Haemodynamic factors might be responsible for localisation of these lesions (*Glagov* 1965).

The greater involvement of the abdominal aorta than its thoracic segment in reindeer is also similar to that seen in man (*Holman et al.* 1958), pigs (*Gupta et al.*), sheep (*Gupta & Nagpal*) and cattle (*Gupta*). In man, this has been attributed to the upright posture, but in animals, in which the aorta remains horizontal, the increased susceptibility of the abdominal segment has been attributed to the biological dissimilarity between the thoracic and abdominal segments of the aorta (*Haimovici & Maier* 1966).

The microscopic changes in the aortic fatty streaks in reindeer were similar to those described in man (*Holman et al.*) and other animals (*Gupta et al.*).

The aetiology of elastic tissue degeneration in the tunica media, seen in reindeer, can not be ascertained. Such lesions have, however, been described in the aorta of pigs, maintained on essential-fatty-acid-deficient diets (*Hill et al.* 1957).

Dieterich & Luick (1979) investigated aortas from 34 Alaskan reindeer and 15 caribou, but did not observe any lesions. It is possible that the heavy infestations of Onchocerca tarsicola in the investigated Swedish reindeer herd (*Rehbinder et al.* 1975, *Bain et al.* 1979) and the migrating microfilaria of this worm may to some extent contribute to the development of the lesions found, which is indicated by the finding of infiltrates of lymphocytes, epitheloid cells and eosinophils in the media and tunica adventitia in 1 specimen. Onchocerca sp. has been suggested to be the cause of similar medial lesions in pigs (*Gupta et al.*).

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SAMMANFATTNING

Spontana aortaskador hos ren (Rangifer tarandus L).

Aortor från 20 skogsrentjurar, 1.5—8.5 år gamla, har undersökts. Stråk av fett förelåg i 9, en fibrös knuta i 1 och degeneration av elastisk vävnad i tunica media i 4 aortor.

Förändringar förelåg hos såväl unga som äldre djur och överensstämde makroskopiskt och mikroskopiskt med vad som beskrivits från andra djurslag och människa. Betydelsen av de hos skogsrenar förekommande kraftiga infestationerna med Onchocerca tarsicola diskuteras.

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