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Diameters of normal and pathological aortic bifurcations and the development of Rinsum, Aart Cornelis van

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SUMMARY

This thesis examines the geometry of the distal abdominal aorta and aortic bifurcation. The small (< 10 mm) internal diameter of the distal abdominal aorta in a number of young women in whom an aortic bifurcation prosthesis was inserted was the indication for this study. Data concerning diameters of the distal abdominal aorta and common iliac arteries, (and the resultant parameters), have been gathered from the literature and compared. The concept of hypoplasia contained in the literature is described.

The investigation consisted of the determination of the diameters mentioned, (and the resultant parameters), in patients with a normal aortic bifurcation and in those with obliterating atherosclerotic abnormalities in this area. Measurements of the diameters of the distal abdominal aorta and common iliac arteries were obtained at postmortem, peroperatively, from angiograms and echographically. A description of the different methods of measurement used with their respective advantages and disadvantages is given.

The internal diameter, (α_2), of the normal distal abdominal aorta appeared to increase significantly in both sexes with an increase in age, body length and body weight.

The area ratio of a normal aortic bifurcation, of around 0.75 in both sexes, was well below the theoretical optimal value of 1.15. There is no relationship with age. At other arterial bifurcations the value for the area ratio appeared optimal.

The average tapering of the normal distal abdominal aorta was about 10 % in both sexes.

In patients with atherosclerotic abnormalities, the average internal diameter, (α_2), of the distal abdominal aorta was significantly smaller and the degree of tapering was significantly greater than in the normal groups.

The average area ratio at the aortic bifurcation in patients with atherosclerotic abnormalities did not differ significantly from that in the normal groups.

The fact that the aortic bifurcation is a predilection site for atherosclerotic abnormalities can be explained by a primary alteration in the parameters. Alternatively, the altered parameters could be secondary to the atherosclerotic abnormalities.

Finally, the concept of hypoplasia of the distal abdominal aorta is examined.