

A Study of the Growth of the Abdominal Aorta in the African Foetus, Stillborn Child and Adult*

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INTRODUCTION

The results of a pilot study of the variations in the arrangement of the visceral branches of the abdominal aorta in African stillborn children (Cattle and McKeag, 1965) suggested that it would be interesting to discover if the processes of growth involving the abdominal aorta lengthwise were similar to those seen in the growth of the spinal column where, in the adult, the distances between the superior and inferior surfaces of the bodies of the vertebrae in the upper part of the column are not as great as the corresponding distances in the vertebrae which comprise the lower part of the spinal column.

MATERIALS AND METHOD

We examined the abdominal aortae of (a) eleven African foetuses, six males and five females, whose individual ages were estimated as being between 12 and 20 weeks (Blechs Schmidt, 1961); (b) 27 African stillborn children, 20 boys and seven girls, who were without any obvious anatomical abnormality and who were believed to be full term; and (c) 20 African adults, 17 men and three women, who had undergone routine *post-mortem* examination for a variety of fatal illnesses that were unrelated to the abdominal aorta and the spinal column.

The techniques used (i) to expose the aortae in the foetuses and in the stillborn children, and (ii) to measure the origins of the visceral branches of the aortae were the same as those described in our previous paper. All the abdominal and thoracic organs in the adults that we examined were removed for us by our pathologist colleagues during the course of the *post-mortem* examinations. Our colleagues left behind the thoracic aortae, which had been disturbed by the removal

of the aortic arch, and the abdominal aortae *in situ* still bound to the posterior abdominal wall by the adjacent tissues. The distance on the aorta between (a) the origin of each visceral branch of the abdominal aorta and (b) the level of the costovertebral end of the tenth rib was measured. These distances were then expressed as a percentage of the distance on the aorta between the level of the costovertebral end of the tenth rib and the bifurcation of the aorta for each individual in our series of foetuses, stillborn children and adults. The average value for each distance, expressed as a percentage of the length of the abdominal aorta defined as above, was calculated for each series of individuals.

RESULTS

See Table I for a summary of the results. The presentation of the results was complicated by the fact that in all three series of individuals, foetuses, stillborn children and adults, considerable variation was found in the origin of the inferior phrenic arteries and the middle suprarenal arteries. The former vessels derived from the aorta in 42 per cent. of all the individuals whom we examined. When related to the origin of the superior mesenteric artery, the middle suprarenal vessels were found to arise in three ways from the aorta, viz.: (a) from a point above the level of the origin of the superior mesenteric artery in 45 per cent. of individuals; (b) at the level of the origin of the superior mesenteric artery in 8 per cent. of individuals; and (c) from a point below this level in 47 per cent. of the bodies we examined.

Excepting the average distance between the inferior phrenic arteries and the coeliac trunks, the contribution that the length of abdominal aorta between successive visceral branches of that vessel made to the total length of the vessel, as measured between the level of the costovertebral end of the tenth rib and the aortic bifurcation was proportionately the same in the foetus, stillborn child and adult. This means that within the length of the abdominal aorta between the level of the costovertebral end of the tenth rib and the bifurcation of the aorta, the aorta grows at the same rate along its length in the foetus, stillborn child and adult, i.e., there is no differential rate of growth lengthwise at the lower end of the aorta, as defined, comparable with that seen in the total length of the spinal column.

Preliminary measurements made in 21 stillborn children showed that there was a considerable difference in the distance between the superior and inferior surfaces of the tenth thoracic ver-

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Table 1
A SUMMARY OF THE RESULTS AND CALCULATIONS OBTAINED FROM THE MEASUREMENTS MADE ON THE ABDOMINAL AORTA OF AFRICAN FOETUSES, STILLBORN CHILDREN AND ADULTS

Measurements	Foetuses Six Males and Five Females		Stillborn Children Twenty Males and Seven Females		Adults Seventeen Males and Three Females	
	Absolute (mm.)	Expressed as a per- centage of length of aorta as defined in the text	Absolute (mm.)	Expressed as a per- centage of length of aorta as defined in the text	Absolute (mm.)	Expressed as a per- centage of length of aorta as defined in the text
1. Between the inferior phrenic arteries and the coeliac trunk	1.5	6.0	1.7	3.0	2.0	1.0
2. Between the coeliac trunk and the middle suprarenal arteries	1.9	7.9	4.6	8.1	13.5	6.7
3. Between the middle suprarenal arteries and the superior mesen- teric artery	2.4	1.0	-0.2	-0.4	10.1	0.5
4. Between the superior mesenteric artery and the renal arteries	2.1	8.8	4.2	7.4	13.5	6.7
5. Between the renal arteries and the gona- dal arteries	3.1	12.9	7.1	12.5	25.0	12.4
6. Between the gonadal arteries and the in- ferior mesenteric artery	3.7	15.0	7.8	13.9	23.6	11.7
7. Between the inferior mesenteric artery and the aortic bifurcation	5.1	20.8	12.5	22.1	46.0	22.9
Average length of the aorta between the tenth rib and the bifurcation of the aorta	24.4 mm.		56.4 mm.		201.0 mm.	

tebra and the corresponding parameter of the fifth lumbar vertebra, but not in the corresponding measurements between the lowermost thoracic vertebrae and the lumbar vertebrae. This suggests that we should extend our studies to include measurements affecting the origin of the branches of the thoracic aorta in order to discover the relationship, if any, that exists in the processes of growth lengthwise between the entire length of the vertebral column; the aorta from the arch to the bifurcation, and the spinal cord, in a further series of foetuses, stillborn children and adults.

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