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1 (1065)

As to the cause of the dilatation of the subclavian artery in certain cases of cervical rib.—Experimental Study.

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In twenty-four or more instances a circumscribed dilatation of the subclavian artery has been observed in cases of cervical rib. The dilatation in these cases is distal to the site of pressure made by the rib.

As to the cause of these aneurisms there has been considerable conjecture, usually prefaced by the comment that their occurrence would be comprehensible if they presented on the proximal instead of on the distal side of the compression.

Weakening of the wall of the artery from erosion or trauma, variable or intermittent pulse pressure, and vasomotor disturbances in nutrition are the suggestions which have been offered to explain the phenomenon.

For several years my experiments in arterial compression have had more or less in view the determination of the cause of this dilatation. For the past year they have been continued by Dr. Mont Reid and myself almost exclusively with the object of shedding light on this problem. In 1906 we (Dr. Richardson,

Dr. Dawson and myself) made the observation[1] that after partial occlusion of the thoracic aorta the maximum pressure may be permanently lowered as much as 46 mm. Hg, and the minimum pressure actually increased distal to the constricting band of metal.

The dilatation of the artery observed in arterio-venous fistula, might, it seemed to me, have a bearing on the interpretation of the aneurisms in cases of cervical rib. Might not both phenomena, I asked myself, be due to degenerative changes in the arterial wall consequent upon lowered pressure—in the case of the cervical-rib-aneurisms, upon lowering of the pulse pressure.

Now, inasmuch as dilatation of the subclavian artery has relatively so seldom been observed with cervical rib (perhaps 24 times in about 400 cases) it seemed to me that if it were due merely to the lowered pulse pressure then only a very definite absolute or relative amount of reduction of the systolic pressure would suffice to produce it.

In June, 1914, I observed, in a dog, for the first time an unquestionable dilatation of the three arteries below the constricting band which had been placed just above the aortic trifurcation. The constriction exercised by the band was sufficient to greatly lessen, if not, indeed, to obliterate the palpable thrill produced by the constriction, but not enough to shut off the palpable pulse. With this observation as fresh incentive, Dr. Reid and I have continued the experiments for the past year and a half with encouraging results: in only one additional instance, however, was there a very striking dilatation. In this, as in the one of the preceding year, the occlusion of the aorta by the band was almost total.

If the occlusion must be so nearly complete in order to effect a pronounced dilatation it will assist to explain not only the difficulty we have had in producing it in dogs, but also the fact that it has been observed relatively so seldom in the human subject from compression of the subclavian artery by a cervical rib. For when in dogs the aortic pulse is occluded beyond the stage of

[1] DOG 96. PARTIAL OCCLUSION OF THORACIC AORTA.
Operation, 22/5/1906. Sacrificed 7 months later.

	Maximum Pressure.	Mean Pressure.	Minimum Pressure.	Pulse Pressure.
Femoral	116	93	88	28
Carotid	160	113	83	77

palpable thrill the lumen is in danger of becoming obliterated—as by the formation of a cylindrical fibrous cord beneath the band—and thus cancel the experiment; and in the cervical rib cases we may assume, argumentatively, that the subclavian artery, compressed to the stage sufficient to produce an aneurism, is likely to become totally occluded in the presumably considerable time required for the manifestation of the dilatation. Thus, in dogs a number of months must apparently elapse after the application of the band before a dilatation in striking degree can occur. In the two cases, observed just one year apart, 5 months and 20 days, and 6 months and 19 days, respectively, had elapsed. In the second of these, however, a dilatation of less than one mm. was found at the expiration of 2 months.

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A comparison of the effects of glucose and of meat administration upon the non-protein blood nitrogen and the duration of life in experimental renal insufficiency.

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The following study was undertaken to determine (1) whether those dietary factors that tend to increase the non-protein blood nitrogen in acute insufficiency also tend to shorten the duration of life, and (2) the value of glucose in prolonging life in acute renal insufficiency. The method adopted was to observe the daily curve of non-protein blood nitrogen and the duration of life after complete renal insufficiency had been induced by bilateral ureteral ligation in a series of dogs; half the animals being given glucose, the other half, meat.

Six dogs were divided into two groups of three each. One group was fed upon beef heart, the other upon glucose dissolved in water. On the third day, 5 c.c. of blood was taken from the jugular vein for estimation of the total non-protein nitrogen by the Folin method, and immediately thereafter each dog was etherized and both ureters ligated. On the following day, blood