

most active, and that those from the middle third are the least active. Apparently, the nearer the source of the graft is to the epiphysis, upper or lower, the greater is the osteogenic power. The differences as to the site of implantation of the graft seemed to be unimportant in this respect.

Clinical observations on the rapidity of the repair of fractures (in man) in these different parts of the tibia correspond closely with the osteogenic power as shown in these experiments.

## 7519 P

**Narrowing of Artery from Contraction of Experimentally Produced, Fibrous Capsule.**

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Previously the contractibility of capsules of young sterile fibrous tissue surrounding pulmonary lobes and intestinal segments, organs offering little resistance to the constriction, was studied;<sup>1, 2, 3</sup> whereas the present work concerns the contractibility of such tissue about arterial segments, where far greater resistance occurs.

Fourteen arteries, femoral and carotid, in 6 dogs, were handled. Initial treatment in each case: Under aseptic precautions, a short length of the vessel was exposed by incision and loosely wrapped once around with light, close-woven, collodion-impregnated, silk cloth or with thin rubber dam. This material was 3 cm. long and just wide enough loosely to encircle the vessel; after application, its opposing edges were fastened together with silk sutures. The wound was closed. Seven to 105 days after operation, the vessel was removed *in toto*, injected first with lipiodol at arterial pressure for roentgenographic determination of the size of the lumen, and injected afterward with formalin for fixation and section.

Two of the wounds became infected and the specimens were rejected. In the other cases, the findings were as follows: The envelop, bathed in a little sero-fibrinous exudate, lay loosely about

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<sup>1</sup> Van Allen, C. M., and Wang, T. T., *PROC. SOC. EXP. BIOL. AND MED.*, 1933, **30**, 812.

<sup>2</sup> Wolfe, J. J., Wang, T. T., and Van Allen, C. M., *J. Thoracic Surg.*, 1934, **3**, 300.

<sup>3</sup> Van Allen, C. M., and Chao, Y. C., *PROC. SOC. EXP. BIOL. AND MED.*, 1934, **31**, 1242.

the vessel. All adjacent tissues had developed a layer of fibrous tissue, 1 mm. or less in thickness, next to the foreign material, the layer on the inside of the envelop having developed from the adventitia of the artery and constituting a capsule around the vessel. This layer could be easily stripped from the muscularis. In the younger specimens, it was composed of closely packed, well preserved fibroblasts and, in the older ones of relatively acellular, largely hyalinized fibrous tissue. The muscularis and intima were without cellular change, and the lumen was quite empty. The size of the latter varied greatly, depending on the age of the specimen. Table I gives the calibre of the enveloped part of each vessel relative to that of the non-enveloped, immediately adjacent parts. The 7-, 58-, and 105-day specimens showed no reductions of calibre; but the others were all more or less extensively strictured. Arranged in order of increasing age, the specimens of 10 to 24 days exhibited irregularly progressive reductions, while those of the following 81 days showed irregularly progressive increases in calibre. The silk and rubber seemed to react similarly. Thrombosis was entirely lacking.

TABLE I.

Dog No.	Enveloped Artery	Envelop Material	Period of Envelopment (days)	Cross-sectional Area of Lumen (% of normal)
1	Carotid	Silk	7	100
2	"	"	10	70
3	"	Rubber	14	26
4	Femoral	Silk	14	13
1	"	"	14	25
1	"	"	21	13
5	"	"	21	4
4	"	"	24	4
1	Carotid	"	28	62
2	"	Rubber	58	100
6	Femoral	"	73	28
5	"	"	105	100

The narrowing of the vessels seemed due to a concentric contraction of the fibrous capsules surrounding them. Probably the high intravascular pressure, in the presence of hyaline degeneration of the capsule, was responsible for the dilatation; since in the previous experiments with relatively slight resistance to the cicatricial contraction, the narrowing persisted indefinitely. Attention is recalled to the fact that the cicatrix here represented developed under aseptic conditions, for there is reason from other experiments to suppose that the contractibility of such tissue is very different (much less) than that of infected scar.

The constriction of veins by this process is being studied. Those

vessels, too, may become extensively compressed without injury to the walls and without thrombosis.

## 7520 P

**Narrowing of Intestine from Contraction of Experimentally Produced, Fibrous Capsule.**

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The constrictive force of a capsule of young sterile fibrous tissue surrounding short segments of intestine was studied, as an extension of previous experiments in the contractibility of this tissue.<sup>1, 2</sup>

Twelve different segments of ileum, 3 in each of 4 dogs, were treated. Operation: The abdomen was opened under aseptic precautions, a loop of terminal ileum was delivered, and a side-to-side anastomosis was made between the limbs of the loop, so as to side-track about 40 cm. of the gut. Then the mesentery of the side-tracked portion was incised about 3 cm., parallel to and about .5 cm. from the gut, at 3 different sites about 10 cm. apart and no nearer to the anastomosis than 5 cm. No mesenteric vessels were injured. At one site, the gut with its attached bit of mesentery was wrapped once about with a strip of thin rubber dam 2.5 cm. wide and just long enough to reach loosely around. The opposed edges were sutured together. At another site, light, close-woven silk cloth was used in the same manner; and at the third, this kind of cloth, impregnated with collodion (to render it impervious to fibroblasts), was similarly used. The whole loop was wrapped in omentum, returned to the abdomen, and the abdomen was closed. Five to 20 days after operation, the dogs were killed and the loops were removed. The bowel at each enveloped site was injected, first, with water under a gradient of pressure, to determine the patency; second, with barium suspension under 20 cm. H<sub>2</sub>O pressure, to portray by X-ray the outlines of the lumen; and, third, with formalin, for fixation and section.

The reactions to the different kinds of envelop were essentially the same: All tissues in contact with the foreign material developed

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<sup>1</sup> Van Allen, C. M., and Wang, T. T., *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 812.

<sup>2</sup> Wolfe, J. J., Wang, T. T., and Van Allen, C. M., *J. Thoracic Surg.*, 1934, **3**, 300.