ANGIOTACTIC SURGERY
PRELIMINARY STUDIES*

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The concept of angiotactic surgery originally was conceived by two of the authors, Drs. Sanford F. Rothenberg and Ernest J. Penka. The angiotactic instrument and internal sleeve were devised by Drs. Sanford F. Rothenberg and Ernest J. Penka, and Ted Shore.

ANGIOTACTIC INSTRUMENT AND INTERNAL SLEEVE

The angiotactic instrument consists of a 2 cc. syringe connected to a 4F Courmand Single Lumen cardiac catheter which in turn is connected to a carrier 3 mm. in diameter. The carrier consists of two metal hemispheres cemented to a Neoprene 65 bladder. The internal sleeve is made of polyester film bonded to itself by a thin layer of polyethylene. Six layers of polyester film are used to make the internal sleeve or implant, which may be of any cylindrical length and diameter. The length used in this experiment was 1 cm. and the diameter was 5 mm. The polyester sleeve is placed on the carrier by distracting the two hemispheres, then doubly folding the internal sleeve (Fig. 1).

The first fold is made with the bladder at the central point. The second fold is devised not only to decrease the diameter of the sleeve during excursion through the vascular channel, but also in order that the sleeve be captured by both hemispheres. The sleeve is released by distending the bladder with saline. The bladder, which is made of Neoprene 65, has the characteristic of first linear expansion and then circumferential expansion; this characteristic is ideal since the linear expansion permits the sleeve to be engaged from the metal hemispheres, and the circumferential expansion permits the polyester sleeve to resume its original cylindrical form, which is facilitated both by the memory that freshly folded polyester maintains and the extrinsic force of molding supplied by the arterial wall (Fig. 2). After the appropriate size of sleeve has been released, the carrier is withdrawn and the cylindrical internal sleeve remains fixed within the artery (Fig. 2).

METHOD

Five dogs were used, varying from 16 to 25 kg., utilizing Nembutal anesthesia ½ gr. per kg. of body weight. The abdomen was prepared and draped in the usual sterile manner. A left midrectus incision was made from the costal margin to the pubis. The incision was surgically extended transperitoneally. After appropriate retraction of the viscera, the lumbar aorta was exposed. Ten cm. cephalad to the aortic trifurcation, a 2 cm. arteriotomy was made, after applying a vascular clamp cephalad and caudal to the intended site of arteriotomy. The carrier containing the internal sleeve was introduced through the arteriotomy and the caudal arterial clamp was removed. The carrier and sleeve were then introduced along the course of the aorta by advancing the catheter with a forceps through the arteriotomy wound. Release of the sleeve was made 3 to 10 mm. cephalad to the aortic trifurcation. The sleeve


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was released by gentle pumping action of the plunger of the syringe to disengage the metal hemispheres, followed by the slow instillation of \( \frac{1}{2} \) cc. of saline to distend the sleeve into the desired position. The selected outside diameter of the aorta was approximately 5 mm. in all animals. The selected inside diameter of the polyester sleeve was 5 mm. in all cases. The release of the sleeve was identified grossly by the slight distention of the aorta visible at the site of the release; the carrier then was withdrawn without sleeve through the arteriotomy wound. The caudad arterial clamp then was replaced and the arteriotomy wound was closed with a continuous line of 5-0 arterial silk. No anticoagulant therapy was administered during these experiments.

In order to study carrier turn-capability, a plastic channel was devised, consisting of 137°...