place too great a load on the shaker when it operates at high speeds, an audible "knock" warning the operator in such cases.

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AUTOLOGOUS PLASMA CLOT SUTURE OF NERVES

FIBRIN suture of peripheral nerves accomplished by the use of fortified cockerel plasma with chick embryo extract as the clotting agent has been described by Young and Medawar.[1] These authors reported encouraging results following application of the method to suture of the sciatic nerve in rabbits. In repeating these experiments, we have found considerable inflammatory reaction with fibrosis at the site of the nerve suture. Because such reaction may seriously interfere with proper regeneration of nerve fibers, we have been led to study the suitability of autologous plasma clotted with autologous muscle extract for suture of peripheral nerves. Among other advantages, the procedure has proved to be simpler than the method employing heterologous materials.

The technique consisted of exposing and cutting the sciatic nerves of rabbits, bringing the retracted stumps together with jeweler's forceps, depressing the ends so as to form a trough and adding first 5 drops of plasma and then 1 drop of tissue extract. The fluids were mixed *in situ* and about 3 drops were withdrawn into a pipette to reduce to a minimum the amount of clot remaining as suture material. Although clotting occurred in about 40 seconds, the nerve ends were held together with the forceps for 4 minutes after addition of the fluids to make certain that the clotting process was complete. When tension on the suture line was great or the clot was of poor tensile strength, separation of the nerve stumps followed withdrawal of the forceps. This occurred in about 30 per cent. of the operations.

In order to evaluate the suitability of different suture materials, comparative studies were carried out with cockerel, human and rabbit plasma. In most of the experiments, heparinized or unmodified mammalian plasma was used and fortification of the plasma by the addition of fibrinogen was omitted. When no anticoagulant was employed, the blood was drawn into a chilled syringe coated with mineral oil and immediately transferred to paraffin-lined test-tubes packed in ice. The tubes were centrifuged in 250 cc cups filled with ice. In a few instances, citrated plasma was used and clotting was induced by addition of calcium chloride and tissue extract.

[1] J. Z. Young and P. B. Medawar, *The Lancet*, 2: 126, 1940.

Concentrated saline extracts of mouse lung and rabbit gluteus muscle were employed as clotting agents. One cc samples of plasma were coagulated in test-tubes of 8 mm internal diameter and the clots tested for tensile strength. Although great variation was found, the results indicated a superiority of mammalian over cockerel plasma. The average tensile strength found in 74 tests of human plasma was 89 grams; in 34 tests of rabbit plasma, 34 grams; in 16 tests of cockerel plasma from 4 birds, 19 grams.

Suture of the sciatic nerves was done in 27 rabbits. Rabbit plasma was employed in 19 of the sutures, while human and cockerel plasma were utilized 13 and 9 times respectively. Silk sutures and other control procedures were carried out in 11 instances. The sutured nerves were removed 2 to 26 weeks after suturing. Microscopic studies showed evidence indicating that the nerve fibers readily grow beyond the suture line into the distal end of the nerve.

These experiments have progressed sufficiently to permit the following conclusions:

(1) Rabbit plasma with rabbit muscle extract is superior to cockerel plasma with chick embryo extract for nerve suture in rabbits. The former clots possess greater tensile strength and provoke less inflammatory and fibrotic reaction.

(2) Clots obtained from human plasma cause more tissue reaction in rabbits than clots obtained from rabbit plasma.

(3) Autologous plasma clot suture of nerves in rabbits compares favorably with silk suture in the amount of resultant tissue reaction. The former moreover obviates the disadvantages of strangulation and disorganization of nerve fibers which occurs with silk suture, especially in small nerves with delicate connective tissue sheaths. When the nerve stumps are under tension, plasma clot suture is, at present, not as desirable as silk suture, since it possesses less holding power.

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