

RESEARCH IN SURGERY AT THE CLEVELAND CLINIC

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THIS report concerns research conducted by our staff surgeons outside of their regular clinical practice. This research is scheduled separately from that of the Cleveland Clinic's Division of Research, which is staffed entirely by full-time research specialists. The Division of Research has achieved distinction for basic contributions to our understanding of hypertension, atherosclerosis, brain chemistry, and related fields.¹ The research specialists engage in *program* research. None of the members of the Division of Research is a surgeon, but the animal laboratories and other facilities of that Division are made available to any of our surgeons who wish to develop or to investigate a worthy idea.

Project Research

In contrast to the program research in hypertension and atherosclerosis, which features fundamental problems and investigations, *surgical* research is largely developmental and clinical, and when it utilizes the facilities of the Division of Research it becomes known as *project* research. A surgeon with a problem to investigate, presents it to a committee of the staff, the Research Projects Committee. If the project is approved, animals and other facilities are provided, time is allotted, and funds are allocated to cover the expense. Much of the financing is from funds of our own Foundation, and they in turn derive from the fees earned by the working clinicians. Progress reports on these projects are submitted periodically, and, hopefully, progress results. Since most of our staff surgeons are able to devote scarcely more than half a day per week to such activities, and since with some it is strictly a spare-time effort, the projects generally are modest.

Examples of *project* research in plastic surgery, thoracic surgery, vascular surgery, and general surgery include the following investigations.

(1) In experiments on rabbits, Dr. Eldon R. Dykes, of the Department of Plastic Surgery, found that cerebral ischemia could be avoided, following compression of a common carotid artery, by elevating the systemic systolic blood pressure 50 mm. of Hg above normal through the use of vasopressors.² This finding may have application to neck surgery for malignant disease.

(2) In experiments on dogs, Dr. Robin Anderson of the Department of Plastic Surgery, and I, some years ago utilized tubular skin grafts to replace portions of the common bile duct.³ Our conclusion, after a dozen or so experiments, was that although skin would remain viable for long periods in the abdomen, it would not propel bile.

From a speech presented at the meeting of The Society of University Surgeons, in Cleveland, Ohio, on February 8, 1962.

(3) About 165 heart operations were performed on dogs by Dr. Donald B. Effler and his thoracic surgical group before they attempted their first open-heart operation on a human.⁴ For some of those operations four donor dogs were needed. The last two operations before undertaking human surgery were full-scale dress rehearsals under the same strict conditions required for operating on patients.

(4) More recently, Doctor Effler has used an operating microscope to practice operations on minute blood vessels in dogs, to determine whether or not the microscope will be of practical help in the surgery of coronary arteries on patients.

(5) Dogs were used by Dr. Alfred W. Humphries, now a vascular surgeon, previously an orthopedic surgeon, in developing a method for fusing vertebrae by a transabdominal anterior approach. A specially designed clamp left permanently in place made external immobilization by casts unnecessary. He later applied this successfully to patients.⁵

(6) Currently, Doctor Humphries is studying vascular flow in dogs, using electromagnetic technics to determine the effects of various factors—such as hypertension, hypotension, arteriovenous fistulas, bypass grafts—upon flow rate.

(7) A cineroentgenographic study of various types of end-to-end intestinal anastomoses in dogs is being carried out by Dr. Rupert B. Turnbull, Jr., in collaboration with radiologists. They are documenting the behavior of anastomosis starting at almost the time of operation.

(8) A project that has assumed the status of a small program is that of Dr. George Crile, Jr., who has a large mouse colony that he uses for investigating the effect of various physical agents on experimental malignant disease. He uses such agents as heat,⁶ cold, radar waves, cobalt 60 and roentgen irradiation, alone or in combination, in an effort to shed more light on behavior of malignant cells.

(9) Dr. Willem J. Kolff, although not a surgeon, is a part-time member of the Division of Surgery, and his unflagging efforts to place a successful artificial heart in dog and in man also assume the status of a small program. Valuable by-products of his work relate to improvement of artificial heart valves.⁷

Numerous other examples of the use of the research laboratories by clinical surgeons in these and the other surgical specialties could be cited.

It is worth more than passing mention that the enthusiastic assistance of our Residents in Surgery aids materially in the execution of most of these projects.

Outside the laboratory, most of us conduct "clinical research" by following closely and faithfully patients on whom we have performed various types of surgical procedures. From my own office I have conducted a so-called "forward follow-up" (from the time of operation) on nearly one thousand patients who underwent various gastric or duodenal operations. I hope to learn something, for example, of the end results of procedures done for duodenal ulcer. To me the follow-up becomes more fascinating year by year. Pursuing patients by letter, telephone, telegram, registered letter, and sometimes by personal call is a challenge, and I have had faithful replies, including reports on patients even in jails and in mental hospitals.

SURGICAL RESEARCH

Conclusion

In summary, developmental and clinical research actually is done by working surgeons in an organization like the Cleveland Clinic, although for basic investigation they must depend for the most part on their colleagues in the medical schools.

References

1. The Division of Research; symposium on cardiovascular studies. *Cleveland Clin. Quart.* **29**: 63-117, 1962.
2. Dykes, E. R., and Anderson, R.: Correction of cerebral hypotension after ligation of carotid artery: experimental study in rabbits. *S. Forum* **12**: 481-482, 1961.
3. Anderson, R., and Hoerr, S. O.: Reconstruction of common bile duct using split skin grafts. *Plast. & Reconstruct. Surg.* **17**: 203-210, 1956.
4. Effler, D. B.; Groves, L. K.; Sones, F. M., Jr., and Kolff, W. J.: Elective cardiac arrest in open-heart surgery; report of three cases. *Cleveland Clin. Quart.* **23**: 105-114, 1956.
5. Humphries, A. W.; Hawk, W. A., and Berndt, A. L.: Anterior interbody fusion of lumbar vertebrae: surgical technique. *S. Clin. North America* **41**: 1685-1700, 1961.
6. Crile, G., Jr.: Heat as adjunct to treatment of cancer; experimental studies. *Cleveland Clin. Quart.* **28**: 75-89, 1961.
7. Akutsu, T.; Dreyer, B., and Kolff, W. J.: Polyurethane artificial heart valves in animals. *J. Appl. Physiol.* **14**: 1045-1048, 1959.