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AN ATLAS  
*of*  
SURGICAL  
ONCOLOGY  
Fundamental Procedures  
Volume I

Everett D. Sugarbaker

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CRC PRESS

# An Atlas of Surgical Oncology

## Fundamental Procedures Volume I

Author

**Everett D. Sugarbaker**

Attending Surgeon

St. Mary's Health Center

Memorial Community Hospital

Director

Sugarbaker Tumor Clinic

Jefferson City, Missouri



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Sumite materiam vestris, qui scribitis, aequam Viribus.  
“Let those who write, fix on a subject to which their  
force is equal.”

Lat. Horace

## PREFACE

Within the knowledge of the author there does not presently exist a collection of day-by-day contemporaneous operative procedures directed primarily towards the surgical eradication of that group of diseases which are collectively known as the carcinomas. The term "cancer" is hereinafter used to refer to this group of malignant diseases alone. That there are numerous reports in papers, monographs, and occasionally in larger works of such methods is true but these are usually confined to a single anatomical system or region or even to a single operative procedure. Often these present some particular variant of which the writer is particularly fond or has found to be especially helpful under certain divergent circumstances and wishes to share with others. Many of these are of course excellent presentations whose true worth may only be fully appreciated by physicians of long experience. A few have been relegated to oblivion with the passage of time.

It is hoped that the present collection will be especially useful to residents in training and to that great mass of surgeons who do not have ready access to a large medical library. If at both ends of the spectrum some medical students and occasional surgical oncologists find it interesting or helpful, so much the better.

It is not within the scope of this effort nor would it be possible to represent every variant procedure performed for cancer. The enormous diversity of malignant tumors both by cell type, histologic grade, and by anatomic setting as well would obviously preclude even an attempt at such a work. In the preparation of the contained illustrations, great diligence has been taken to present fundamental techniques which have withstood the test of time, with the emphatic intention that they serve only as technical starting points from which the surgeon may take heart and hopefully will progress as his appreciation of the particular circumstances at hand in both its pathologic and anatomic aspects dictate. It is by no means suggested that the surgery of this disease be standardized, for the very opposite is intended. Obviously it is a grave responsibility of the would-be operator for cancer to absorb and apply as much of these two disciplines, namely pathology and anatomy, as he is able, combining them with all of the general surgical principles that he has previously learned.

Just as no two cancers are alike in all of their aspects, so no two operative ventures for the elimination of a cancer should be conducted in the same manner. Routinization has little or no place in this type of surgery. The general condition of the patient either before or during surgery may occasionally stricture an ideal accomplishment of the problem at hand. Therefore the help that the radiologist or the chemotherapist may offer should constantly be mentally kept in balance by the surgeon along with the fact that these modalities are usually only palliative as surgical aids. Therefore, they should only be employed as a supplement to and not as a substitute for adequate surgery. It is every surgeon's fond hope that a nontoxic systemic substance will eventually be found to cure this group of diseases but until that is accomplished, surgery will probably maintain its place as the modality responsible for by far the largest percentage of cured patients. This places a grave responsibility on the surgeon. Cure of cancer, as it is presently understood, is the extension of life free of the disease, for a reasonable time until life's existence is terminated by some unrelated ailment. That this is somewhat philosophic is readily granted. Cure must therefore be considered in this context and *there is no good substitute for it*. Thorough preoperative preparation, pre- or intraoperative consultation, adequate anesthesia, good assistance, personal skill, and courage are the combination of ingredients that are usually needed in preventing or solving such problems.

It must be constantly born in mind that disturbances in function will frequently occur but are almost always to a great extent correctable. Problems in cosmetics may ultimately be largely remedied if the malignant tumor is completely removed. Largely as a result of shortsightedness regarding these accomplishments medical cancer literature of the past decade has unfortunately too often been more concerned with palliation than with cure and is becoming moreso. Too often failure results because too much attention has been paid to these two problems.

To the surgeon who is willing to accept it, cancer with its varied nuances, extends a vibrant challenge. Success in solving problems of this nature therefore, offers an immense and unique satisfaction of its own regardless of any other remuneration.

Notably excluded from this work are tumors of the central nervous system, the lymphomas, and



the generally systemic malignant conditions such as the leukemias in which surgery has little or no place. Little attention has been paid to the sarcomas; first, because as compared to the carcinomas they are uncommon, second, they are almost ubiquitous within the human organism, and third, their treatment is at present in a state of flux. The single most appropriate admonition regarding their removal might be, "remove as widely as the anatomy will permit". Though this would seem to be a facetious and overly simplistic statement, it is because of the violation of this principle that the majority of the failures with these tumors occur.

## THE AUTHOR

Everett D. Sugarbaker, M.D.F.A.C.S., American Board of Surgery, is at present attending surgeon at St. Mary's Health Center, Memorial Community Hospital and Director of the Sugarbaker Tumor Clinic. Dr. Sugarbaker was graduated from Wheaton College, Wheaton, Illinois, with a B.Sc. (honors) and with a degree in chemistry. He was later cited as Man of the Year in 1960 on the occasion of the school's 100th anniversary. He received his M.D. degree in 1935 from Cornell University Medical College where he became fascinated with the subject of cancer.

On inquiry, he found that it was necessary to obtain several years of surgical training before he would be eligible for acceptance to the Memorial Hospital, now the Memorial Hospital and Sloan Kettering Institute. This training he received under Dr. Roy McClure at the Henry Ford Hospital in Detroit. Dr. Sugarbaker returned to New York City in 1937 and obtained the Rockefeller Research Fellowship in cancer which he completed in 1940. He was then awarded the Bowen Scholarship by the New York Academy of Medicine and spent a year with Dr. Richard Cattell, one of the world's foremost bowel surgeons of that day.

For a short time Dr. Sugarbaker was chief surgeon at the National Cancer Institute but left there to become chief surgeon at a newly built hospital for indigent cancer patients only, in Missouri. There he remained for about 5½ years, with the title of Assistant Clinical Professor of Washington University (he taught fourth-year medical students). He was also active in establishing the American Cancer Society throughout the state of Missouri. He has published 75 or more articles, the majority presenting original ideas regarding the surgical treatment of cancer. Dr. Sugarbaker is a founding member of the Society of Surgical Oncology as well as of the Society of Head and Neck Surgeons, in both of which he continues to be active.

## INTRODUCTION

The substance of this treatise combines the contributions of an endless line of great surgeons too numerous to mention to whose courage, devotion, and skill we are all deeply indebted. They surmounted obstacles difficult to imagine today in developing techniques and procedures from which all surgeons now benefit.

This present endeavor is the result of more than 40 years of personal appreciation of their efforts and accomplishments in the surgical treatment of cancer. A few modest extensions of those efforts by the author were only possible because of timely developments in antibiotics, anesthesia, and the more intelligent use of blood.

The illustrations are the result of years of intraoperative sketching by the very capable Mr. Gerald P. Hodge. These sketches were then carefully reviewed and combined by the author before the completed drawings were produced, in order that the more important anatomy might be highlighted and the less important properly relegated to the background.

Often several operative procedures contributed to the same set of illustrations in order that a single basic technique for each procedure might be the consequence. Again it should be reiterated that this has been done only that there might be a place of beginning, in short a road map presenting the main highway from which detours and digressions should be made as the individual surgical problem dictated.





IN MEMORY OF

Dr. James Ewing (1866—1943), a great physician and a great man whose dedication to oncology became the inspiration of so many who were privileged to work in his shadow.

## DEDICATION

Dedicated to surgeons everywhere who with conscience, energy, knowledge, and skill are willing to contend with these most common and highly dreaded diseases regardless of remuneration until God in his Providence provides a better method less damaging and more fruitful in its results.

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## *General*

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## SURGICAL TREATMENT OF CANCER

Since cancer patients are, as a rule, well past middle age, they frequently present additional problems unrelated to their tumor, of which the surgeon must be aware prior to the patient's entry into the operating room. Many of these are correctable, such as anemia, diabetes, heart problems, etc. Tumor-related problems such as malnutrition, weight loss, hypo-proteinemia, may be in large part noncorrectable until the tumor has been removed, though some help may be obtained by the use of highly nutritional parenteral feedings preoperatively. An awareness of these by adequate preoperative study should make the surgeon better able to assess how much surgery the patient can tolerate.

Surgery accounts for approximately 90% of major cancer cures. In concept, surgery is an extremely simple, almost crude method of treatment, and depends entirely for its success on the ability of the operator to completely remove the tumor. It remains a form of treatment which with few exceptions is strictly local in its application whereas the disease, with rare exceptions, tends to become generalized. Obviously, therefore, surgical treatment depends for its success on the lack of distant spread through earlier diagnosis, on the anatomic location of the tumor, and on the ability of the surgeon to work wide of it or to remove structures adjacent to it in order to accomplish its complete removal. It may unfortunately, at times be mutilating to a degree and even disturb certain functions but these are usually later correctable, in large measure, if the patient is cured. One must keep in mind that if left untreated or if too closely approached, the tumor will produce even greater irreparable mutilation and disturbance of function than will the surgery. The physician may well console himself with the thought that the whole is more important than any of its expendable parts. Most patients actually do realize this though they may be reluctant to agree at first, frequently indulging themselves in wishful thinking.

Surgery utilizes an age-old principle of separating the bad from the good. It is most successfully employed when vessel spread seems unlikely, the limits of the disease seem to be well demarcated, the anatomy lends itself well to wide removal of both the primary and draining node areas, and the tumor is not one of reasonable radiosensitivity or radiation therapy has already been tried and has failed. The defects following surgical removal are more easily corrected than are those following heavy irradiation because the tissues involved remain in an undamaged condition and lend themselves easily to subsequent reconstruction. If there is a reasonable question in the surgeon's mind that the tumor may inadvertently have been incompletely removed, he should seek help from his radiologic colleague who may often contribute to the longevity and occasionally to the cure of the patient. Also since surgery is strictly local in its application, and one is dealing with a disease which tends to become generalized, neither should he refuse the help of a chemotherapy colleague well trained in the use of his drugs when there is a good reason to suppose that systemic metastases may have already taken place, even though they may not be clinically apparent. Unfortunately, however, there is still no physiologic nontoxic, generally applicable and curative substance yet available among the major groups of cancer in adults. The surgeon must not dismiss his responsibility to the patient, therefore, by permitting the use of drugs whose known effects may be worse than the effects of the patient's disease, and the end result, namely death, being inevitable following either.

Factors unrelated to the tumor may influence the surgical tolerance of the patient and therefore, the extirpation of his cancer. Although cancer does occur in children, by and large its incidence rises with each succeeding decade of life, as insurance statistics so clearly show. Therefore, the complicating problems of the cardio-vascular-renal system, which the patient may present, require very careful consideration.

The second important factor relates to the anatomic setting of the tumor; tumors arising adjacent to and invading vital structures, such as the heart, aorta, common carotid artery, etc., by their location alone, are extremely frustrating. In some instances by the use of vascular grafts, some of these may be removed but very careful consideration should be given to the reasonableness of such procedures from the standpoint of the cure of the patient before these are attempted. Attachment or even adhesion of a tumor to nonvital structures should present no great problem. They should never be stripped apart for cancer cells are usually present at the interface but rather enough of the



attached or adherent organ or structure should be allowed to remain undisturbed on the tumor so that excision through unmistakably normal tissue takes place.

The problem of an elderly, poor risk patient with an extensive intraabdominal tumor may be seriously compounded in an abdomen filled with adhesions from previous and often unnecessary surgery. As a rule the less essential the original surgery, the worse the care taken to prevent adhesions.

Incisions through previously heavily irradiated tissue should never be made where any reasonable alternative exists, for such tissues are most unlikely to heal. Incisions can usually be made around questionable irradiated areas of the abdominal wall. Irradiated bowel can be short circuited and where solid tissue remain beneath an area demanding excision as in the neck, groin and on large surfaces of the trunk or extremities, sliding grafts employed immediately may be very life saving.

Complete removal of a cancer requires a precise degree of accuracy, beyond that required for the removal of the gall bladder, or the repair of structural defects, and the exposure demanded must be in direct proportion. It is therefore extremely important that one have full relaxation of structures such as the abdominal wall, complete control of bleeding so that the whereabouts of the tumor are constantly known and a sufficient distance from it be constantly maintained. Blood covering or staining the field usually interferes completely with the necessary precision. The arterial supply of a part may frequently be temporarily cut off by preliminary application of a tourniquet ligature. Wherever this is possible it should be accomplished so that removal of the tumor is accomplished with exactness. The saving of blood though important is secondary to accuracy. If an initial attempt to remove a major cancer has been badly handled, it is highly unlikely that any subsequent attempt will be successful.

The aim of surgical treatment is first and foremost to cure, and there is no good substitute for this. Inadequate surgery where adequacy was possible, followed by a course of irradiation or chemotherapy may simply represent salve to the surgeon's conscience and is difficult to excuse. Palliation as compared to cure occupies a very poor second place and probably is only reasonable when the means to attain a cure involve an immediate threat to the patient's life in general. The general surgeon's responsibility is seeing to it that his patients leave the hospital with a minimum of morbidity and mortality, whereas the cancer surgeon's concern not only includes the above, but that the patient continues to live a reasonable normal and fruitful life.

The use of staples has not been mentioned in procedural descriptions but these will likely play an increasingly important role in many anastomoses.

The full place of microsurgery in the employment of composite tissues in reconstructive surgery has yet to be firmly established.

## BIOPSY

The simplest form of biopsy is the removal of a fragment of viable tumor such as is on the skin or on any other easily accessible surface with an appropriate cutting forceps (Figure 1A). This is usually an entirely painless procedure and may usually be done without novocaine since cancer has no nerve supply. Pathologists, however, usually prefer a section of tissue at the junction of tumor with normal tissue if possible, which assures one of getting viable tumor. This, of course, is usually painful and requires local anesthesia. It may be reserved, therefore, for those instances in which the pathologist is hesitant to make a diagnosis on what he has first been given. In small lesions, an excision biopsy may be all that is required both for diagnosis and cure.

Some tumors situated more deeply within the patient's anatomy require special instruments for diagnosis. The most frequently used of these is the sigmoidoscope which may be carefully inserted into the patient's rectum and gently advanced around Heister's valves with the help of some air insufflation until the tumor has been found, at which point a biopsy forceps is inserted and a fragment of this tumor is removed in the same manner as is done in the surface tumors (Figure 1B). Biopsying above the cul-de-sac floor or within the stomach must be done with care lest the peritoneal cavity be entered (Figure 1C). The fiberoptic gastroscope and the colonoscope are excellent instruments but because of the expense involved are usually reserved for problem cases. Very small cancers not visible on X-ray diagnoses however may be found by the expert use of those instruments. Cystoscopic biopsies, though small, are usually adequate for diagnosis.

Papaniclau smears are made by scraping a usually normal-appearing cervix with a tongue blade and smearing the material obtained between two microscopic slides. If the smear is equivocal, forceps biopsy of cervical mucosa at quadrant points may be necessary as well as a scalpel biopsy of the cervical canal.

The recently popular suction-type biopsy of the uterine cavity frequently gives inadequate information. A conventional gently done curettage is much to be preferred.

When biopsying tumors of the vocal cords, one naturally needs some basal anesthetic agent. Three grains of Nembutal by mouth at bedtime is given to the average-sized patient and repeated approximately 2 hr before the procedure. Morphine 1/4 grain, and Scopolamine 1/150 grain are given by hypodermic injection, 1/2 hr prior to the procedure. Timing is important and the surgeon must be available. The mucous membranes of the lips, oral cavity, pharynx, hypopharynx, and larynx are sprayed using an atomizer with 5 to 10% cocaine, and the patient is not disturbed for about 5 min. He is then laid in the supine position with his head projecting beyond the upper end of the table and manipulated by an assistant. All removable dental work should be taken from the mouth. The object is to bring the mouth and the larynx into a straight line (Figure 1D). In patients with short, thick muscular necks and large incisor teeth, this occasionally becomes a problem. Fixed dental bridge work is at risk and the patient should be prewarned. In tumors still further down, such as in the trachea or bronchi, a longer instrument (bronchoscope) lighted at the tip is naturally used, with the patient premedicated in approximately the same manner using an appropriately long biopsy forceps. A good suction tube longer than the instrument must be used to clear out mucoid secretions or clots, and a specimen is obtained. The same may be done in the esophagus (Figure 1E). The aspirate and/or subsequent washings obtained for cell study from bronchi should be placed in appropriately labeled bottles as to the site of origin. The newer fiberoptic instruments, if available, eliminate many of these problems and have the advantage of allowing one to enter much smaller bronchi than the heavier rigid scopes will permit. General anesthesia is advisable here, however, since the procedure is usually of longer duration. The washings and collection of cells for examination should not be overlooked.

Subsurface tumors may be approached with an aspirating needle, having a short sharp bevel usually of about 15 to 18 gauge size (Figure 2A). A small weal is made in the skin with 2% novocaine. A small stab wound is made in the skin overlying the tumor with a number 11 blade so as to exclude keratinized epidermal cells (especially important in neck nodes) which may also contain significant keratin from carcinomas of the mouth to confuse the pathologist. An ideal application of aspiration biopsy is in suspect cervical lymph nodes (Figure 2B), the majority of which are related to tumors