Eighth Edition

CAMPBELL'S OPERATIVE ORTHOPAEDICS

Edited by

A.H. CRENSHAW, M.D.

VOLUME FIVE

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Edited by

A.H. CRENSHAW, M.D.

Editorial assistance by

KAY DAUGHERTY

Art coordination by

CHARLES CURRO

with over 7900 illustrations

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CAMPBELL'S OPERATIVE ORTHOPAEDICS

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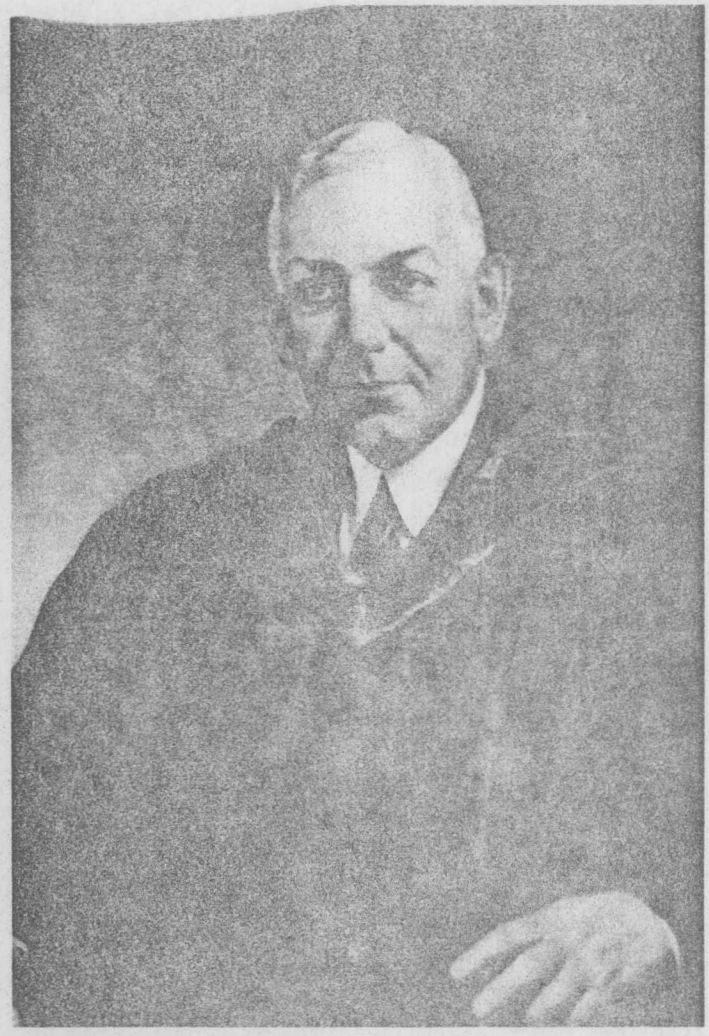


WILLIS C. CAMPBELL, M.D.

1880-1941

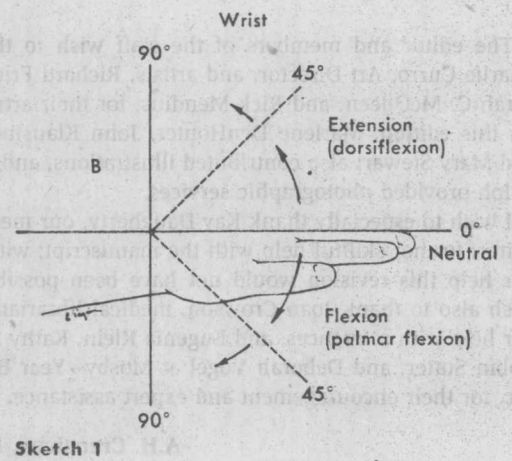
Preface to Eighth Edition

Many new methods and techniques in orthopaedic surgery have been developed or refined during the last 5 to 6 years; those of importance to practicing orthopaedic surgeons are included in this eighth edition.

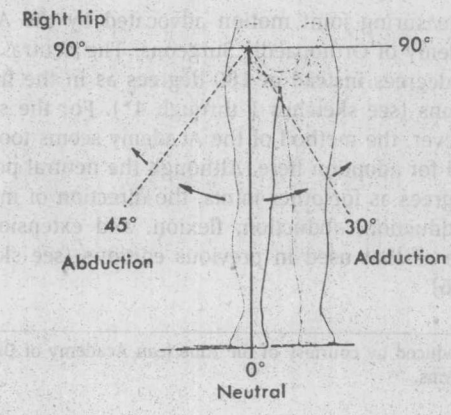
All chapters have been revised and brought up-to-date. All are written by members of the staff of the Campbell Clinic. Several authors, some new to this edition, have had much experience in a busy, Level 1 trauma center, and this experience is reflected in the discussions on fresh fractures, delayed unions, nonunions, microsurgery, and other subjects.

The format of this edition is essentially the same as for the last edition. The discussions on the foot have been expanded into 11 chapters and on the hand into 18. A total of 86 chapters have been grouped into 18 parts for better presentation. Over 2300 illustrations are new or totally redrawn.

We have continued to use almost entirely the method



Sketch 1



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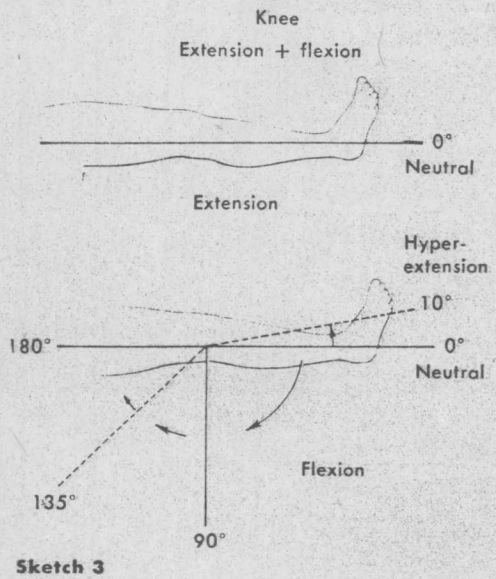

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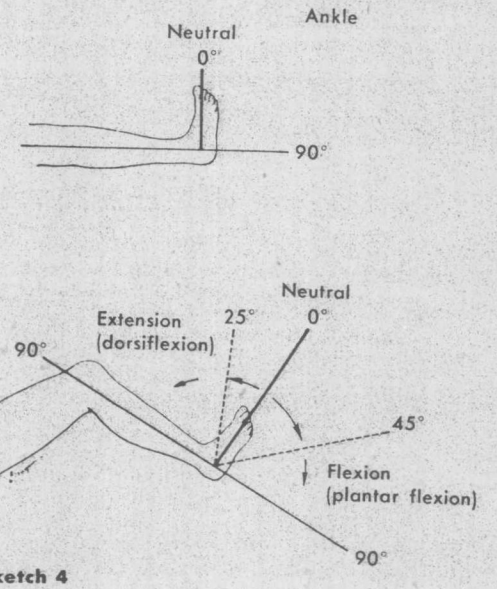

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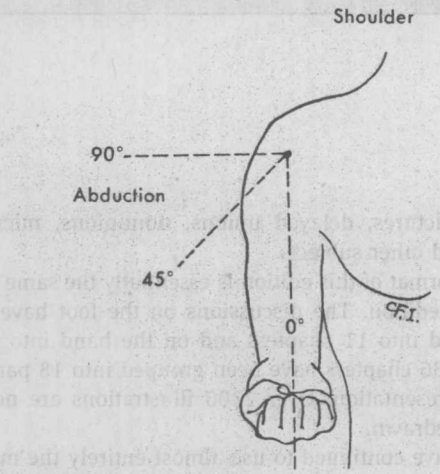
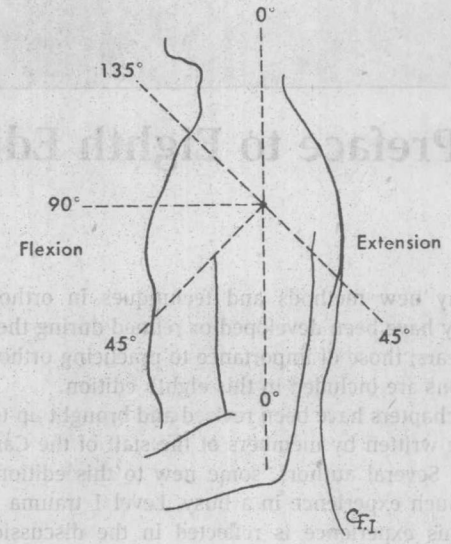


Sketch 5



Sketch 6

of measuring joint motion advocated by the American Academy of Orthopaedic Surgeons. The neutral position is 0 degrees instead of 180 degrees as in the first three editions (see sketches 1 through 4*). For the shoulder, however, the method of the Academy seems too complicated for adoption here. Although the neutral position is 0 degrees as for other joints, the direction of movement in adduction, abduction, flexion, and extension is the same as that used in previous editions (see sketches 5 and 6).

Reproduced by courtesy of the American Academy of Orthopaedic Surgeons.

The editor and members of the staff wish to thank Charlie Curro, Art Director, and artists, Richard Fritzler, Sarah C. McQueen, and Rick Mendius, for their artwork for this edition. Marlene DenHouter, John Klausmeyer, and Mary Stewart also contributed illustrations, and Dan Ralph provided photographic services.

I wish to especially thank Kay Daugherty, our medical editor, for her skillful help with the manuscript; without her help this revision would not have been possible. I wish also to thank Joan Crowson, medical librarian, for her help with references, and Eugenia Klein, Kathy Falk, Robin Sutter, and Deborah Vogel at Mosby–Year Book, Inc. for their encouragement and expert assistance.

A.H. Crenshaw, M.D.

Preface to First Edition

The title of this book, *Operative Orthopedics*, is not intended to convey the impression that the chief or most important method of treatment of orthopaedic affections is open surgery. Although many orthopaedic affections are best treated by operative measures alone, the majority are successfully treated by more conservative means. Further, such measures are often essential adjuncts either before or after operation.

This volume has been written to meet the current need for a comprehensive work on operative orthopedics, not only for the specialist, but also for many industrial and general surgeons who are doing excellent work in some branches of orthopedic surgery, and are making valuable contributions to this field.

The evolution of orthopedic surgery has been exceedingly slow as compared to that of surgery in general. Not until aseptic technic had been materially refined was surgery of the bones and joints feasible. The statement is often made that the World War afforded the experience which made possible the rapid development or orthopedic surgery during the past two decades. The surgery of the war, however, was chiefly the surgery of sepsis; there was little of the refined asepsis which is required in reconstruction surgery. Undoubtedly, the demonstration during the war of the necessity and importance of this field led many able men to specialize in orthopedics, and to them considerable credit is due for its subsequent progess.

No classification of orthopedic affections is entirely satisfactory; consequently, any arrangement of operative procedures is subject to similar criticism. With the exception of the chapters on Arthroplasty and Arthrodesis, operations described in this text are grouped together according to their applicability to a given affection. This involves less repetition as to generalities of etiology, pathology, and treatment than would be necessary in a classification according to anatomic location. Operative procedures appropriate to two or more affections are described in the discussion of the one wherein they are most commonly employed.

To overcome the too widespread conception of orthopedic surgery as a purely mechanical equation, an effort is made in the first chapter of this book to correlate the mechanical, surgical, and physiologic principles of orthopedic practice, and throughout the book to emphasize the practical application of these physiologic principles. A special chapter has been written on surgical technic, for the purpose of stressing certain details in preparation and aftertreatment which vary to some extent from those described in works on general surgery. A thorough knowledge of these phases of treatment is a requisite to success. To avoid constant repetition, chapters have been included on apparatus and on surgical approaches; repeated reference is made to these chapters. The aftertreatment is given in detail for practically all operative technics. This is a most essential, yet too often neglected, factor in the success of any surgical treatment.

In giving the position or range of motion of a joint, only one system has been followed: with the exception of the ankle and wrist, the joint is in neutral position when parallel with the long axis of the body in the anteroposterior and lateral planes. As the joint proceeds from the neutral position in any direction, the number of degrees in which such movement is recorded decreases progressively from 180 to 170, 160, and so on, to the anatomic limit of motion in that particular direction. To illustrate, complete extension of the knee is 180 degrees; when the joint is flexed 30 degrees, the position is recorded as the angle formed between the component parts of the joint, i.e., the leg and thigh, or 150 degrees. Flexion to a right angle is 90 degrees, and full flexion 30 degrees. In the wrist, the joint is at 180 degrees, or in the neutral position, when midway between supination and pronation, and flexion and extension. In the ankle joint, motion is recorded as follows: the extreme of dorsiflexion, 75 degrees; right angle, 90 degrees; and the extreme of plantar flexion, 140 degrees.

In some instances, the exact end results have been given, to the best of our knowledge. So many factors are involved in any one condition, that a survey of end results can be of only questionable value unless the minute details of each case are considered. Following arthroplasty of the knee, for example, one must consider the etiology, pathology, position of the ankylosed joint, the structure of the bones comprising the joint, the distribution of the ankylosis, and the age of the patient, in estimating the end result in each case. Further, a true survey should include the results of *all* patients treated over a period of *many* years, and should be made by the surgeon himself, rather than by a group of assistants, or by correspondence.

In our private clinic and the hospitals with which we are associated, a sufficient amount of material on every phase of orthopedic surgery has been accumulated dur-

ing the past twenty years or more to justify an evaluation of the various procedures. From this personal experience, we also feel that definite conclusions may be drawn in regard to the indications, contraindications, complications, and other considerations entering into orthopedic treatment. In all surgical cases, mature judgment is required for the selection of the most appropriate procedure. With this in mind, the technics which have proved most efficient in the author's experience have been given preference in the text. In addition, after a comprehensive search of the literature, operative measures have been selected which in the judgment of the author are most practicable.

Although no attempt has been made to produce an atlas of orthopedic surgery, an effort has been made to describe those procedures which conform to mechanical and physiologic principles and will meet all individual requirements. In any work of this nature, there are sins of omission; also, many surgeons in the same field may arrive independently at the same conclusions and devise identical procedures. We have endeavored, however, to give credit where credit was due. If there are errors, correction will gladly be made. In some of the chapters we have drawn heavily from authoritative articles on special subjects; the author gratefully acknowledges his indebtedness for this material. He also wishes to thank those authors who have so graciously granted permission for the reproduction of original drawings.

In conclusion, I cannot too deeply express my sincere appreciation and gratitude to my associate, Dr. Hugh Smith, who has untiringly and most efficiently devoted practically all of his time during the past two years to collaboration with me in the compilation and preparation of material, which alone has made this work possible. I also desire to express appreciation to Dr. J.S. Speed for his collaboration on the sections on Spastic Cerebral Paralysis and Peripheral Nerve Injuries to Dr. Harold Boyd for anatomic dissections verifying all surgical approaches described, and for his assistance in preparing the chapter on this subject; to Dr. Don Slocum for his aid in the preparation of the chapter on Physiology and Pathology; to Mrs. Allene Jefferson for her efficient editorial services, and to Mr. Ivan Summers and Mr. Charles Ingram for their excellent illustrations.

Willis C. Campbell
1939

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Color Plates

PART XVII

THE HAND

CHAPTER 61

Basic Surgical Technique and Aftercare

PHILLIP E. WRIGHT II*

PREOPERATIVE PLANNING

Before arranging for any operation it is important for the patient and the surgeon to have realistic expectations about its outcome. The patient should understand the options; the alternatives to surgery; the expected outcome with and without surgical treatment; the potential risks, hazards, and benefits of the surgery; the nature of the incisions; the potential need for incisions to be made on other parts of the body for the harvesting of grafts; and the possible use of internal fixation, drains, and other types of implants such as those used in silicone arthroplasty. The nature of immobilization after surgery, including the use of splints and casts, also should be understood by the patient, and he should understand that recovery and rehabilitation might be prolonged, especially after major reconstructive procedures on the hand.

As part of the preoperative preparation the patient is instructed to keep his hands clean for several days before surgery and to avoid skin injury to minimize the potential for infection. If he develops cuts or skin infections, the operation should be delayed. Although the skin of the hand and upper extremity will be thoroughly prepared in the operating room, the limb should be scrubbed with an antiseptic soap (iodophors and chlorhexidine derivatives are effective). If the fingernails are long or dirty, they should be cleaned and trimmed to remove potential sources of bacterial contamination.

ARRANGEMENT AND ROUTINE IN OPERATING ROOM

Because surgical results depend considerably on the skill, judgment, and precise work of the surgeon, it is important to keep intraoperative distractions to a minimum. Disorganization, fatigue, and uncertainty decrease efficiency of the operating team. It is important for the surgeon to establish a standard routine that is followed regularly (Fig. 61-1). Each assistant can then depend on this routine. The activities of the assistants in following this routine should not be disrupted by the surgeon with irregular, unexpected, or inconsistent demands. A standard routine makes it possible for assistants to know what is expected of them at each step in the operation and allows them to perform without hesitation, delay, or wasted motion.

The operating room should always be quiet and pleasant. When a local anesthetic is being used and the patient is awake, loud or inappropriate noises or bursts of conversation may alarm the patient and should be avoided.

The stool on which the surgeon sits should be firm and comfortable and absolutely stable. It should allow the surgeon to sit with the knees almost level with the hips, the feet resting flat on the floor without strain. The working surface of the operating hand table should be at elbow height to provide a comfortable support for the forearms. If the light is directed from above the surgeon's left shoulder (for a right-handed surgeon), it will shine directly on the operative field and shadows are avoided.

Seated opposite the surgeon, the assistant should view the operative field from 8 to 10 cm higher than the surgeon to allow him to see clearly without bending forward and obstructing the surgeon's view. Although mechanical hand holders are available, none are as good as a motivated and well-trained assistant. It is especially helpful for the assistant to be familiar with each procedure. Usually the primary duty of the assistant is to hold the patient's hand stable, secure, and motionless, retract-

*Revision of chapter by Lee W. Milford, M.D.